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TECHNICAL SUPPORT DOCUMENT FOR

SECTION 194.23: REVIEW OF CHANGES TO THE WIPP

PERFORMANCE ASSESSMENT

PARAMETERS SINCE THE DATABASE MIGRATION

CRA Parameter Review

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Note: This document is part of a series of PA parameter reviews done since the original CCA. This particular review was completed in December 2004 and is reported as part of our CRA decision. Issues noted in this report are finalized in the PABC Parameter Review, Docket A-98-49 Item II-B1-6 and in the EPA PABC Review TSD, Docket A-98-49 Item II-B1-16.

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EXECUTIVE SUMMARY

The ability of the U.S. Department of Energy's (DOE's)Waste Isolation Pilot Plant (WIPP) facility to continue to meet the certification requirements of the U.S. Environmental Protection Agency (the Agency or EPA) is demonstrated in part through the use of a series of performance assessment (PA) computer codes that are documented in the Department's Compliance Recertification Application (CRA). Since the original Compliance Certification Application (CCA), the Department's WIPP science advisor, Sandia National Laboratories (SNL), migrated data used to support performance assessment codes to new database software, added new operating systems, and added new hardware processors. In addition, values of some model parameters were changed since the original CCA PA was performed and supporting documentation for these data were moved from Albuquerque to a new WIPP Records Center in Carlsbad, New Mexico. EPA's initial review and approval of this Technical Baseline Migration (TBM) was conducted and documented in April, 2003 (EPA, 2003,EPA Docket II-B3-51). This CRA Technical Support Document (TSD) describes the Agency's review of parameter traceability, adequacy of parameter documentation, and changes to the performance assessment parameters used including the parameter database (PAPDB) to support the CRA since the TBM. Results of this review document the Agency's evaluation of DOE's compliance with the requirements of 40 CFR 194.23(c)(4) for the recertification.

There were 128 new parameters and 203 changes to parameter values in the PAPDB since the Technical Baseline Migration was conducted in 2002 and 2003 that support DOE's Compliance Recertification Application. Accuracy of the data entry process was checked and found to be satisfactory. There were no transcription errors between the parameter entry forms and the entry of data into the computer database. Our review of the parameter entry forms found them to be adequate although the practice of permitting data entry staff to make changes to the data entry forms may result in data entry errors or data values not intended by the data originator. Although current procedures do not explicitly prohibit this practice, procedures should be modified to prohibit this practice. All parameter values in the PAPDB as of July 2004 appear correct and traceable to documentation justifying their values.

Two tests of the database-to-code interface were conducted to evaluate accuracy of performance assessment codes in accessing PAPDB data. All values accessed by the performance assessment codes were correct (i.e., they matched the values in the PAPDB or were within the range of acceptable sampled values) with the exception of one parameter. The one non-matching parameter was due to an override of the PAPDB value by the analyst using the ALGEBRA code. Acceptable documentation justifying this override was provided by SNL. Because this one exception was an intentional override by the analysts and the justification for the override was adequately documented, the PAPDB database to PA code interface was found to be satisfactory.

However, while resolving the issue of parameter overrides for the AP-106 calculations we discovered that additional parameters were changed for the CRA PA analysis. In addition, we discovered during our PAPDB review and database-to-code interface testing that there were parameters used in some analyses (e.g., DRSPALL, MODFLOW) that were not recorded in the PAPDB. Discovery of parameters being used in CRA PA calculations that were not in the

PAPDB resulted in a detailed review of PA computer code input files in the VAX VMS Code Management System (CMS) and Linux Concurrent Versions System (CVS) file management systems. This review identified over 70 parameters that were not in the PAPDB when the CRA PA was performed. We then reviewed code user's manuals, analysis plans, and analysis packages for the CRA PA. We also reviewed various references from these documents and had extensive discussions with SNL analysts responsible for the CRA PA. These reviews and discussions resulted in adequate documentation being identified for these parameters. A list of these parameters and references to supporting documentation is provided in Table 7 of this report. Traceability for these parameters was not always easy, often requiring discussion with analysts to define parameters and find documentation for their values. We recommended that these parameters be added to the PAPDB or a more transparent parameter referencing system be developed to facilitate and enhance review of PA parameters.

This CRA PA parameter review addressed parameter identification, PA code access of database parameters, and documented traceability for parameters used in the WIPP CRA PA. The SNL practice of not including all appropriate parameters used in the CRA PA in the PAPDB makes it difficult to identify all parameters used in the CRA PA and to trace to documentation justifying the values for all the parameters used in the CRA PA. Placing all parameters used in the PA calculations in the PAPDB, or central parameter database, with complete documentation references, would provide a more efficient means of identifying parameters used in particular PA analysis and of tracing changes to those parameters and the supporting documentation for those parameters.

Even though the EPA found the review of parameters used in the CRA PA calculation difficult at times, we believe that we have been able to verify adequate documentation is available for our more thorough technical review. In particular, the Agency's technical review will address the following parameter related technical issues:

- Basis for the inventory updates (traceability/accuracy to source data and future inventory estimates),
- Accuracy of decay calculations,
- Basis for thermodynamic database changes and associated solubility changes,
- Basis for parameter values overrides/code stability issue in BRAGFLO analyses, and
- Basis for non-PAPDB parameter values supporting the changed transmissivity fields (MODFLOW analyses data in Linux-based CVS file system).

1.0 INTRODUCTION

The ability of the U.S. Department of Energy's (DOE's) Waste Isolation Pilot Plant (WIPP) facility to continue to meet the certification requirements of the U.S. Environmental Protection Agency (the Agency or EPA) is demonstrated in part through the use of a series of performance assessment computer codes that are documented in the Department's Compliance Recertification Application (CRA). Since the original Compliance Certification Application (CCA), the Department's WIPP science advisor, Sandia National Laboratories (SNL), migrated data used to support performance assessment codes to new database software, a new operating system, and new hardware processor. In addition, values of some model parameters were changed during the data migration and supporting documentation for these data were moved from Albuquerque to a new WIPP Records Center in Carlsbad, New Mexico. EPA's initial review of this Technical Baseline Migration (TBM) was conducted and documented in April, 2003 (EPA, 2003, EPA Docket II-B3-51). This Technical Support Document describes the Agency's review of parameter traceability, adequacy of parameter documentation, and changes to the performance assessment parameters used, including the parameter database (PAPDB), to support the CRA since the TBM. Results of this review document the Agency's evaluation of DOE's compliance with requirements of 40 CFR 194.23(c)(4).

2.0 APPROACH

The EPA's review was conducted by Agency and contractor personnel. The scope of this review included:

- Verification and documentation of all changes to the PAPDB since the technical baseline migration (TBM),
- Reviewing procedural documentation supporting database changes,
- Reviewing and evaluating supporting metadata for new and changed parameter values,
- Checking the ability of performance assessment codes to accurately access input parameters from the new database, and
- Review of CRA performance assessment code input files on the CMS/VMS and the Linux-based CVS file systems to identify parameters not in the PAPDB.

The primary objective of the Agency's review was to assess documentation and traceability of changes to the parameter values and metadata that have occurred since the TBM in the PAPDB. A secondary objective was to determine if all parameters used in the CRA PA calculations were in the PAPDB. Final technical review of the PAPDB data values will be conducted separately as part of the Agency's review and evaluation of the CRA.

Review of the PAPDB changes was initiated in November 2003 with preparatory activities and an initial on-site review of the PAPDB. The parameter database is maintained in Carlsbad by the

Department's WIPP science advisor, Sandia National Laboratories (SNL). The Agency's review was implemented in several steps, recognizing that changes in approach might be needed as the review progressed. Preparatory activities were conducted prior to the onsite reviews as follows:

- Obtained a list of all parameters changed or added to the database since the CCA
- Sorted the list into two parts: parameters changed or added after the TBM and parameters changed or added since the CCA, during the TBM. The focus of the on-site review was on parameters changed or added after the TBM activities, and
- Prepared a checklist for reviewing the adequacy of parameter traceability documentation for the changed and new parameters in the PAPDB.

The first subset of the PAPDB consisted of 128 new parameters and 203 changes in parameters since the TBM activities. The second subset of the PAPDB consisted of 95 parameter value changes made since the CCA, during the TBM activities. It does not include parameters whose units, references, etc. were changed since the CCA.

Activities were conducted during the team's first visit to Carlsbad as follows:

- Confirmed the completeness of the changed and new parameter list by visually inspecting the on-line PAPDB and comparing all parameters in the PAPDB with the database reviewed during the TBM review during 2002 and 2003.
- Reviewed accuracy of parameter data entry by comparing the on-line PAPDB values with the values on the Parameter Data Entry Forms (PDEs). Parameter units, distribution type, statistics, names, and references also were reviewed.
- Checked PDEs for completeness, signatures and references to supporting justification documentation.
- Compiled a list of supporting documentation to be reviewed to confirm accuracy of the parameter values on the PDEs and to evaluate the traceability of the parameter changes, and
- Reviewed the ability of the current performance assessment codes to accurately access input parameters from the database.

Other activities were conducted by email and telephone. SNL provided copies of documentation for parameters changed since the TBM. These documents were reviewed to assess the appropriateness of the parameter changes by the Agency review team. SNL also provided additional supporting documentation as requested to address issues that developed as the review of the database changes continued.

In July 2004 we made a second visit to Carlsbad to review changes to the PAPDB resulting from the team's initial assessment of the database. We conducted a more comprehensive test of the ability of the CRA PA codes to accurately retrieve parameters from the PAPDB and to talk with program analysts. We also obtained data files and documents necessary to determine if all parameters used in the CRA PA were present in the PAPDB. The results of the PAPDB parameter review and database access assessment are documented in Sections 3.0 and 4.0 of this report.

Remote access to the CMS/VMS file system was established after the July 2004 visit to Carlsbad to facilitate the parameter review of PA code input/output files residing on the CMS file system in Carlsbad. Remote access was not feasible for the Linux-based CVS file system. A visit to the SNL facilities in Albuquerque was made in October 2004 to review the CVS system input and output files associated with the transmissivity field derivation and groundwater flow analyses supporting the CRA. We also talked with the responsible analysts. The results of the CMS and VMS and CVS file system parameter review are documented in Section 5.8 of this report.

3.0 REVIEW OF CHANGED PARAMETER VALUES AND NEW PARAMETERS IN THE PAPDB

There are 128 new parameters and 203 changes to existing parameters out of the approximately 1700 parameters currently in the PAPDB. These parameters are identified in Table 1. Because of the large amount of information for each parameter, Table 1 is separated into three sections. Table 1 presents current values for each changed parameter (Table 1, Section 1) and the previous value for comparison purposes (Table 1, Section 2). When more than one current value is presented for a parameter, the one associated with the most recent date is the current value listed in the CRA. Each change from the TBM database for a parameter is listed separately in the database and in Table 1.

Also listed in Table 1, Section 3 are references to supporting documentation for changed/new parameters, and a column documenting Parameter Data Entry form check (PDE Check, Section 3). A “1” in this column indicates that the parameter values on the PDE form agreed with those in the PAPDB and that the form was completely and correctly filled out. A “2” in the PDE Check column indicates the presence of handwritten changes on the form that have not been corrected by a Problem Parameter Report or other documentation. A “3” in the PDE Check column indicates minor handwritten corrections on the PDE that are not associated with parameter values (e.g., corrections to references). Minor comments with respect to the PDEs are provided in the comment column. Descriptions of the parameter names/properties listed in Table 1 are provided in Appendix A.

Table 2 provides an assessment of the adequacy of supporting documentation for parameter changes and has a column labeled, “Doc. OK?,” indicating whether parameter values in the PAPDB match values present in the supporting documentation and whether the values are supported by the referenced documentation. “1” in this column indicates the values matched and were traceable to values present in referenced supporting documentation listed in the PAPDB. “2” in this column indicates that values were traceable through the referenced documentation listed in the PAPDB; that is, documents referenced in the listed documentation in the PAPDB provided the necessary traceability. Table 2 lists only the median value for each parameter. See Table 1 for complete parameter values.

3.1 Parameter Value Review

3.1.1 Inventory Changes

One reason for the large number of changes to the PAPDB is that the radionuclide inventories used in PA computer codes PANEL and NUTS were updated in August 2003 after their initial update for the CRA in May 2003. Examination of documentation listed in the PDEs (Leigh, 2003c; Leigh, 2003e; Leigh, 2003h; Leigh, 2003i) did not explain why the values were revised after the initial update. However, additional review of documents referenced in the supporting documents justifies updating the initial inventory and subsequent revisions. The initial inventory change (May 2003) was the result of a request by SNL (dated April 2002) to Los Alamos National Laboratory (LANL) to update the generator site Transuranic Waste Inventory Report (per Downs and Guerin, 2003) to address revisions in inventory estimates that were made since the CCA, to account for currently emplaced waste and waste to be emplaced, and that addresses heterogeneous waste emplacement. It also addresses corrections to ^{238}U and ^{151}Sm concentrations for tank waste stream RP-W03. SNL also requested inventory information for additional radionuclides (~14) to support performance assessment (PA) of direct brine release and subsurface transport for the CRA calculations. This inventory update is based on the Transuranic Waste Baseline Inventory Database (TWBID) Rev. 2.1, Version 3.11.

In August 2003 a second inventory revision occurred to address continued updates to the waste inventory database by LANL. This database update occurred after Idaho National Environmental and Engineering Laboratory (INEEL) reported waste volumes they had originally reported were not the actual shipped volumes that would be received at WIPP (Leigh, 2003f). Additional volume associated with packing 55-gallon drums into ten drum overpacks was not included. This change impacted waste material densities, container material densities, and the radionuclide concentrations reported. The resulting revision to the PAPDB was based on TWBID Rev. 2.1, Version 3.12, Data Version D.4.08 and was documented in SNL (2003l). SNL also requested that scaled volume and activities data for selected radionuclides be separated into tables for CH and RH waste streams for this updated inventory.

In September 2003 a third revision to the radionuclide inventories in the PAPDB was made (SNL, 2003o). This revision was required because radionuclide data for eight waste streams from LANL were incorrectly set to zero, affecting 60 radionuclides. There was a significant inventory change only for the ^{244}Cm inventory. Computer code PANEL had not yet been run, and ^{244}Cm was not used in the NUTS calculations. Therefore, there was no significant impact on performance assessment calculations for the CRA as a result of these changes.

Comparison of the inventory values in the PAPDB with the values in the supporting documentation indicate that all values in the database were correctly entered (see Table 2). Supporting parameter documentation indicated that adequate documentation exists (either in the primary reference present in the PAPDB or in additional referenced documentation) to establish how the data was derived, and that quality procedures were followed. Our review did not attempt to verify the actual inventory data or to review the decay calculations used to decay inventory data to 2033 because the inventory data collection and calculation methods had not changed from the CCA and were conducted under a quality control program. Final technical review of the inventory data will be performed as part of the Agency's technical review of the CRA.

3.1.2 New Parameters

New parameters can be classified into five groups.

Group 1 consists of parameters that were included as data statements in the Fortran source code in BRAGFLO Version 4.10.01, but were removed in BRAGFLO Version 5.00 and placed into the PAPDB. These parameters are now gotten by BRAGFLO from the PAPDB. There are two types of parameters: molecular weights of compounds and chemical parameters required by the Redlich-Kwong-Soave equation of state. These parameters are designated by a “B” after the analysis name in the “Analysis column” (first column) in Tables 1 and 2. Review of data statements in the source code for BRAGFLO Version 5.00 shows original data commented out. Comparison of the source code with the PAPDB data entries (SNL, 2003d) indicates that all values entered in the PAPDB are entered correctly. Three values present in BRAGFLO Version 4.10.01 were not entered into the PAPDB, because they were already in the PAPDB (Parameter ID # 2858, 2864, 2865; SNL, 2004n). These were molecular weight values for H_2, H_2O and Fe. Parameter values in the PAPDB were the same as those used in the CCA. Documentation of these new parameters is sufficient.

Group 2 consists of parameters added to the PAPDB to support the new spallings model (DRSPALL). These parameters are identified in Tables 1 and 2 by Material ID: SPALLMOD. Detailed discussion of these parameters, including justification and derivation is documented in “Parameter Justification Report for DRSPALL,” (Hansen, et al., 2003). All SPALLMOD parameter values listed in Appendix A of this TSD match values in the PAPDB with the following exceptions: DDZPERM, DRILRATE, DRZPERM, MUDPRATE, MUDSOLVE, POISRAT, and SHAPEFAC (see Table 2). In the original report these parameters were not constants but sampled values. DRSPALL sensitivity analyses, documented in Lord and Rudeen (2003), “Sensitivity Analysis Report - Part II DRSPALL Version 1.00,” provided support for converting these parameters to constant values. These sensitivity analysis studies indicated that variations in their values did not significantly influence results.

In addition, the value for the SPALLMOD:REFPRS parameter did not match the Parameter Justification Report Appendix A table, but it did match the value derived in the text of the document. Thus, there appeared to be a typographical error in the Appendix A table. The value in the PAPDB was correct. SNL corrected the error in the Appendix A table (documented in SNL, 2004d). There were also two values used in DRSPALL not supported by documentation, the mean values for SPALLMOD:REPIPERM and SPALLMOD:TENSLSTR. The values in the PAPDB were correct based on formulas for computing them from the max-min values and distribution types provided, but the Appendix A table did not list the mean values. However, for consistency and completeness, supporting documentation should provide all values included in the PAPDB for each parameter along with the calculations and formulas used to generate those values. SNL provided documentation (SNL, 2003v and SNL, 2003w) that showed how the values were calculated and added a reference in the PAPDB to ensure adequate traceability of values in the PAPDB for these two parameters.

Group 3 consisted of parameters added to the PAPDB to support the Modified Shaft Analysis. These parameters were designated by their analysis name: AP106. New parameters were required because the simplified shaft model reduced 11 separate material types present in the conceptual models of shaft seal components to two equivalent layers and reduced the six time intervals to two time intervals (James and Stein, 2003; Scott and Stein, 2002). The result was a set of parameters for three materials: SHFTU, SHFTL_T1, and SHFTL_T2. Values used are weighted averages of parameter values assigned to the original 11 layers or they had constant or sampled values identical to CCA material SALT_T1. Comparison of PAPDB values in the EXCEL spreadsheet from the Appendix to "Analysis Report for: Development of a Simplified Shaft Seal Model for the WIPP PA, Rev. 1." (James and Stein, 2003) indicated that all values in the PAPDB were entered correctly (see Table 2). Documentation identified in the PAPDB is complete and sufficient.

Group 4 consists of eight parameters, three associated with the Advanced Mixed Waste Impact Assessment calculations and designated by their analysis name: AMW, three GLOBAL parameters: ONEPLG, TWOPLG and THREEPLG, and two reference (REFCON) values. The GLOBAL parameters represent probabilities of having plug patterns 1, 2 or 3, respectively for borehole plugs modeled in the CRA analyses. The REFCON parameters were REFCON:FVRW and REFCON:LHSBLANK. REFCON:FVRW represent the fraction of solid material removed as cuttings and cavings by drilling intrusion into the RH waste regions of the WIPP. The LHSBLANK was a placeholder parameter used to facilitate a more descriptive output of the LHS code. PAPDB values for the GLOBAL parameters and the REFCON values were entered correctly and the documentation is complete (see Table 2).

Two parameters, WAS_AMW:CLOSMOD1 and WAS_AMW:CLOSMOD2, are discrete random variables used to select a porosity surface for the representative waste panel in BRAGFLO. Initially documentation for these parameters provided probabilities but no further information to support the distribution, maximum, minimum, mean, and median values recorded in the PAPDB. There was information to support development of these values, but no calculations or data tables were documented. This issue was subsequently addressed through the development and issuance of a "Memo to Records", (SNL, 2004a), dated 22 March 2004. This memo provided a detailed explanation of the derivation and justification of the two WAS_AMW:CLOSMOD parameters in the PAPDB. A reference to this memo was added to the PAPDB. Documentation is now complete and sufficient for these parameters.

WAS_AMW:FRACAMW was an uncertain sampled parameter representing the fraction of representative panel's volume filled with waste from the AMWTF. There was no information in referenced documents supporting values in the PAPDB at the time of out initial review. This issue was subsequently addressed through development and issuance of a "Memo to Records", (SNL, 2004b), dated 22 March 2004. This memo provided a detailed explanation of the derivation and justification for values in the PAPDB for this parameter. A reference to this memo was added to the PAPDB. Comparison of data in the new supporting documentation with the PAPDB values indicates that all values were entered correctly. The current supporting documentation for the parameters used in the AMWTF analyses is accurate and sufficient. (See Table 2).

Group 5 consists of 16 parameters associated with revised solubilities for actinides (SOLMOD3, SOLMOD 4, SOLMOD 5, and SOLMOD6) and two parameters for solubility multipliers

(SOLTH4 and SOLU4) used in the CRA PA. They incorporated effects of organic ligands and microbes on actinide solubilities and reflect new calculations using the same methodologies used in the CCA, but used revised brine compositions, four organic ligands, and the brucite-hydromagnesite carbonation reaction buffer specified by the Agency for the PAVT. Calculation of these solubilities was documented in "*Calculation of Actinide Solubilities for the WIPP CRA*", (Brush and Xiong, 2003). Solubility parameters calculated in the CCA reflected inorganic ligand influences and did not include the impact of organic ligands. Solubility multiplier parameters were values developed for the CCA but never entered into the parameter database. All data entries are correct for these parameters and the supporting documentation is complete and sufficient (see Table 2). PA calculations appear sensitive to radionuclide solubilities, therefore the derivation of these new solubilities will be reviewed in detailed technical review during the Agency's review of the CRA.

3.1.3 Other Changed Parameters

There were a number of other parameters in the PAPDB that were changed since the TBM. These parameter changes were associated with value revisions due to new information or value corrections. Nineteen parameters associated with the property COMP_RCK (rock bulk compressibility) were found to be incorrect; values in the old database were pore compressibility rather than bulk compressibility. Correct values were used in the certification PAVT, AP-106, and subsequent PA analyses by using ALGEBRA to multiply the pore compressibility by porosity. These values were changed in the PAPDB to reflect the correct values for bulk compressibility. Comparison of the data in the supporting documentation with the PAPDB values indicate that all values were entered correctly. The supporting documentation is accurate and sufficient (See Table 2).

Four parameters for the material, CULEBRA, and one for MAGENTA were also updated to reflect new information on water levels and transmissivity fields for the WIPP. In addition, parameter REFCON:VREPOS was changed to address an incorrect repository volume calculation. Comparison of PAPDB values with values in the supporting documentation show that the values have been entered correctly. Supporting documentation is sufficient and complete for these parameters (see Table 2).

Three parameters were changed as a result of requests from the Agency. These were AM+3:MKD_AM, PU+3:MKD_PU, and SOLMOD3:SOLCIM. Two revisions were made to each of these parameters with the second revision correcting ranges and values incorrectly entered the first time. Rationale and calculations supporting the first revision are fully documented in SNL (1996c), "Revised Ranges and Probability Distribution of Kds for Dissolved Pu, Am, U, Th, and Np in the Culebra for the PA Calculations to Support the WIPP CCA", Hansen and Leigh (2002), and Hansen (2002), "A Reconciliation of the CCA and PAVT Parameter Baselines, Rev. 1/Rev 2." There were changes in the distribution type at the Agency's request for the certification PAVT and changes in the parameter value range due to errors in the procedure used to calculate the Kds. The original change to SOLMOD3:SOLCIM was made at the request of the Agency to correct errors in the database used to calculate the value (Hansen and Leigh, 2002; Hansen, 2002). An SNL Memo to Records (SNL, 2002i) states that the value in Hansen and Leigh (2002) for this parameter was incorrectly entered and provides a corrected value. Current values for these parameters in the PAPDB are correctly entered, and documentation for the SOLMOD3 parameter is complete and sufficient. However, original documentation referenced in the PDE forms and record in the PAPDB for the KD parameters was incomplete. Calculations of mean, median and standard deviation values were recently added to the documentation (SNL, 2004h and SNL, 2004g) at the Agency Review Team's request to provide sufficient justifiction for the values in the PAPDB. The AM+3 and PU+3 MKD parameters are now considered correctly entered and the supporting documentation sufficient.

Table 3 list parameters whose values have changed since the CCA and reviewed by the Agency's Review Team as part of the TBM activities in 2002. Because of the large amount of data for each parameter the table is divided into two sections. These parameters are not reviewed further in this report.

3.2 Parameter Data Entry Process Review

Parameter data entry process and control were evaluated by reviewing the Parameter Data Entry (PDEs) forms used as the basis for data entry into the PAPDB in accordance with SNL Procedure NP 9-2, Parameters, Rev. 0. Each form for the 331 new or changed parameters was inspected for completeness (i.e., all appropriate blanks filled in and necessary signatures). Accuracy of the data entry process was checked by visually comparing the information on the form with the information shown in the on-line PAPDB. In no cases were errors found in the entered parameter values when compared to the forms.

We noted several PDE forms were changed by the data entry person or the QA Manager. These changes were documented by line-throughs and then initialed. We also reviewed appropriateness of those changes and the process by which they were made. Four parameters had some type of change present on the PDE form (i.e., a handwritten change to the typed form), shown in BOLD letters below. We could not confirm that the data value originator approved these manual changes. Subsequent review of the supporting documentation for these parameters indicated that the changed values were correct and matched the values in the PAPDB. Other parameters listed below are either minor typographical corrections or have a Parameter Problem Report to document the change.

BLOWOUT THCK_CAS (Param ID 3473) Parameter type changed, change is correct
CM244 INVCHD (Param ID 112) Parameter correction documented by Parameter Problem Report (SNL, 2003x).
SHFTL_T1 RELP MOD (Param ID 3570) Value changed by data entry person; value is correct per James and Stein (2003).
SPALLMOD TENSLSTR (Param ID 3676) Numerous changes in parameter values by data entry person; max and min values agree with reference Hansen et al., (2003), but no mean or median values given in reference for comparison; distribution in reference is log-uniform, not uniform as present in PDE and PAPDB. A memo to the Record Center, dated 2 Feb 04, corrects the text of Hansen et al., (2003) to agree with the Appendix A Table. The correct distribution is uniform. Median value give in Table A of Hansen et al. (2003).
SPALLMOD REPIPERM (Param ID 3666) Mean and Std. Dev. Values provided by data

entry staff (handwritten), not data requestor. Values are correct per Hansen, et al., (2003).
SPALLMOD PARTDIAM (Param ID 3667) Mean and Std. Dev. Values provided by data entry staff (handwritten), not data requestor. Values are correct per Hansen et al., (2003).
WAS_AREA DCELLCHW (Param ID 2041) Corrections to references by QA Manager, corrections OK.
WAS_AREA DCELLRHW (Param ID 2274) Data version and references corrected by QA Manager, corrections OK.

Review of Data Entry Procedure, NP 9-2, indicated that there was no explicit procedure for making corrections to a Data Entry Form by staff members prior to entry of data into the PAPDB. Section 2.3 of NP 9-2 suggest that a new Data Entry Form be generated. Parameter Problem Reporting (Section 2.4 of Procedure NP 9-2) only addresses making corrections in parameter values after data was entered into the PAPDB. Discussions with data entry staff indicated that it was acceptable for them to make changes because the form was reviewed and approved after each change was made (with everyone's knowledge) by the QA Manager, per Procedure NP 9-2. Everyone with signature authority is permitted to make changes to the form prior to actual data entry into the PAPDB. We believe this practice may result in errors in the database and problems with parameter value justification and traceability. Any changes or additions to parameter values on the PDE form after submission for data entry should require the signature acknowledgment of the original data requestor or the PA Manager.

4.0 REVIEW OF PAPDB DATABASE-TO-CODE INTERFACE

Performance assessment computer codes that execute on the VAX computer platform transfer access the parameter database directly, therefore accurate access by the WIPP PA codes of PAPDB parameter values was evaluated by comparing code input files with PAPDB database values and are discussed in this section. Four checks were conducted of the PAPDB interface with WIPP PA codes: BRAGFLO, PANEL, DRSPALL and CUTTINGS. These checks were conducted by Bart Buell at the SNL WIPP Carlsbad Facility and observed by the Agency Review Team. The results are shown in Table 4. A computer code named GROPECDB was used to interrogate PA CAMDAT (CDB) binary format files so that parameter values used in calculations can be examined. For example, the command GROPECDB LHS3_DRS_CRA1_A1_R001.CDB, interrogates the LHS3 output file of the DRSPALL code for the CRA1 analysis, for replicate A1[1] and vector R001[1]. Generally, the results are queried from the ALGEBRA, LHS or CCGF code files.

As can be seen in Table 4, all values returned exactly matched non-sampled values (constant values) or fell within the range of sampled values except for one. ALGEBRA returned a value of 0.0 for the SHFTL_T1:PCT_A parameter when the value in the PAPDB is 0.56. In this case, the analyst had instructed the ALGEBRA code to alter the PAPDB value. Review of the "Analysis Report for the Development of a Simplified Shaft Seal Model for the WIPP Performance Assessment,"(James and Stein, 2003) did not provide any justification of this change. Discussions with SNL staff resulted in the issuance of a memo addressing this concern: "Parameter Values Used for the Simplified Shaft Model in the CRA1 and AMWTP BRAGFLO Analyses," (SNL, 2003u).

Override of the SHFTL_T1:PCT_A parameter was caused by numerical instabilities in the PA code BRAGFLO when certain shaft seal parameters were assigned the values in the PAPDB. The instabilities arose when the initial brine saturations within the shaft were near residual brine saturation. This then resulted in high capillary pressures and nonequilibrium in the gas phase at the start of the simulation step. To avoid this problem, zero capillary pressure was assigned for all materials and the initial brine saturation was set very high. Thus the value for SHFTL_T1:PCT_A was reset to 0.0 for the analyses. A similar situation during the CCA was resolved in the same manner. Technical basis for this parameter change will be evaluated further by the Agency during its technical review of the CRA.

Because of issues discussed below concerning changing of PAPDB parameter values during analysis and the existence of parameters used in the CRA PA that were not in the PAPDB, a more complete evaluation of the accuracy of the CRA PA code retrieval of parameter values from the PAPDB was conducted during the team's second visit to Carlsbad. Results of that evaluation are documented in Table 5. All retrieved parameter values matched those values in the PAPDB. In conclusion, the code to database interface testing results were satisfactory.

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1 Both A# and R# are used to designate replicate # in the CRA PA codes, with R# being more common. Both R*xxx* and V*xxx* are used to designate vectors in the CRA PA codes, with V*xxx* being more common (Long, 2004).

SNL also provided a list of 20 parameters used in the AP-106 analyses that were changed using ALGEBRA, listed in Table 6. The changes in parameters for the shaft materials (SHFTL_T1, SHFTL_T2 and SHFTU) are explained in a Memo to Record (SNL, 2003u). Parameter DRZ_PCS:RELP_MOD was reassigned in the ALGEBRA code to the values for DRZ_1:RELP_MOD for all properties except permeability before BRAGFLO was run. A problem was identified with the mean and median values and a Parameter Problem Report was issued by SNL to correct the values (SNL, 2004f). The PAPDB was modified to correct DRZ_1:RELP_MOD values currently used by BRAGFLO and are listed in the table below, therefore it is no longer necessary to modify the values for this parameter in the ALGEBRA code. The REPOSIT parameters were set equal in ALGEBRA to the WAS_AREA values for each property because BRAGFLO requires two waste materials in the grid. The technical basis for these parameter changes will be evaluated during the Agency's review of the CRA.

SNL also provided a list of 10 additional parameters used in DRSPALL that were not in the PAPDB. These values were not in the PAPDB because they were considered by SNL to be primarily code control parameters, not material properties. The use and description of each of these parameters, taken from an undated SNL memo from D. Lord to Record, "Description of DRSPALL Parameters Called Out in CRA Table PAR-2," (SNL, 2004c), is provided below.

SPALLMOD:CHARLEN (characteristic length for tensile failure) – This parameter is implemented in DRSPALL to mitigate zone-size dependence in tensile failure. The characteristic length is defined as the distance from the cavity wall into the solid over which the mean effective stress is evaluated. This distance must capture at least 5 computational zones. It was determined using zone size convergence studies and set at 2 cm for the CRA. As this parameter serves more as a numerical control parameter rather than a property, it was not considered appropriate for the PAPDB by SNL. However, it also could be considered a property suitable for inclusion in the PAPDB with reference to documentation justifying the selection of the values by SNL.

SPALLMOD:DRZTCK (DRZ thickness) – The disturbed rock zone thickness in the spallings model is a constant designating the distance above the repository at which gas flow between the repository and the well bore is precluded due to effectively zero permeability. The value was set at 0.85m and the initial bit height above the repository (INITBAR-see next entry) was set at 0.15m. SNL did not include this "material property" because operationally it has no impact on DRSPALL results when INITBAR = 0.15 as set for the CRA. However, this does not appear to be a run control parameter. It can be considered a property and should be part of the PAPDB with reference to documentation justifying the selection of the values by SNL.

SPALLMOD:INITBAR (initial height above the repository) – This parameter sets the initial height of the drill bit above the top of the waste room at the start of the DRSPALL simulation. Since the rotational drilling rate is constant, this parameter sets the time from drilling start to repository penetration. It must allow enough time for startup transients in fluid pressure and velocity to settle down before the bit penetrates the repository. Its value was established through observations of numerous test runs during code development. SNL considers this parameter to be a run control parameter, although it could also be considered a property suitable for inclusion in the PAPDB.

SPALLMOD:EXITPLEN (exit pipe length) and EXITPDIA (exit pipe diameter) – These parameters describe the length and diameter of the pipe that connects the well head at the top of the borehole annulus to the mud pit. The value for EXITPLEN is conservatively set to 0.00 for CRA calculations because any non-zero pipe length used would provide some resistance to mud flow and raise well bottom pressure slightly which in turn would reduce spallings. By setting EXITPLEN to 0.00, the exit pipe functionality is not used in CRA calculations. SNL considers these parameters to be run control parameters, although they also could be considered properties suitable for inclusion in the PAPDB.

SPALLMOD:FRCHBETA (Frochheimer Beta) – This parameter is a constant in an empirical formula for gas flow not specific to the WIPP waste form and therefore SNL does not consider it suitable for inclusion in the PAPDB. However, it is a constant and could easily be included in the PAPDB along with the other constants in the database.

SPALLMOD:MAXPPRES (maximum allowed mud pump pressure) – This parameter sets the maximum allowed pressure for the mud pump. A value of 27.5 Mpa was selected from literature from oilfield mud pump manufacturers. However, this parameter was not used in the CRA by the DRSPALL code because the drill pipe portion of the domain was shut off, and a constant mud flow rate condition was imposed at the bit nozzles. Thus, SNL did not include it in the PAPDB. However, it also can be considered a property suitable for inclusion in the PAPDB.

SPALLMOD:REPOSTCK (repository thickness) – This parameter permits the user to override the calculated repository height with an arbitrary value. It was set to 0.00 for all CRA runs, and DRSPALL calculates the height resulting from the sampled porosity (SPALLMOD:REPIPOR). Thus, SNL did not include it in the PAPDB, and considers it a run control parameter, although it also could be considered a property and included in the PAPDB.

SPALLMOD:REPOTRAD (repository domain outer radius) – This parameter defines the distance from the origin to the outer boundary of the repository domain. The default value is 19.2 m which is conservatively large for the spallings analyses. SNL considers this a run control parameter, although it is a physical property and could be included in the PAPDB.

SPALLMOD:STPDTIME (stop drilling time) – This parameter stops the drilling at a specified time. Its default value is 1000 seconds. This value far exceeds the time necessary for the bit to pass through the repository height and thus has no effect on CRA calculations. SNL also considers this a run control parameter, and thus has not included it in the PAPDB. However, it could also be considered a property suitable for inclusion in the PAPDB.

We were concerned that not including the these parameters in the PAPDB means that some parameters may not be adequately documented. These parameters were not discussed in the DRSPALL Parameter Justification Report (Hansen, et al., 2003) and we could not find where they were documented. Our review of these parameters suggests that they may be considered material properties and that they should be recorded in the PAPDB.

As a result, we asked SNL to enter all these parameters into the PAPDB. In DOE's response dated July 22, 2004 (SNL, 2004e) four of the ten parameters were entered into the PAPDB: SPALLMOD: DRZTCK, FRCHBETA, REPOSTCK and REPOTRAD (SNL, 2004i; SNL, 2004j; SNL, 2004k; SNL, 2004l). SNL considers the remaining six parameters to be numerical control parameters not suitable for entry into the PAPDB. They were documented by the modeling results and documentation was found in the "*.DRS files located in CMS library, LIBCRA1_DRS. DOE's response (SNL, 2004e) and the references provides adequate justification for the values selected for all ten parameters. DOE's response document of August 13, 2004 (SNL, 2004m) further identifies which of these references support which parameter, thus addressing parameter justification and documentation. The parameter documentation provided in this DOE response was found to be sufficient. Although the Agency finds that documentation is sufficient for all 10 of these DRSPALL parameters, EPA continues to disagree with DOE's position on the nature of the six parameters not included in the PAPDB. The Agency will complete its technical evaluation of these parameters during its final technical review of the CRA.

5.0 CRA PA CODE INPUT FILE REVIEW

Not all parameters used in the CRA PA calculations were included in the PAPDB. Therefore, a review of parameter data in CRA PA code input files was conducted to determine the nature and type of input data used by each code. EPA reviewed the adequacy of documentation for parameters used that are not presently included in the PAPDB.

Models and codes used in the CRA PA were identified in Analysis Plan-105, *"Analysis Plan for CRA Performance Assessment Calculations"* (SNL, 2003a). PA codes requiring data values directly from the PAPDB (i.e, not derived from other PA codes) are:

- BRAGFLO—two-phase brine and gas flow in and around the repository (Salado brine and gas flow),
- CUTTINGS_S—Cuttings and cavings releases by borehole penetration,
- DRSPALL—Spallings release,

- MODFLOW and PEST—Culebra groundwater flow,
- PANEL—Radionuclide transport to Culebra (Salado transport),
- NUTS—Radionuclide transport to Culebra (Salado transport),
- SECOTP2D—Radionuclide transport in the Culebra,
- CCDFGF—Total release calculations, and
- FMT—Actinide solubility calculations.

Two other codes were used to support the CRA PA calculations: SANTOS and SUMMARIZE. Discussions with SNL staff indicated that no new SANTOS calculations were conducted for the CRA. Therefore, SANTOS results from the CCA were used in the CRA. Thus it was not considered necessary to review parameter input to SANTOS. Input files for SUMMARIZE consist of output files from other PA codes listed above and therefore do not require original parameters. Thus, it also is not reviewed.

Specific input files related to the above CRA performance codes, except the MODFLOW and PEST codes, were documented in *"Execution of Performance Assessment for the CRA (CRA1)"*

(Long, 2004). Input files for MODFLOW and PEST are documented in *"PA Run Control Summary for Culebra Transmissivity Field Calculations and Mining Scenarios"* (McKenna et al., 2004). Generic input files for each of the codes are identified in each codes user's manuals. Input files for each code were reviewed first to determine if they were "independent" input files, i.e., that they represented initial input of data into the code and were not representing data files derived from previous PA code calculations. Second, to determine if there were any parameters used in the code that were not present in the current PAPDB. The results of these reviews are presented in the following sections.

5.1 BRAGFLO Assessment

The "*Analysis Plans for Calculations of Salado Flow and Transport: CRA"* (Stein, 2003c) and for "*Calculations of Direct Brine Releases: CRA"* (Stein, 2003d) states that BRAGFLO was used to simulate Salado brine and gas flow and direct brine releases from future drilling penetrations into the repository. These documents identify changes in the analyses, such as new or changed parameters since the original certification CCA PA. All BRAGFLO input parameters specifically identified in these documents are in the PAPDB.

BRAGFLO input files reviewed for the Salado flow and transport assessment are:

- GM_BF_CRA1.INP (GENMESH input file)
- MS_BF_CRA1.INP (MATSET input file)
- LHS1_CRA1_A1.INP (LHS input file)
- IC_BF_CRA1.INP (ICSET input file)
- ALG1_BF_CRA1.INP (ALGEBRA input file)
- BF1_CRA1_Sxxx.INP (PREBRAG input file for xxx = 1,2,3,4,5,6 for Scenarios 1, 2, 3, 4, 5, & 6)

These files are reproduced in Appendix B.

GENMESH input file, GM_BF_CRA1.INP, defines the computational grid framework for the BRAGFLO analyses. Its input data are not in the PAPDB, but the grid is defined and documented in the analysis plan (Stein, 2003c; Stein and Zelinski, 2003a), the analysis package (Stein and Zelinski, 2003b), and in Caporuscio et al. (2003). Comparison of the X-Y coordinates in the input file with coordinates in these documents showed no discrepancies. This documentation is sufficient.

MATSET input file, MS_BF_CRA1.INP, contains only one material that was not in the PAPDB, DRF_PCS. The material DRF_PCS represents the empty drift and explosion wall portion of the panel closure. This parameter was considered by SNL to be a "derived material" and was set equal to the WAS_AREA material which is in the PAPDB. This material and its associated properties were defined using the ALGEBRA code and a rationale for the values assigned to it was provided in Caporuscio et al. (2003), Hadgu (2003), Hadgu et al. (2003) and Stein and Zelinski (2003b). The Agency found the documentation for this parameter sufficient for the CRA, but believes it does represent a different material and should be added to the PAPDB.

LHS input file, LHS1_CRA1.A1.INP, contains only parameters present in the PAPDB. ICSET input file, IC_BF_CRA1.INP, sets initial conditions and contains parameter names that are not in the PAPDB. However, these parameters are defined either in this file or in the ALGEBRA file from manipulation of parameters that are in the PAPDB. Therefore, they do not constitute "new" or independent parameters.

ALGEBRA input file, ALG1_BF_CRA1.INP, also contains several parameter names that were not in the PAPDB, but these parameters were also defined from manipulation of parameters that were in the PAPDB with the exception of the following:

- DIP1 (=1.0) and DIP2 (=0.0) (the angle of dip in degrees of the Salado Formation),

- SB_MIN (minimum brine saturation), and

- CAP_MOD (capillary pressure model number) for SHFTU, SHFTL_T1 and SHFTL_T2.

Rationale for the DIP parameter and its assigned values was found in Caporuscio et al. (2003). SB_MIN was not used in the CRA1 BRAGFLO calculations because CAP_MOD was set to 1 for all materials. SB_MIN was only used when CAP_MOD was set to 3 (Stein, 2003a; 2003b). CAP_MOD for SHFTU, SHFTL_T1 and SHFTL_T2 was set using ALGEBRA to equal 1.0, the same value as for other materials (CONC_PCS, CONC_MON, etc.) in the file. In addition, PAPDB values for PCT_A and PCT_EXP for DEWYLAKE, CENTARES, CONC_PCS, CONC_MON, SHFTU, SHFTL_T1, and SHFTL_T2 are reset in ALGEBRA to a value of 0.0 to eliminate capillary effects in those materials. Justification for this override was documented in a SNL memo (SNL, 2003u). EPA finds that the documentation for these parameters is sufficient for the CRA, but recommends that they be added to the PAPDB to facilitate review.

PREBRAG input files, BF1_CRA1_Sxxx.INP, where x = Scenarios 1-6 contain only parameters present in the PAPDB. BRAGFLO input files reviewed for the direct brine release (DBR) assessment were:

- GM_DBR_CRA1_DIR_REL.INP (GENMESH input file)
- MS_ DBR_CRA1_DIR_REL.INP (MATSET input file)
- IC_DBR_CRA1_DIR_REL_S1.INP (ICSET input file)
- ALG_ DBR_CRA1_PRE_DIR_REL_Sxxx.INP (ALGEBRA input file)
- REL_DBR_CUSP_CRA1_DIR_REL.INP (RELATE input file)
- DBR_BFL_CRA1_DIR_REL_Sxxx_U.INP (BRAGFLO input file)

where xxx = 1,2,3,4,5 for Scenarios 1-5. These files are reproduced in Appendix B.

GENMESH input file, GM_DBR_CRA1_DIR_REL.INP, defined the computational grid for the BRAGFLO DBR analyses. Its input data were not in the PAPDB, but the grid was defined and documented in the analysis plan (Stein, 2003d) and the analysis package (Stein, 2003e). Comparison of the X-Y coordinates in the input file with coordinates in these documents showed no discrepancies and the documentation is sufficient.

MATSET input file, MS_DBR_CRA1_DIR_REL.INP, includes parameters from the PAPDB and several parameters and properties that were not in the PAPDB. These parameters and properties are listed below:

WAS_AREA: HEIGHT, PRESPAN1, GPRSPAN1, BSATPAN1, GSATPAN1, PRESPAN2, GPRESPAN2, GSATPAN2, PRESPAN3, GPRSPAN3, BSATPAN3 and GSATPAN3

These are heights, brine and gas pressures and saturations for panels 1-3; although they are not defined in the PREBRAG and BRAGFLO users manuals (Stein, 2003a; Stein, 2003b) or in the analysis plan (Stein, 2003d). Initial values for these parameters were set in the MATSET file. The HEIGHT is set to 1.5, and the remaining parameters were set to zero. Discussions with the analyst (J. Stein, SNL) and review of the analysis package for DBR CRA calculations (Stein, 2003e-Section 4.2-4.3) resulted in a determination that these values were derived values. The analysis package states: "ALGEBRACDB reads a CAMDAT output file produced by CUTTINGS_S and outputs a CAMDAT file with information about pressure, saturation, porosity and crushed panel height, which is used as initial conditions for the DBR calculations. This was how BRAGFLO results were transferred to DBR." CUTTINGS_S provided the following intruded waste disposal area information at the time of intrusion: compacted height for the area, permeability of the area, brine saturation and pressure averaged over the volume of the intruded waste area, and the skin factor used in the calculation of the well productivity index (PI) (Hadgu, et al., 2003). Thus, the values for these parameters were provided by the 10,000 year BRAGFLO calculations [S1] via the CUTTINGS_S and BRAGFLO codes for repository panels as well as for the other materials in the analysis, and for designated intrusion times and locations (Hadgu, et al., 2003). DBR material heights are also adjusted to conserve total brine volume or brine saturation between the grid used for BRAGFLO calculations and the grid used for the DBR calculations. Other parameters also were adjusted to account for the differences in the grids used for the BRAGFLO and CUTTINGS_S calculations and the DBR calculations (Stein, 2003d). Calculations were documented in the the MATSET file and the ALGEBRA file: ALG_DBR_CRA1_PRE_DIR_REL_Sxxx.INP. Traceability to output parameters was verified by using the GROPE utility code to inspect parameters in the output files from the BRAGFLO and CUTTINGS_S codes for intrusion times specified in the DBR analysis plan (Stein, 2003d). PRESPAN was brine pressure, GPRSPAN was gas pressure, BSATPAN was the brine saturation, GSATPAN was the gas saturation and HEIGHT was material height, converted from BRAGFLO grid to DBR grid. Although the documentation for these parameters was found to be sufficient for the CRA, parameter definition and traceability to documentation was difficult without access to the analyst. We recommend that explanatory notes be added to the MATSET input file clarifying the source and definitions for these parameters.

DRZ_CONC: PERM_X, PERM_Y, PERM_Z, POROSITY, PORE_DIS, SAT_RGAS, SAT_RBRN, COMP_RCK, CAP_MOD, RELP_MOD, PC_MAX, PO_MIN, PCT_A, PCT_EXP, KPT, HEIGHT, PERMBRX, and POR_INTR.

This material, DRZ_CONC, represents the DRZ next to the panel closure, and was treated as an equivalent DRZ with the majority of its properties set equal to the values for the DRZ_1 properties [this is not explicitly stated in Hadgu (2002), but was noted in the MATSET input file]. The values for PERM_X, PERM_Y, PERM_Z and POROSITY were set as a combination of the property values derived for materials DRZ_1 and CONC_PCS in the ALGEBRA file: ALG_DBR_CRA1_PRECUSP_ DIR_REL.INP. Values for initial HEIGHT and POR_INTR were set to 9.06 and 0, respectively, in the MATSET file. The HEIGHT and POR_INTR parameters were derived from the CUTTINGS_S output file (see discussion for WAS_AREA above). POR_INTR was the porosity at the defined intrusion time in the 10,000 year BRAGFLO (S1) calculations. The values for the remaining properties for this material were set in the ALGEBRA file as equal to the property values established for material DRZ_1 which was in the PAPDB. The documentation for these parameters were found to be sufficient; however because this appears to represents a new material, it should be explicitly defined in the analysis plan for the DBR calculations. Future DBR analysis plans for calculations using this material should provide a definition of these parameters or they should be added to the PAPDB.

PAN_SL2: PRMX_LOG, PRMY_LOG, PRMZ_LOG, POROSITY, PORE_DIS, SAT_RGAS, SAT_RBRN, COMP_RCK, CAP_MOD, RELP_MOD, PC_MAX, PO_MIN, PCT_A, PCT_EXP, KPT, SAT_IBRN, PERMBRX, POR_INTR and HEIGHT
These are properties for a new material, PAN_SL2, which define a middle panel closure that was setup to permit different equivalent permeabilities to be assigned because this panel closure has a different orientation from the other panel closures (incorporation of Option D panel closure concept, Stein 2003d). Its permeability range was the reverse of the permeabilities for the other panel closures. (Hadgu, et al., 2003; Hadgu, 2002). SNL also considered this material to be a "derived material" (Hadgu, 2002) because its properties were defined in terms of other materials already present in the PAPDB. Values for HEIGHT and POR_INTR are set to 7.96 and 0, respectively, in the MATSET input file. The HEIGHT and POR_INTR parameters are derived from the CUTTINGS_S output file (see previous discussion for WAS_AREA). POR_INTR was the porosity at the defined intrusion time in the 10,000 year BRAGFLO (S1) calculations. The values for the remaining properties for this material were set in the ALGEBRA file, ALG_DBR_CRA1_PRE_ DIR_REL.INP, equal to the values for CONC_PCS which, in turn, was set equal to WAS_AREA both of which are in the PAPDB. The documentation for these parameters was found to be sufficient. We recommend that this material be added to the PAPDB.

WELLBORE: INTR_TIME, BITSIZE, SKIN, WELLPI, DRAIN_RAD, PRM_OPEN, PRM_SAND, PRM_CREP, PRM_CAST, AREA_TOT, VOLU_TOT, CAST_RE, CAST_WB AND WELL_PAN.
These were wellbore properties for the intrusion boreholes assumed in the DBR analyses and their values were assigned in the MATSET input file. All were set to 0.0 using MATSET except for CAST_RE, CAST_WB, PRM_CAST and WELL_PAN which are given specific initial values. All of these parameters had their values changed in the ALGEBRA input file. The material, WELLBORE, was not explicitly defined in the analysis plan (Stein, 2003d) or the analysis package (Stein, 2003e) for BRAGFLO Direct Brine Releases, although some of the associated properties were defined in these documents. We determined during our interview with J.Stein that DRAIN_RAD was

the external drainage radius and was calculated in ALGEBRA based on the grid cell dimensions of the lower well cell (10.2m) (Stein, 2003e). The same value was used for all boreholes in the DBR analyses. Therefore, it was a derived value based on the grid established in the GENMESH input file for the CRA PA calculations. The AREA_TOT was fixed at a constant value defined by a maximum spall volume of 4.0 m^3 (which was the VOLU_TOT parameter) divided by the initial height (3.96m) and was equal to 1.01. SKIN was the skin factor and WELLPI was the well productivity index, both of which were defined in the analysis package (Stein, 2003e). The skin factor was calculated in the ALGEBRA files. BITSIZE, CAST_WB, CAST_RE and WELL_PAN were assigned values in the ALGEBRA file, ALG_DBR_CRA1_PRE_DIR_REL.INP, from the CUTTINGS_S output files and were considered calculated values.

PRM_CAST was set equal to CASTILER:PERM_X. PRM_OPEN, PRM_SAND, and PRM_CREP were set equal to PERM_Y values for this material in the REL_DBR_CUSP_CRA1_DIR_REL.INP RELATE input file. Discussions with J. Stein showed that INTR_TIME was the intrusion time which was defined in the analysis plan and analysis package (Stein, 2003d; 2003e).

The documentation for these parameters was found to be sufficient for the CRA. They should be explicitly defined DBR analysis to facilitate review.

DRZ_1: PERMBRX, POR_INTR and HEIGHT

HEIGHT is set to 43.6, and PERMBRX and POR_INTR was set to zero using the ALGEBRA input file. The HEIGHT and POR_INTR parameters were derived from the CUTTINGS_S output file (see discussion for WAS_AREA previously). POR_INTR was the porosity at the defined intrusion time 10,000 year BRAGFLO calculations. PERMBRX was defined in the ALGEBRA input file in term of parameters in the PAPDB. The documentation for these parameters was found to be sufficient for the CRA. They should be defined in DBR analysis to facilitate review.

S_HALITE: HEIGHT

The HEIGHT was set to 8.98, the same value used in the certification CCA PA (Stein,2003e). The documentation was found to be sufficient for the CRA.

REFCON:DIP_DEG (accounts for dip in Salado)

The value was set to 1.0 in the ALGEBRA input file an was discussed in the analysis plan and package (Stein 2003d; 2003e). This was the same value used in the certification CCA PA (Stein, 2003e). Documentation was found to be sufficient for the CRA. We recommended that this parameter be added to the PAPDB.

ICSET input file, IC_DBR_CRA1_DIR_REL_S1.INP, contains parameters that were not in the PAPDB. However, these parameters were derive from values in the MATSET and ALGEBRA input files.

ALGEBRA input file, ALG_ DBR_CRA1_PRE_DIR_REL_S1.INP, was used to manipulate parameters in MATSET to setup new parameters and also contained new parameters that were not in the PAPDB. The new parameters were: D1, D2, DE, FBHP. The first three were not documented in the input files, the analysis plan, or the analysis package, but their descripion was obtained from discussions with the analyst (J. Stein). They were parameters used to calculate effective permeability of the various components of the panel closure and FBHP was the flowing bottom hole pressure. Documented in Hadgu et al., (2003), D1 was the thickness of the DRZ (represented by DRF_PCS was used in the TBM DBR calculations for the Option D Panel Closure concept in Hadgu, et al, 2003) and was set to 32.1m. D2 was the thickness of the CONC_PCS and was set to 7.9 m. DE was the total thickness (40m). The FBHP was calculated using the ALGEBRA code, and supporting documentation for the equations used for the calculations were in SNL (1999) and in Hadgu et al (2003). SNL (1999) provided the coefficients used in calculating the FBHP based on curve fits for various types of brine/gas flow. Waste panel pressures required for the analysis were provided from the 10,000 year BRAGFLO calculations. Thus, the FBHP was a derived parameter. Documentation for these parameters was found to be sufficient for the CRA. We recommend that D1, D2 and DE be included in the PAPDB.

RELATE input file, REL_DBR_CUSP_CRA1_DIR_REL.INP, contained no new parameters. The parameters in this file were also used in the MATSET input file.

BRAGFLO input file, DBR_BF1_CRA1_DIR_REL_S1_U.INP, contained numerical and run control data which were described in the users manual for PREBRAG. It also contained parameters identified in the MATSET file and new parameters not in the PAPDB. The new parameters were: H2_MOLE, CO2_MOLE, CH4_MOLE, N2_MOLE, H2S_MOLE and O2_MOLE. These parameters were defined in the PREBRAG User's Manual (Stein, 2003b) and the documentation was considered sufficient for the CRA. However, they should be included in the PAPDB.

The parameters, materials and properties identified above were used in BRAGFLO for the CRA PA and not included in the PAPDB were found to be sufficiently documented for the CRA. However these parameters should be added to the PAPDB or an alternative method for more transparent parameter review should be developed.

5.2 DRSPALL Assessment

DRSPALL calculated the volume of WIPP solid waste subjected to material failure and transported to the surface as a result of inadvertent drilling intrusion. Input parameters for DRSPALL were defined in the *"DRSPALL User's Manual"* (Lord, 2003a). The DRSPALL input files reviewed were:

- GM_DRS_CRA1_R1.INP (GENMESH input file)
- MS_DRS_CRA1_R1.INP (MATSET input file)
- LHS1_DRS_CRA1_A1.INP (LHS input file)
- DRS_CRA1_R1_S1.DRS (Scenario 1 DRSPALL input file)

Review of these files indicated that DRSPALL parameters were not in the PAPDB. Parameters not in the PAPDB were identified and discussed are in Section 4.0 of this report. Adequate documentation was provided for all the "new" parameters (Hansen, et al., 2003; Lord, 2002;

Lord et al. 2003; Rudeen et al., 2003; SNL, 2003q; SNL, 2004e).

DRSPALL input files are reproduced in Appendix C.

5.3 CUTTINGS_S Assessment

CUTTINGS_S code was used to estimate the volume of waste brought to the surface as a result of an inadvertent borehole drilled directly into the WIPP repository penetrating waste containers. The input files reviewed were:

- GM_CUSP_CRA1.INP (GENMESH input file)
- MS_CUSP_CRA1.INP (MATSET input file)
- LHS1_CRA1_A1.INP (LHS input file)
- CUSP_CRA1_S1_U_T100.INP (CUTTINGS_S input file)
- CUSP_CRA1.SDB (CUTTINGS_S input file)

CUTTINGS_S input files are reproduced in Appendix D.

Review of all of the input files indicated that all parameters used by CUTTINGS_S were in the PAPDB or were hard-wired, set in the source code, and have not been modified since the original certification CCA PA.

5.4 PANEL Assessment

According to the Analysis Plan AP-99, "*Analysis Plan for Calculations of Salado Flow and Transport: CRA"* (Stein, 2003c), PANEL was used to calculate radionuclide transport through the Salado for Scenario S6. Input files reviewed were:

GM_PANEL_CRA1.INP	(GENMESH input file)
MS_PANEL_CRA1.INP	(MATSET input file)
LHS1_PANEL_CRA1_A1.INP	(LHS input file)
ALG_PANEL_CRA1.INP	(ALGEBRA input file)

Review of all of these input files and the analysis package for PANEL (Garner, 2003a; Garner, 2003b) indicated that all parameters used by PANEL were in the PAPDB or were derived from modification of parameters in the PAPDB.

PANEL input files are reproduced in Appendix E.

5.5 NUTS Assessment

According to the Analysis Plan AP-99, "*Analysis Plan for Calculations of Salado Flow and Transport: CRA"* (Stein, 2003c), NUTS was used to calculate radionuclide transport through the Salado for CRA scenarios S1-S5. It used the same grid used in the BRAGFLO PA calculations. NUTS also required input files from PANEL (WIPP PA, 1997). Input files reviewed were:

- NUT_CRA1_SCN_R1_S1.INP (NUTS input file)

- ALG_NUT_CR1_SCN_R1_S1.INP (ALGEBRA input file)
- NUT_CRA1_ISO_R1_S1.INP (NUTS input file)

NUTS input files are reproduced in Appendix F.

Review of these input files and the analysis package for the Salado Transport Calculations (Lowry, 2003a) indicated that these files contain parameter names that were not in the PAPDB. However, these files were essentially run control files or parameter manipulation files and the parameter names were adequately defined in the NUTS user manual. In addition, these input files utilize output from other codes (i.e., BRAGFLO and/or PANEL) as described in the NUTS user manual.

5.6 SECOTP2D Assessment

Analysis Plan 100, *"Analysis Plan for Calculations of Culebra Flow and Transport: CRA"*, (Leigh, et al., 2003), stated that SECOTP2D was used to calculate radionuclide transport in the Culebra. This analysis plan also identified the PAPDB input parameters used by the code. Input parameters were documented in the SECOTP2D (Ramsey, 1997b) and PRESECOTP2D (Ramsey, 1997a) user's manuals. Source term information for the radionuclides was gotten from PANEL output files. Input files reviewed were:

- GM_ST2D_CRA1.INP (GENMESH input file)
- MS_ST2D_CRA1.INP (MATSET input file)
- LHS1_ST2D_CRA1_A1.INP (LHS input file)
- ALG_ST2D_CRA1.INP (ALGEBRA input file)
- ST2D1_CRA1.INP (SECOTP2D input file)

These SECOTP2D related input files are reproduced in Appendix G.

GENMESH input file, GM_ST2D_CRA1.INP, defines the computational grid for the SECOTP2D analyses. Its input data was not in the PAPDB, but the grid was defined and documented in the analysis plan (Leigh, et al., 2003) and in Lowry (2003b). Comparison of data in the documents with the input file data resulted in no discrepancies and the documentation was sufficient.

All parameters in the files MS_ST2D_CRA1.INP and LHS_ST2D_CRA1.INP were present in the PAPDB.

ALGEBRA input file, ALG_ST2D_CRA1.INP, contained several parameter names not in the PAPDB, but these parameters are derived from parameters that were in the PAPDB with the exception of ACTCONST. ACTCONST was a constant, not defined in the SECOTP2D user manual and assigned a value of 1.128E+13. It was used to convert input source term mass to curies and vice versa. Documentation for its derivation was in SNL (1992) and was the same value used in the certification CCA PA calculations. There was a data entry form SNL (1996e), dated March 1,1996, stating that it was entered into the CCA database as REFCON:ACTCONST (parameter ID 3113). Old spreadsheets of the CCA database showed this parameter, but it did not show up current PAPDB, indicating that it was not migrated into the new database. Documentation was sufficient for this parameter for the CRA. We believe it should be added to the PAPDB.

SECOTP2D input file, ST2D1_CRA1.INP, contained run control input and input parameters. All input parameters were traceable directly to or through the ALGEBRA file to the PAPDB.

5.7 MODFLOW/PEST Assessment

Analysis Plan AP-105, *"Analysis Plan for CRA Performance Assessment Calculations",* (Leigh, 2003a), stated that the code MODFLOW was used to calculate flow fields in the Culebra Dolomite Member in the Rustler formation. Culebra flow field results were used by SECOTP2D to calculate radionuclide transport in the Culebra. Recalculation of flow fields (T-fields) for the CRA were documented in Analysis Plan AP-088, *"Analysis Plan for Evaluation of the Effects of Head Changes on Calibration of the Culebra Transmissivity Field"* (Beauheim, 2002b).

The following input parameters were identified in this document:

- Transmissivity values at wells
- Well Locations
- Ground Surface Elevation at wells
- Stratigraphic information (Culebra top and bottoms elevations)
- Equilibrated heads at defined times
- Culebra fluid density at wells
- Transient Pressure Data
- Transient Flow-Rate Data
- Boundaries of potential mining areas

These data were not included in the PAPDB. However, there was documentation of the data used in the CRA PA, data manipulations or calculations performed, and references to data sources. Spatial data (stratigraphic data) used to develop input files for the analysis of Culebra T-fields were digitized from geologic maps documented in *"Analysis Report for Task 1 of AP-088, Construction of Geologic Contour Maps*" (Powers, 2002). This report identified the general sources of the geological data (previous WIPP reports, WIPP drill holes, commercial non-proprietary oil and gas geophysical logs, potash drill hole information from the Bureau of Land Management in New Mexico) used to develop the maps. It did not explicitly tie each borehole with a specific report, well log, or other data source. We determined that this was sufficient for the CRA because the data was traceable, with some effort, to original sources using the borehole designation. Surface elevations were obtained from the USGS National Elevation Dataset (NED) (http://edcnts12.cr.usgs.gov/ned/). Mining information (geographic) was obtained from an updated BLM map obtained from the Washington Regulatory Environmental Services and was documented in Lowry (2003b).

Other data used to develop input files was presented in Appendix A, "*Analysis Report for Task 2 of AP-088, Estimating Base Transmissivity Fields"* (Holt and Yarbrough, 2002 and 2003-- file newdat4_7_02m2.prn). This file included identifiers, coordinates, well elevations, elevations to the middle of the Culebra, log transmissivities, the amount of Salado dissolution, and the Culebra depth for each well used in the development of base transmissivity fields. There were data for 46 wells. Sources for the data presented in this file were referenced in the Analysis Report for Task 2 (Holt and Yarbrough, 2002 and 2003). Residual results, between measured and base transmissivities, were located in the file Residuals.dat located in Appendix A of Holt and Yarbrough (2002 and 2003). Resultant base transmissivity fields were located in 10 files: newb01r.zip through newb10r.zip located in Appendix O of Holt and Yarbrough (2002 and 2003). The residuals and base transmissivity files were used as input in the conditioning of the base transmissivity fields.

Head data used in conditioning base transmissivity fields to steady state heads were documented in Beauheim (2002a) as the file, TfieldHeads.xls. This file included well identifiers, center of Culebra elevation, measured water levels, fluid densities, and calculated freshwater head data for up to 47 wells for 1980, 1990, and 2000. Also included were head values used in the certification CCA PA. Supporting documentation for the data in this file were either provided in the document or were adequately referenced. The Culebra thickness was set to 7.75 m and the value for this parameter was recorded in the PAPDB even though the value was not retrieved from the PAPDB for the MODFLOW calculations.

The head and draw-down data used for conditioning to transient heads were documented in Beauheim (2003). 1,332 data points were used in the transient head calibration analysis, and these were selected based on the scientific judgement of the analysts from the data in Beauheim (2003) (McKenna and Hart, 2003a and 2003b). McKenna and Hart (2003b) also document the well name and location, the stress periods, start and stop times, well draw-down, and pump rates for the wells used in the transient modeling as well as model domain, gridding, boundary conditions and pilot point locations. The effects of potash mining on flow and transport in the Culebra were documented in Lowry (2003b) and SNL (2002b). Generation of mining-influenced transmissivity fields and flow budget files by MODFLOW for input to SECOTP2D was described in Lowry (2003b).

Review of the data input files of a representative transmissivity field of the MODFLOW and PEST analyses for the CRA flow fields was conducted at the SNL facilities in Albuquerque in October, 2004. The purpose of this review was to verify data that documented in the reports listed above was properly entered into the parameter input files and that there were no new parameters in the input files (i.e., input parameters not identified in the analysis plans or associated analysis reports). The guide for this review was the "*PA Run Control Summary for the Culebra Transmissivity Field Calibrations and Mining Scenarios,"* (McKenna et al., 2004) which identified the names and locations of all input and output files used by the MODFLOW and PEST codes in the transmissivity field and Culebra flow analyses for the CRA. These files were listed in Table 2 of McKenna et al (2004) and the generic file listing were reproduced in part in Appendix H. The main input files for a representative T-field realization, designated d01r07, were also reproduced in Appendix H along with parameter input data identified in the analysis reports discussed earlier in this section. There were no new parameters identified in this review and the documentation for the parameters used in the MODFLOW and PEST analyses was considered sufficient for the CRA. We recommend that a more transparent database and parameter documentation system be developed to enhance and facilitate review.

5.8 CCDFGF Assessment

According to the "*Analysis Plan for CRA PA Calculations"* (Leigh, 2003a), CCDFGF was used to assemble calculated release data from various PA codes into complementary cumulative distribution functions (CCDF) for comparison with regulatory release limits. The calculations required four separate code runs: EPAUNI, PRECCDFGF, CCDFGF and CCDFSUM. Based on Long (2004) and WIPP PA (2003). Input files for these code runs were:

EPU_CRA1_RH.INP	(EPAUNI input file)
EPU_CRA1_RH_MISC.INP	(EPAUNI input file)
EPU_CRA1_CH.INP	(EPAUNI input file)
EPU_CRA1_CH_MISC.INP	(EPAUNI input file)
CCGF_CRA1_MS.CDB	(MATSET output file, CCDFGF input file)
CCGF_CRA1_CONTROL.INP	(CCDFGF input file)
CCGFSUM_CRA1_R1.INP	(CCDFSUM input file)
CCGFSUM_CRA1_ALL.INP	(CCDFSUM input file)

Review of these input files indicated that the first five input files contain parameters and the last three input files contain run control data. These input files were described in each codes user's manual. The EPU_xxx input files contained parameters related to individual waste stream profiles or inventories expected in the repository. These parameters were not included in the PAPDB. Waste inventory data in these files was documented in SNL (2003l) and SNL (2003o). Comparison of the input files with inventory data in these files indicated that the values were entered correctly and the documentation was sufficient for the CRA. We believe they should be entered into the PAPDB because they appear to be material parameters. Parameters values in the CCDF_CRA1_MS.CBD file were in the PAPDB.

5.9 FMT Assessment

Analysis Plan AP-105, *"Analysis Plan for CRA Performance Assessment Calculations",* (Leigh, 2003a) stated that actinide solubilities for the CRA were recalculated with updated thermodynamic data using the FMT code. Thermodynamic database used in the FMT code were not recorded in the PAPDB. The basis for the update of the certification CCA thermodynamic database and for the recalculation of actinide solubilities for the CRA was found in the following documents:

- SNL (2003b): Release of FMT Database FMT_021120.CHEMDAT
- SNL (2002c): Recommended Parameter Values for Modeling Organic Ligands in WIPP Brine
- SNL (2002g): Recommended □□°/RT Values for Modeling the Solubility of Oxalate Solids in WIPP Brines
- Snider(2003): Verification of the Definition of Generic Weep Brine and the Development of a Recipe for this Brine
- SNL (2002f): Recommended Parameter Values for Modeling An(V) Solubility in WIPP Brines
- SNL (2002e): Recommended Parameter Values for Modeling An(IV) Solubility in WIPP Brines

- SNL (2002d): Recommended Parameter Values for Modeling An(III) Solubility in WIPP Brines
- Brush (2003): Calculation of Actinide Solubilities for the WIPP CRA, Analysis Plan AP-098, Rev. 1. (Section 5.3.3 of this document contains a synopsis of the changes to the FMT Database)

The FMT database used in the CRA was in file: FMT_021120.CHEMDAT. This file is listed in Appendix I of this TSD. The documentation supporting the new database was considered sufficient for the CRA. The review and evaluation of technical adequacy of data in the database and the actinide solubility calculations will be conducted independently during our CRA technical review.

6.0 SUMMARY

We reviewed changes to the U.S. Department of Energy's WIPP facility performance assessment database in preparation for a detailed technical review for the first CRA. There were 128 new parameters and 203 changes to parameter values in the performance assessment database (PAPDB) since the Technical Baseline Migration conducted in 2002 and 2003 that supported the DOE's Compliance Recertification Application. The accuracy of the data entry process was checked and found to be satisfactory. There were no transcription errors between the parameter entry forms and the entry of data into the computer database. Our review of the parameter entry forms found them to be adequate.

However, four PDE forms had parameter values changed by the data entry staff prior to entering the data into the computerized parameter database. Subsequent review of supporting documentation indicated that the values in the PAPDB were correct, although in some cases, the referenced documentation did not provide full information to support all data entries. Generally, median, maximum, minimum, and distribution type were recored, but not mean or standard deviation. There were formulas for generating these values from the data presented in the supporting documents, but there was no evidence of the calculations being performed. Calculations, when required, should be included in the supporting documentation for all values entered in the PAPDB. SNL subsequently provided the missing calculations to verify that all values in the PAPDB matched values in the supporting documentation. Only three (3) parameter values, all associated with the AMWTF analyses initially had insufficient documentation to support the values present in the PAPDB. Upon notification by the Agency, SNL provided additional documentation for these parameters verifying that values on the PDE forms and in the PAPDB were correct. All values reviewed in the PAPDB as of July 2004 appear correct and traceable to documentation justifying their values. The adequacy of the technical bases for the parameter values in the PAPDB will be evaluated during our final technical review of the CRA.

Two tests of the database to code interface were conducted to evaluate the accuracy of the performance assessment codes in accessing data from the PAPDB. All values accessed by the performance assessment codes were correct (i.e., matched the values in the PAPDB or were within the range of acceptable sampled values), except for one parameter. The one exception was an analyst override of a PAPDB value in the ALGEBRA input file. Acceptable documentation justifying this override was provided by SNL. Because this one exception was an intentional override by the analysts and the justification for the override was adequately documented, the PAPDB database to PA code interface was found to be satisfactory.

However, while resolving the issue of the parameter override for the AP-106 analyses we found that additional parameters were changed for this analysis. In addition, SNL indicated that there were parameters used in some analyses (e.g., DRSPALL) that were not in the PAPDB. These parameters were considered by SNL to be run control parameters, not material properties. Therefore, SNL did not consider them to be suitable for inclusion in the PAPDB. We believe that these parameters should be included in the PAPDB or a master database. At this time, DOE has included four of the 10 parameters identified for DRSPALL in the PAPDB. They have provided sufficient documentation justifying the values for all ten parameters for the CRA. We recommend that the remaining six parameters be added to the PAPDB.

Discovery of parameters used in CRA PA calculations that were not in the PAPDB resulted in a more detailed review of PA code input files. This review resulted in the identification of over 70 parameters that were not in the PAPDB used in the CRA PA. This number did not include the data used to setup computational grids, the thermodynamic database used by the FMT code, and the individual waste stream inventories used by the CCDFGF code but were adequately documented elsewhere. The August 13, 2004 response from DOE to the Agency's request that DOE identify all parameters used in the PA stated that the PA code user's manuals and the CRA analysis packages for each code identified all parameters used in the CRA PA (SNL, 2004m).

A review of the user's manuals, CRA analysis plans, and CRA analysis packages for the PA codes indicated that these documents either provide the necessary information or cite references where such information may be found except for the BRAGFLO code (Stein, 2003d; Stein, 2003e). The BRAGFLO user's manual provided generic input files and did not address specific parameter development or values. CRA analysis packages for BRAGFLO did not identify all parameters used in the analyses, discuss parameter value overrides, or contain all the input files used in an analysis or identify the specific library where the PA run files may be located. However, with the assistance of the analysts involved in the BRAGFLO analyses, the sources of all parameters in the BRAGFLO input files not in the PAPDB were identified and traced to adequate documentation.

Table 7 of this technical support document list parameters identified as input parameters for the CRA PA codes that were not in the PAPDB. Adequate documentation was found for all parameters listed in Table 7. The parameters marked in Table 7 for inclusion in the PAPDB should be added to the PAPDB along with references to facilitate review or an alternative method of documenting parameters used in performance assessments should be developed.

This CRA PA parameter review addressed parameter identification, PA code parameter access, and traceability of parameters used in the WIPP CRA PA. The SNL practice of omitting some parameters used in the CRA PA from the PAPDB makes it difficult to identify all parameters used in the CRA PA and to trace the parameter information documentation that justifies the values for all the parameters used in the CRA PA. Placing all parameters used in the PA calculations in the PAPDB or a centralized WIPP database would provide a more efficient means of identifying and reviewing parameters. Alternative systems may be acceptable for some analyses if they can provide an equivalent level of parameter identification and supporting documentation as that present for the existing PAPDB. In addition, the practice of permitting data entry staff to make changes to the data entry forms may result in data entry errors or data values not intended by the data originator also complicated our review. Although current procedures do not explicitly prohibit this practice, the practice should be modified to ensure parameters are adequately documented and controlled.

Evaluation of the technical adequacy of the parameter values used in the CRA PA is beyond the scope of this review. Technical adequacy of changes in parameter values from those used in the CCA for parameters in the PAPDB, of value overrides of PAPDB parameters during the CRA PA and of parameters used in the CRA PA that are not in the PAPDB will be completed as part of the Agency's technical review of the CRA. In particular, the Agency's technical review will address the following parameter related technical issues:

- Basis for the inventory updates (traceability/accuracy back to original waste stream inputs and future inventory estimates),
- Accuracy of decay calculations,
- Basis for thermodynamic database changes and associated solubility changes, and
- Basis for parameter values overrides/code stability issue in BRAGFLO analyses.

Table 1 Section 1

Table 1. Section 1. Parameters That Have Changed Since the Technical Baseline Migration (TBM).

Analysis	Parameter ID No.	Material ID	Property ID	Distribution Type	CURRENT VALUE			
					Mean	Median	Minimum	Maximum
CRA1	4	AM241	INVCHD	Constant	4.7800E+05	4.7800E+05	4.7800E+05	4.7800E+05
CRA1	4	AM241	INVCHD	Constant	4.4200E+05	4.4200E+05	4.4200E+05	4.4200E+05
CRA1	5	AM241	INVRHD	Constant	3.9600E+04	3.9600E+04	3.9600E+04	3.9600E+04
CRA1	5	AM241	INVRHD	Constant	1.5800E+04	1.5800E+04	1.5800E+04	1.5800E+04
CRA1	3504	AM241L	INVCHD	Constant	4.9500E+05	4.9500E+05	4.9500E+05	4.9500E+05
CRA1	3504	AM241L	INVCHD	Constant	4.5900E+05	4.5900E+05	4.5900E+05	4.5900E+05
CRA1	3509	AM241L	INVRHD	Constant	4.4600E+04	4.4600E+04	4.4600E+04	4.4600E+04
CRA1	3509	AM241L	INVRHD	Constant	1.6600E+04	1.6600E+04	1.6600E+04	1.6600E+04
CRA1	3415	AM243	INVCHD	Constant	3.3400E+01	3.3400E+01	3.3400E+01	3.3400E+01
CRA1	3415	AM243	INVCHD	Constant	2.1000E+01	2.1000E+01	2.1000E+01	2.1000E+01
CRA1	3416	AM243	INVRHD	Constant	7.9800E-01	7.9800E-01	7.9800E-01	7.9800E-01
CRA1	3416	AM243	INVRHD	Constant	7.4200E-01	7.4200E-01	7.4200E-01	7.4200E-01
CRA1	2277	ASPHALT	COMP_RCK	Constant	3.0000E-10	3.0000E-10	3.0000E-10	3.0000E-10
CRA1	3473	BLOWOUT	THCK_CAS	Constant	1.2583E+02	1.2583E+02	1.2583E+02	1.2583E+02
CRA1	3414	BOREHOLE	WUF	Constant	2.9600E+00	2.9600E+00	2.9600E+00	2.9600E+00
CRA1	3414	BOREHOLE	WUF	Constant	2.4800E+00	2.4800E+00	2.4800E+00	2.4800E+00
CRA1	108	CF252	INVCHD	Constant	6.4000E-05	6.4000E-05	6.4000E-05	6.4000E-05
CRA1	108	CF252	INVCHD	Constant	4.6400E-05	4.6400E-05	4.6400E-05	4.6400E-05
CRA1	109	CF252	INVRHD	Constant	5.6000E-06	5.6000E-06	5.6000E-06	5.6000E-06
CRA1	109	CF252	INVRHD	Constant	3.9500E-06	3.9500E-06	3.9500E-06	3.9500E-06
CRA1	2328	CL_L_T1	COMP_RCK	Constant	3.8000E-10	3.8000E-10	3.8000E-10	3.8000E-10
CRA1	2345	CL_L_T2	COMP_RCK	Constant	3.8000E-10	3.8000E-10	3.8000E-10	3.8000E-10
CRA1	2362	CL_L_T3	COMP_RCK	Constant	3.8000E-10	3.8000E-10	3.8000E-10	3.8000E-10
CRA1	3071	CL_L_T4	COMP_RCK	Constant	3.8000E-10	3.8000E-10	3.8000E-10	3.8000E-10
CRA1	2379	CL_M_T1	COMP_RCK	Constant	4.3000E-10	4.3000E-10	4.3000E-10	4.3000E-10
CRA1	2396	CL_M_T2	COMP_RCK	Constant	4.3000E-10	4.3000E-10	4.3000E-10	4.3000E-10
CRA1	2413	CL_M_T3	COMP_RCK	Constant	4.3000E-10	4.3000E-10	4.3000E-10	4.3000E-10
CRA1	2430	CL_M_T4	COMP_RCK	Constant	4.3000E-10	4.3000E-10	4.3000E-10	4.3000E-10
CRA1	2447	CL_M_T5	COMP_RCK	Constant	4.3000E-10	4.3000E-10	4.3000E-10	4.3000E-10
CRA1	2311	CLAY_BOT	COMP_RCK	Constant	3.8000E-10	3.8000E-10	3.8000E-10	3.8000E-10
CRA1	3001	CLAY_RUS	COMP_RCK	Constant	4.7000E-10	4.7000E-10	4.7000E-10	4.7000E-10
CRA1	3410	CM243	INVCHD	Constant	1.8200E-01	1.8200E-01	1.8200E-01	1.8200E-01
CRA1	3410	CM243	INVCHD	Constant	1.8200E-01	1.8200E-01	1.8200E-01	1.8200E-01
CRA1	3411	CM243	INVRHD	Constant	2.3100E-01	2.3100E-01	2.3100E-01	2.3100E-01
CRA1	3411	CM243	INVRHD	Constant	2.2500E-01	2.2500E-01	2.2500E-01	2.2500E-01
CRA1	112	CM244	INVCHD	Constant	4.8200E+03	4.8200E+03	4.8200E+03	4.8200E+03
CRA1	112	CM244	INVCHD	Constant	2.4300E+03	2.4300E+03	2.4300E+03	2.4300E+03

Table 1. Section 1. Parameters That Have Changed Since the Technical Baseline Migration (TBM).

CRA1	112	CM244	INVCHD	Constant	3.3900E+03	3.3900E+03	3.3900E+03	3.3900E+03
CRA1	113	CM244	INVRHD	Constant	1.0500E+02	1.0500E+02	1.0500E+02	1.0500E+02
CRA1	113	CM244	INVRHD	Constant	7.9400E+01	7.9400E+01	7.9400E+01	7.9400E+01
CRA1	3412	CM245	INVCHD	Constant	1.3900E-02	1.3900E-02	1.3900E-02	1.3900E-02
CRA1	3412	CM245	INVCHD	Constant	8.5900E-03	8.5900E-03	8.5900E-03	8.5900E-03
CRA1	3413	CM245	INVRHD	Constant	1.0900E-02	1.0900E-02	1.0900E-02	1.0900E-02
CRA1	3413	CM245	INVRHD	Constant	1.0600E-02	1.0600E-02	1.0600E-02	1.0600E-02
CRA1	2265	CM248	INVCHD	Constant	1.4900E-01	1.4900E-01	1.4900E-01	1.4900E-01
CRA1	2265	CM248	INVCHD	Constant	9.1400E-02	9.1400E-02	9.1400E-02	9.1400E-02
CRA1	2266	CM248	INVRHD	Constant	2.5900E-03	2.5900E-03	2.5900E-03	2.5900E-03
CRA1	2266	CM248	INVRHD	Constant	1.8300E-03	1.8300E-03	1.8300E-03	1.8300E-03
CRA1	3052	CONC_MON	COMP_RCK	Constant	6.0000E-11	6.0000E-11	6.0000E-11	6.0000E-11
CRA1	3515	CONC_PCS	COMP_RCK	Constant	6.0000E-11	6.0000E-11	6.0000E-11	6.0000E-11
CRA1	3148	CONC_PLG	COMP_RCK	Constant	3.8000E-10	3.8000E-10	3.8000E-10	3.8000E-10
CRA1	2464	CONC_T1	COMP_RCK	Constant	6.0000E-11	6.0000E-11	6.0000E-11	6.0000E-11
CRA1	2481	CONC_T2	COMP_RCK	Constant	6.0000E-11	6.0000E-11	6.0000E-11	6.0000E-11
CRA1	2037	CS137	INVCHD	Constant	6.9300E+03	6.9300E+03	6.9300E+03	6.9300E+03
CRA1	2037	CS137	INVCHD	Constant	4.6100E+03	4.6100E+03	4.6100E+03	4.6100E+03
CRA1	118	CS137	INVRHD	Constant	1.7700E+05	1.7700E+05	1.7700E+05	1.7700E+05
CRA1	118	CS137	INVRHD	Constant	1.7400E+05	1.7400E+05	1.7400E+05	1.7400E+05
CRA1	142	CULEBRA	PRESSURE	Constant	9.1410E+05	9.1410E+05	9.1410E+05	9.1410E+05
CRA1	143	CULEBRA	PRMX_LOG	Constant	-1.3112E+01	-1.3112E+01	-1.3112E+01	-1.3112E+01
CRA1	144	CULEBRA	PRMY_LOG	Constant	-1.3112E+01	-1.3112E+01	-1.3112E+01	-1.3112E+01
CRA1	145	CULEBRA	PRMZ_LOG	Constant	-1.3112E+01	-1.3112E+01	-1.3112E+01	-1.3112E+01
CRA1	2497	EARTH	COMP_RCK	Constant	9.9000E-09	9.9000E-09	9.9000E-09	9.9000E-09
CRA1	3494	GLOBAL	LAMBDAD	Constant	5.2500E-03	5.2500E-03	5.2500E-03	5.2500E-03
CRA1	3644	GLOBAL	ONEPLG	Constant	1.5000E-02	1.5000E-02	1.5000E-02	1.5000E-02
CRA1	3646	GLOBAL	THREEPLG	Constant	2.8900E-01	2.8900E-01	2.8900E-01	2.8900E-01
CRA1	3645	GLOBAL	TWOPLG	Constant	6.9600E-01	6.9600E-01	6.9600E-01	6.9600E-01
CRA1	2101	MAGENTA	PRESSURE	Constant	9.4650E+05	9.4650E+05	9.4650E+05	9.4650E+05
CRA1	248	NP237	INVCHD	Constant	1.1300E+01	1.1300E+01	1.1300E+01	1.1300E+01
CRA1	248	NP237	INVCHD	Constant	9.2500E+00	9.2500E+00	9.2500E+00	9.2500E+00
CRA1	249	NP237	INVRHD	Constant	1.0100E+00	1.0100E+00	1.0100E+00	1.0100E+00
CRA1	249	NP237	INVRHD	Constant	8.2200E-01	8.2200E-01	8.2200E-01	8.2200E-01
CRA1	2267	PA231	INVCHD	Constant	1.9700E+00	1.9700E+00	1.9700E+00	1.9700E+00
CRA1	2267	PA231	INVCHD	Constant	1.2100E+00	1.2100E+00	1.2100E+00	1.2100E+00
CRA1	2268	PA231	INVRHD	Constant	6.8600E-04	6.8600E-04	6.8600E-04	6.8600E-04
CRA1	2268	PA231	INVRHD	Constant	6.5500E-04	6.5500E-04	6.5500E-04	6.5500E-04
CRA1	253	PAN_SEAL	COMP_RCK	Constant	2.0000E-10	2.0000E-10	2.0000E-10	2.0000E-10

Table 1. Section 1. Parameters That Have Changed Since the Technical Baseline Migration (TBM).

CRA1	285	PB210	INVCHD	Constant	7.9000E+00	7.9000E+00	7.9000E+00	7.9000E+00
CRA1	285	PB210	INVCHD	Constant	4.9400E+00	4.9400E+00	4.9400E+00	4.9400E+00
CRA1	286	PB210	INVRHD	Constant	1.6200E-05	1.6200E-05	1.6200E-05	1.6200E-05
CRA1	286	PB210	INVRHD	Constant	1.4200E-05	1.4200E-05	1.4200E-05	1.4200E-05
CRA1	2038	PM147	INVCHD	Constant	4.1300E-04	4.1300E-04	4.1300E-04	4.1300E-04
CRA1	2038	PM147	INVCHD	Constant	3.8600E-04	3.8600E-04	3.8600E-04	3.8600E-04
CRA1	289	PM147	INVRHD	Constant	8.0500E-02	8.0500E-02	8.0500E-02	8.0500E-02
CRA1	289	PM147	INVRHD	Constant	7.4700E-02	7.4700E-02	7.4700E-02	7.4700E-02
CRA1	293	PU238	INVCHD	Constant	1.5300E+06	1.5300E+06	1.5300E+06	1.5300E+06
CRA1	293	PU238	INVCHD	Constant	1.2500E+06	1.2500E+06	1.2500E+06	1.2500E+06
CRA1	294	PU238	INVRHD	Constant	3.4800E+03	3.4800E+03	3.4800E+03	3.4800E+03
CRA1	294	PU238	INVRHD	Constant	2.8000E+03	2.8000E+03	2.8000E+03	2.8000E+03
CRA1	3506	PU238L	INVCHD	Constant	1.5300E+06	1.5300E+06	1.5300E+06	1.5300E+06
CRA1	3506	PU238L	INVCHD	Constant	1.2500E+06	1.2500E+06	1.2500E+06	1.2500E+06
CRA1	3511	PU238L	INVRHD	Constant	3.4800E+03	3.4800E+03	3.4800E+03	3.4800E+03
CRA1	3511	PU238L	INVRHD	Constant	2.8000E+03	2.8000E+03	2.8000E+03	2.8000E+03
CRA1	297	PU239	INVCHD	Constant	7.7700E+05	7.7700E+05	7.7700E+05	7.7700E+05
CRA1	297	PU239	INVCHD	Constant	6.5900E+05	6.5900E+05	6.5900E+05	6.5900E+05
CRA1	298	PU239	INVRHD	Constant	5.6400E+03	5.6400E+03	5.6400E+03	5.6400E+03
CRA1	298	PU239	INVRHD	Constant	5.3700E+03	5.3700E+03	5.3700E+03	5.3700E+03
CRA1	3505	PU239L	INVCHD	Constant	9.1000E+05	9.1000E+05	9.1000E+05	9.1000E+05
CRA1	3505	PU239L	INVCHD	Constant	7.6600E+05	7.6600E+05	7.6600E+05	7.6600E+05
CRA1	3510	PU239L	INVRHD	Constant	7.4700E+03	7.4700E+03	7.4700E+03	7.4700E+03
CRA1	3510	PU239L	INVRHD	Constant	7.0500E+03	7.0500E+03	7.0500E+03	7.0500E+03
CRA1	301	PU240	INVCHD	Constant	1.3200E+05	1.3200E+05	1.3200E+05	1.3200E+05
CRA1	301	PU240	INVCHD	Constant	1.0700E+05	1.0700E+05	1.0700E+05	1.0700E+05
CRA1	302	PU240	INVRHD	Constant	1.8200E+03	1.8200E+03	1.8200E+03	1.8200E+03
CRA1	302	PU240	INVRHD	Constant	1.6700E+03	1.6700E+03	1.6700E+03	1.6700E+03
CRA1	305	PU241	INVCHD	Constant	5.1700E+05	5.1700E+05	5.1700E+05	5.1700E+05
CRA1	305	PU241	INVCHD	Constant	5.1400E+05	5.1400E+05	5.1400E+05	5.1400E+05
CRA1	306	PU241	INVRHD	Constant	1.4900E+05	1.4900E+05	1.4900E+05	1.4900E+05
CRA1	306	PU241	INVRHD	Constant	2.3900E+04	2.3900E+04	2.3900E+04	2.3900E+04
CRA1	309	PU242	INVCHD	Constant	3.2700E+01	3.2700E+01	3.2700E+01	3.2700E+01
CRA1	309	PU242	INVCHD	Constant	2.6600E+01	2.6600E+01	2.6600E+01	2.6600E+01
CRA1	310	PU242	INVRHD	Constant	5.0200E-01	5.0200E-01	5.0200E-01	5.0200E-01
CRA1	310	PU242	INVRHD	Constant	4.7400E-01	4.7400E-01	4.7400E-01	4.7400E-01
CRA1	2269	PU244	INVCHD	Constant	1.4500E-06	1.4500E-06	1.4500E-06	1.4500E-06
CRA1	2269	PU244	INVCHD	Constant	1.3200E-06	1.3200E-06	1.3200E-06	1.3200E-06
CRA1	2270	PU244	INVRHD	Constant	1.5600E-03	1.5600E-03	1.5600E-03	1.5600E-03

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CRA1	2270	PU244	INVRHD	Constant	1.1000E-03	1.1000E-03	1.1000E-03	1.1000E-03
CRA1	316	RA226	INVCHD	Constant	1.0000E+01	1.0000E+01	1.0000E+01	1.0000E+01
CRA1	316	RA226	INVCHD	Constant	6.2800E+00	6.2800E+00	6.2800E+00	6.2800E+00
CRA1	317	RA226	INVRHD	Constant	5.5500E-05	5.5500E-05	5.5500E-05	5.5500E-05
CRA1	317	RA226	INVRHD	Constant	4.9900E-05	4.9900E-05	4.9900E-05	4.9900E-05
CRA1	2271	RA228	INVCHD	Constant	7.6500E+00	7.6500E+00	7.6500E+00	7.6500E+00
CRA1	2271	RA228	INVCHD	Constant	7.6300E+00	7.6300E+00	7.6300E+00	7.6300E+00
CRA1	2272	RA228	INVRHD	Constant	3.3600E-01	3.3600E-01	3.3600E-01	3.3600E-01
CRA1	2272	RA228	INVRHD	Constant	2.5100E-01	2.5100E-01	2.5100E-01	2.5100E-01
CRA1-B	3590	REFCON	BIP_11	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
CRA1-B	3591	REFCON	BIP_12	Constant	-3.4260E-01	-3.4260E-01	-3.4260E-01	-3.4260E-01
CRA1-B	3592	REFCON	BIP_13	Constant	-2.2200E-02	-2.2200E-02	-2.2200E-02	-2.2200E-02
CRA1-B	3593	REFCON	BIP_14	Constant	9.7800E-02	9.7800E-02	9.7800E-02	9.7800E-02
CRA1-B	3594	REFCON	BIP_15	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
CRA1-B	3595	REFCON	BIP_16	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
CRA1-B	3596	REFCON	BIP_21	Constant	-3.4260E-01	-3.4260E-01	-3.4260E-01	-3.4260E-01
CRA1-B	3597	REFCON	BIP_22	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
CRA1-B	3598	REFCON	BIP_23	Constant	9.3300E-02	9.3300E-02	9.3300E-02	9.3300E-02
CRA1-B	3599	REFCON	BIP_24	Constant	-3.1500E-02	-3.1500E-02	-3.1500E-02	-3.1500E-02
CRA1-B	3600	REFCON	BIP_25	Constant	9.8900E-02	9.8900E-02	9.8900E-02	9.8900E-02
CRA1-B	3601	REFCON	BIP_26	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
CRA1-B	3602	REFCON	BIP_31	Constant	-2.2200E-02	-2.2200E-02	-2.2200E-02	-2.2200E-02
CRA1-B	3603	REFCON	BIP_32	Constant	9.3300E-02	9.3300E-02	9.3300E-02	9.3300E-02
CRA1-B	3604	REFCON	BIP_33	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
CRA1-B	3605	REFCON	BIP_34	Constant	2.7800E-02	2.7800E-02	2.7800E-02	2.7800E-02
CRA1-B	3606	REFCON	BIP_35	Constant	8.5000E-02	8.5000E-02	8.5000E-02	8.5000E-02
CRA1-B	3607	REFCON	BIP_36	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
CRA1-B	3608	REFCON	BIP_41	Constant	9.7800E-02	9.7800E-02	9.7800E-02	9.7800E-02
CRA1-B	3609	REFCON	BIP_42	Constant	-3.1500E-02	-3.1500E-02	-3.1500E-02	-3.1500E-02
CRA1-B	3610	REFCON	BIP_43	Constant	2.7800E-02	2.7800E-02	2.7800E-02	2.7800E-02
CRA1-B	3611	REFCON	BIP_44	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
CRA1-B	3612	REFCON	BIP_45	Constant	1.6960E-01	1.6960E-01	1.6960E-01	1.6960E-01
CRA1-B	3613	REFCON	BIP_46	Constant	-7.8000E-03	-7.8000E-03	-7.8000E-03	-7.8000E-03
CRA1-B	3614	REFCON	BIP_51	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
CRA1-B	3615	REFCON	BIP_52	Constant	9.8900E-02	9.8900E-02	9.8900E-02	9.8900E-02
CRA1-B	3616	REFCON	BIP_53	Constant	8.5000E-02	8.5000E-02	8.5000E-02	8.5000E-02
CRA1-B	3617	REFCON	BIP_54	Constant	1.6960E-01	1.6960E-01	1.6960E-01	1.6960E-01
CRA1-B	3618	REFCON	BIP_55	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
CRA1-B	3619	REFCON	BIP_56	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

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CRA1-B	3620	REFCON	BIP_61	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
CRA1-B	3621	REFCON	BIP_62	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
CRA1-B	3622	REFCON	BIP_63	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
CRA1-B	3623	REFCON	BIP_64	Constant	-7.8000E-03	-7.8000E-03	-7.8000E-03	-7.8000E-03
CRA1-B	3624	REFCON	BIP_65	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
CRA1-B	3625	REFCON	BIP_66	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
CRA1-B	3647	REFCON	FVRW	Constant	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00
CRA1-B	3582	REFCON	LHSBLANK	Uniform	5.0000E-01	5.0000E-01	0.0000E+00	1.0000E+00
CRA1-B	3589	REFCON	MW_CELL	Constant	2.7023E-02	2.7023E-02	2.7023E-02	2.7023E-02
CRA1-B	3585	REFCON	MW_CH4	Constant	1.6043E-02	1.6043E-02	1.6043E-02	1.6043E-02
CRA1-B	3584	REFCON	MW_CO2	Constant	4.4010E-02	4.4010E-02	4.4010E-02	4.4010E-02
CRA1-B	3587	REFCON	MW_H2S	Constant	3.4082E-02	3.4082E-02	3.4082E-02	3.4082E-02
CRA1-B	3586	REFCON	MW_N2	Constant	2.8013E-02	2.8013E-02	2.8013E-02	2.8013E-02
CRA1-B	3583	REFCON	MW_NACL	Constant	5.8442E-02	5.8442E-02	5.8442E-02	5.8442E-02
CRA1-B	3588	REFCON	MW_O2	Constant	3.1999E-02	3.1999E-02	3.1999E-02	3.1999E-02
CRA1	3108	REFCON	VREPOS	Constant	4.3841E+05	4.3841E+05	4.3841E+05	4.3841E+05
CRA1	2514	SALT_T1	COMP_RCK	Constant	8.0000E-11	8.0000E-11	8.0000E-11	8.0000E-11
CRA1	2531	SALT_T2	COMP_RCK	Constant	8.0000E-11	8.0000E-11	8.0000E-11	8.0000E-11
CRA1	2548	SALT_T3	COMP_RCK	Constant	8.0000E-11	8.0000E-11	8.0000E-11	8.0000E-11
CRA1	2565	SALT_T4	COMP_RCK	Constant	8.0000E-11	8.0000E-11	8.0000E-11	8.0000E-11
CRA1	2582	SALT_T5	COMP_RCK	Constant	8.0000E-11	8.0000E-11	8.0000E-11	8.0000E-11
CRA1	2984	SALT_T6	COMP_RCK	Constant	8.0000E-11	8.0000E-11	8.0000E-11	8.0000E-11
AP106	3550	SHFTU	COMP_POR	Constant	2.0500E-08	2.0500E-08	2.0500E-08	2.0500E-08
AP106	3562	SHFTL_T1	COMP_POR	Constant	4.2800E-09	4.2800E-09	4.2800E-09	4.2800E-09
AP106	3563	SHFTL_T1	KPT	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
AP106	3564	SHFTL_T1	PC_MAX	Constant	1.0000E+08	1.0000E+08	1.0000E+08	1.0000E+08
AP106	3565	SHFTL_T1	PCT_A	Constant	5.6000E-01	5.6000E-01	5.6000E-01	5.6000E-01
AP106	3566	SHFTL_T1	PCT_EXP	Constant	-3.4600E-01	-3.4600E-01	-3.4600E-01	-3.4600E-01
AP106	3567	SHFTL_T1	PO_MIN	Constant	1.0100E+05	1.0100E+05	1.0100E+05	1.0100E+05
AP106	3568	SHFTL_T1	POROSITY	Constant	1.1300E-01	1.1300E-01	1.1300E-01	1.1300E-01
AP106	3569	SHFTL_T1	PRMX_LOG	Cumulative	-1.8000E+01	-1.8200E+01	-2.0000E+01	-1.6500E+01
AP106	3570	SHFTL_T1	RELP_MOD	Constant	4.0000E+00	4.0000E+00	4.0000E+00	4.0000E+00
AP106	3571	SHFTL_T1	SAT_IBRN	Constant	5.3400E-01	5.3400E-01	5.3400E-01	5.3400E-01
AP106	3572	SHFTL_T2	COMP_POR	Constant	4.2800E-09	4.2800E-09	4.2800E-09	4.2800E-09
AP106	3573	SHFTL_T2	KPT	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
AP106	3574	SHFTL_T2	PC_MAX	Constant	1.0000E+08	1.0000E+08	1.0000E+08	1.0000E+08
AP106	3575	SHFTL_T2	PCT_A	Constant	5.6000E-01	5.6000E-01	5.6000E-01	5.6000E-01
AP106	3576	SHFTL_T2	PCT_EXP	Constant	-3.4600E-01	-3.4600E-01	-3.4600E-01	-3.4600E-01
AP106	3577	SHFTL_T2	PO_MIN	Constant	1.0100E+05	1.0100E+05	1.0100E+05	1.0100E+05

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AP106	3578	SHFTL_T2	POROSITY	Constant	1.1300E-01	1.1300E-01	1.1300E-01	1.1300E-01
AP106	3579	SHFTL_T2	PRMX_LOG	Cumulative	-1.9800E+01	-2.0100E+01	-2.2500E+01	-1.8000E+01
AP106	3580	SHFTL_T2	RELP_MOD	Constant	4.0000E+00	4.0000E+00	4.0000E+00	4.0000E+00
AP106	3581	SHFTL_T2	SAT_IBRN	Constant	5.3400E-01	5.3400E-01	5.3400E-01	5.3400E-01
AP106	3551	SHFTU	KPT	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
AP106	3552	SHFTU	PC_MAX	Constant	1.0000E+08	1.0000E+08	1.0000E+08	1.0000E+08
AP106	3553	SHFTU	PCT_A	Constant	5.6000E-01	5.6000E-01	5.6000E-01	5.6000E-01
AP106	3554	SHFTU	PCT_EXP	Constant	-3.4600E-01	-3.4600E-01	-3.4600E-01	-3.4600E-01
AP106	3555	SHFTU	PO_MIN	Constant	1.0100E+05	1.0100E+05	1.0100E+05	1.0100E+05
AP106	3556	SHFTU	POROSITY	Constant	2.9100E-01	2.9100E-01	2.9100E-01	2.9100E-01
AP106	3557	SHFTU	PRMX_LOG	Cumulative	-1.8200E+01	-1.8300E+01	-2.0500E+01	-1.6500E+01
AP106	3558	SHFTU	RELP_MOD	Constant	4.0000E+00	4.0000E+00	4.0000E+00	4.0000E+00
AP106	3559	SHFTU	SAT_IBRN	Constant	7.9600E-01	7.9600E-01	7.9600E-01	7.9600E-01
AP106	3560	SHFTU	SAT_RBRN	Cumulative	2.5000E-01	2.0000E-01	0.0000E+00	6.0000E-01
AP106	3561	SHFTU	SAT_RGAS	Uniform	2.0000E-01	2.0000E-01	0.0000E+00	4.0000E-01
CRA1	3628	SOLMOD3	SOLCOC	Constant	1.7700E-07	1.7700E-07	1.7700E-07	1.7700E-07
CRA1	3629	SOLMOD3	SOLCOH	Constant	1.6900E-07	1.6900E-07	1.6900E-07	1.6900E-07
CRA1	3630	SOLMOD3	SOLSOC	Constant	3.0700E-07	3.0700E-07	3.0700E-07	3.0700E-07
CRA1	3631	SOLMOD3	SOLSOH	Constant	3.0700E-07	3.0700E-07	3.0700E-07	3.0700E-07
CRA1	3632	SOLMOD4	SOLCOC	Constant	5.8400E-09	5.8400E-09	5.8400E-09	5.8400E-09
CRA1	3633	SOLMOD4	SOLCOH	Constant	2.4700E-08	2.4700E-08	2.4700E-08	2.4700E-08
CRA1	3634	SOLMOD4	SOLSOC	Constant	1.2400E-08	1.2400E-08	1.2400E-08	1.2400E-08
CRA1	3635	SOLMOD4	SOLSOH	Constant	1.1900E-08	1.1900E-08	1.1900E-08	1.1900E-08
CRA1	3636	SOLMOD5	SOLCOC	Constant	2.1300E-05	2.1300E-05	2.1300E-05	2.1300E-05
CRA1	3637	SOLMOD5	SOLCOH	Constant	5.0800E-06	5.0800E-06	5.0800E-06	5.0800E-06
CRA1	3638	SOLMOD5	SOLSOC	Constant	9.7200E-07	9.7200E-07	9.7200E-07	9.7200E-07
CRA1	3639	SOLMOD5	SOLSOH	Constant	1.0200E-06	1.0200E-06	1.0200E-06	1.0200E-06
CRA1	3640	SOLMOD6	SOLCOC	Constant	8.8000E-06	8.8000E-06	8.8000E-06	8.8000E-06
CRA1	3641	SOLMOD6	SOLCOH	Constant	8.8000E-06	8.8000E-06	8.8000E-06	8.8000E-06
CRA1	3642	SOLMOD6	SOLSOC	Constant	8.7000E-06	8.7000E-06	8.7000E-06	8.7000E-06
CRA1	3643	SOLMOD6	SOLSOH	Constant	8.7000E-06	8.7000E-06	8.7000E-06	8.7000E-06
CRA1	3627	SOLTH4	SOLCIM	Cumulative	1.8000E-01	-9.0000E-02	-2.0000E+00	1.4000E+00
CRA1	3626	SOLU4	SOLCIM	Cumulative	1.8000E-01	-9.0000E-02	-2.0000E+00	1.4000E+00
CRA1	3675	SPALLMOD	ANNUROUG	Constant	5.0000E-05	5.0000E-05	5.0000E-05	5.0000E-05
CRA1	3662	SPALLMOD	BIOTBETA	Constant	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00
CRA1	3665	SPALLMOD	BITNZDIA	Constant	1.1113E-02	1.1113E-02	1.1113E-02	1.1113E-02
CRA1	3653	SPALLMOD	BITNZNO	Constant	3.0000E+00	3.0000E+00	3.0000E+00	3.0000E+00
CRA1	3652	SPALLMOD	COHESION	Constant	1.4000E+05	1.4000E+05	1.4000E+05	1.4000E+05

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CRA1	3677	SPALLMOD	DDZPERM	Constant	1.0000E-14	1.0000E-14	1.0000E-14	1.0000E-14
CRA1	3659	SPALLMOD	DDZTHICK	Constant	1.6000E-01	1.6000E-01	1.6000E-01	1.6000E-01
CRA1	3674	SPALLMOD	DRILRATE	Constant	4.4450E-03	4.4450E-03	4.4450E-03	4.4450E-03
CRA1	3668	SPALLMOD	DRZPERM	Constant	1.0000E-15	1.0000E-15	1.0000E-15	1.0000E-15
CRA1	3654	SPALLMOD	FFSTRESS	Constant	1.4900E+07	1.4900E+07	1.4900E+07	1.4900E+07
CRA1	3657	SPALLMOD	FRICTANG	Constant	4.5800E+01	4.5800E+01	4.5800E+01	4.5800E+01
CRA1	3671	SPALLMOD	MUDPRATE	Constant	2.0181E-02	2.0181E-02	2.0181E-02	2.0181E-02
CRA1	3673	SPALLMOD	MUDSOLMX	Constant	6.1500E-01	6.1500E-01	6.1500E-01	6.1500E-01
CRA1	3670	SPALLMOD	MUDSOLVE	Constant	-1.5000E+00	-1.5000E+00	-1.5000E+00	-1.5000E+00
CRA1	3667	SPALLMOD	PARTDIAM	Loguniform	2.1500E-02	1.0000E-02	1.0000E-03	1.0000E-01
CRA1	3660	SPALLMOD	PIPEID	Constant	9.7180E-02	9.7180E-02	9.7180E-02	9.7180E-02
CRA1	3663	SPALLMOD	PIPEROUG	Constant	5.0000E-05	5.0000E-05	5.0000E-05	5.0000E-05
CRA1	3672	SPALLMOD	POISRAT	Constant	3.8000E-01	3.8000E-01	3.8000E-01	3.8000E-01
CRA1	3651	SPALLMOD	REFPRS	Constant	1.0177E+05	1.0177E+05	1.0177E+05	1.0177E+05
CRA1	3666	SPALLMOD	REPIPERM	Loguniform	5.1600E-13	2.4000E-13	2.4000E-14	2.4000E-12
CRA1	3655	SPALLMOD	REPOSTOP	Constant	3.8470E+02	3.8470E+02	3.8470E+02	3.8470E+02
CRA1	3664	SPALLMOD	SALTDENS	Constant	2.1800E+03	2.1800E+03	2.1800E+03	2.1800E+03
CRA1	3669	SPALLMOD	SHAPEFAC	Constant	1.0000E-01	1.0000E-01	1.0000E-01	1.0000E-01
CRA1	3661	SPALLMOD	STPDVOLR	Constant	1.0000E+03	1.0000E+03	1.0000E+03	1.0000E+03
CRA1	3656	SPALLMOD	STPPVOLR	Constant	1.0000E+03	1.0000E+03	1.0000E+03	1.0000E+03
CRA1	3658	SPALLMOD	SURFELEV	Constant	1.0373E+03	1.0373E+03	1.0373E+03	1.0373E+03
CRA1	3676	SPALLMOD	TENSLSTR	Uniform	1.4500E+05	1.4500E+05	1.2000E+05	1.7000E+05
CRA1	2039	SR90	INVCHD	Constant	2.8200E+04	2.8200E+04	2.8200E+04	2.8200E+04
CRA1	2039	SR90	INVCHD	Constant	2.6800E+04	2.6800E+04	2.6800E+04	2.6800E+04
CRA1	518	SR90	INVRHD	Constant	1.1800E+05	1.1800E+05	1.1800E+05	1.1800E+05
CRA1	518	SR90	INVRHD	Constant	1.1500E+05	1.1500E+05	1.1500E+05	1.1500E+05
CRA1	605	TH229	INVCHD	Constant	6.1200E+00	6.1200E+00	6.1200E+00	6.1200E+00
CRA1	605	TH229	INVCHD	Constant	5.2500E+00	5.2500E+00	5.2500E+00	5.2500E+00
CRA1	606	TH229	INVRHD	Constant	1.8300E-01	1.8300E-01	1.8300E-01	1.8300E-01
CRA1	606	TH229	INVRHD	Constant	1.3900E-01	1.3900E-01	1.3900E-01	1.3900E-01
CRA1	609	TH230	INVCHD	Constant	2.2600E-01	2.2600E-01	2.2600E-01	2.2600E-01
CRA1	609	TH230	INVCHD	Constant	1.6900E-01	1.6900E-01	1.6900E-01	1.6900E-01
CRA1	610	TH230	INVRHD	Constant	7.2400E-03	7.2400E-03	7.2400E-03	7.2400E-03
CRA1	610	TH230	INVRHD	Constant	6.6700E-03	6.6700E-03	6.6700E-03	6.6700E-03
CRA1	3508	TH230L	INVCHD	Constant	6.3500E+00	6.3500E+00	6.3500E+00	6.3500E+00
CRA1	3508	TH230L	INVCHD	Constant	5.4200E+00	5.4200E+00	5.4200E+00	5.4200E+00
CRA1	3513	TH230L	INVRHD	Constant	1.9000E-01	1.9000E-01	1.9000E-01	1.9000E-01
CRA1	3513	TH230L	INVRHD	Constant	1.4600E-01	1.4600E-01	1.4600E-01	1.4600E-01

Table 1. Section 1. Parameters That Have Changed Since the Technical Baseline Migration (TBM).

CRA1	613	TH232	INVCHD	Constant	6.6300E+00	6.6300E+00	6.6300E+00	6.6300E+00
CRA1	613	TH232	INVCHD	Constant	6.6100E+00	6.6100E+00	6.6100E+00	6.6100E+00
CRA1	614	TH232	INVRHD	Constant	2.9100E-01	2.9100E-01	2.9100E-01	2.9100E-01
CRA1	614	TH232	INVRHD	Constant	2.1800E-01	2.1800E-01	2.1800E-01	2.1800E-01
CRA1	634	U233	INVCHD	Constant	1.4300E+03	1.4300E+03	1.4300E+03	1.4300E+03
CRA1	634	U233	INVCHD	Constant	1.2400E+03	1.2400E+03	1.2400E+03	1.2400E+03
CRA1	635	U233	INVRHD	Constant	4.3800E+01	4.3800E+01	4.3800E+01	4.3800E+01
CRA1	635	U233	INVRHD	Constant	3.4100E+01	3.4100E+01	3.4100E+01	3.4100E+01
CRA1	638	U234	INVCHD	Constant	3.6400E+02	3.6400E+02	3.6400E+02	3.6400E+02
CRA1	638	U234	INVCHD	Constant	2.9700E+02	2.9700E+02	2.9700E+02	2.9700E+02
CRA1	639	U234	INVRHD	Constant	2.3500E+01	2.3500E+01	2.3500E+01	2.3500E+01
CRA1	639	U234	INVRHD	Constant	2.2000E+01	2.2000E+01	2.2000E+01	2.2000E+01
CRA1	3507	U234L	INVCHD	Constant	1.7900E+03	1.7900E+03	1.7900E+03	1.7900E+03
CRA1	3507	U234L	INVCHD	Constant	1.5400E+03	1.5400E+03	1.5400E+03	1.5400E+03
CRA1	3512	U234L	INVRHD	Constant	6.7300E+01	6.7300E+01	6.7300E+01	6.7300E+01
CRA1	3512	U234L	INVRHD	Constant	5.6100E+01	5.6100E+01	5.6100E+01	5.6100E+01
CRA1	642	U235	INVCHD	Constant	1.3800E+00	1.3800E+00	1.3800E+00	1.3800E+00
CRA1	642	U235	INVCHD	Constant	1.3400E+00	1.3400E+00	1.3400E+00	1.3400E+00
CRA1	643	U235	INVRHD	Constant	9.7900E-01	9.7900E-01	9.7900E-01	9.7900E-01
CRA1	643	U235	INVRHD	Constant	9.4200E-01	9.4200E-01	9.4200E-01	9.4200E-01
CRA1	2216	U236	INVCHD	Constant	2.6000E-01	2.6000E-01	2.6000E-01	2.6000E-01
CRA1	2216	U236	INVCHD	Constant	2.3100E-01	2.3100E-01	2.3100E-01	2.3100E-01
CRA1	646	U236	INVRHD	Constant	1.4800E+00	1.4800E+00	1.4800E+00	1.4800E+00
CRA1	646	U236	INVRHD	Constant	1.4200E+00	1.4200E+00	1.4200E+00	1.4200E+00
CRA1	649	U238	INVCHD	Constant	2.4600E+01	2.4600E+01	2.4600E+01	2.4600E+01
CRA1	649	U238	INVCHD	Constant	2.4400E+01	2.4400E+01	2.4400E+01	2.4400E+01
CRA1	650	U238	INVRHD	Constant	1.3100E+02	1.3100E+02	1.3100E+02	1.3100E+02
CRA1	650	U238	INVRHD	Constant	1.3000E+02	1.3000E+02	1.3000E+02	1.3000E+02
AMW	3649	WAS_AMW	CLOSMOD1	Delta	2.0000E+00	2.0000E+00	1.0000E+00	4.0000E+00
AMW	3650	WAS_AMW	CLOSMOD2	Delta	1.0000E+00	1.0000E+00	1.0000E+00	2.0000E+00
AMW	3648	WAS_AMW	FRACAMW	Uniform	6.0000E-01	6.0000E-01	2.0000E-01	1.0000E+00
CRA1	2041	WAS_AREA	DCELLCHW	Constant	7.5000E+01	7.5000E+01	7.5000E+01	7.5000E+01
CRA1	2041	WAS_AREA	DCELLCHW	Constant	5.8000E+01	5.8000E+01	5.8000E+01	5.8000E+01
CRA1	2274	WAS_AREA	DCELLRHW	Constant	6.1000E+00	6.1000E+00	6.1000E+00	6.1000E+00
CRA1	2274	WAS_AREA	DCELLRHW	Constant	4.5000E+00	4.5000E+00	4.5000E+00	4.5000E+00
CRA1	1992	WAS_AREA	DIRNCCHW	Constant	2.3000E+02	2.3000E+02	2.3000E+02	2.3000E+02
CRA1	1992	WAS_AREA	DIRNCCHW	Constant	1.7000E+02	1.7000E+02	1.7000E+02	1.7000E+02
CRA1	1993	WAS_AREA	DIRNCRHW	Constant	3.9000E+02	3.9000E+02	3.9000E+02	3.9000E+02
CRA1	1993	WAS_AREA	DIRNCRHW	Constant	4.8000E+02	4.8000E+02	4.8000E+02	4.8000E+02

Table 1. Section 1. Parameters That Have Changed Since the Technical Baseline Migration (TBM).

CRA1	2040	WAS_AREA	DIRONCHW	Constant	1.4000E+02	1.4000E+02	1.4000E+02	1.4000E+02
CRA1	2040	WAS_AREA	DIRONCHW	Constant	1.1000E+02	1.1000E+02	1.1000E+02	1.1000E+02
CRA1	2044	WAS_AREA	DIRONRHW	Constant	1.2000E+02	1.2000E+02	1.2000E+02	1.2000E+02
CRA1	2044	WAS_AREA	DIRONRHW	Constant	1.1000E+02	1.1000E+02	1.1000E+02	1.1000E+02
CRA1	2043	WAS_AREA	DPLASCHW	Constant	5.5000E+01	5.5000E+01	5.5000E+01	5.5000E+01
CRA1	2043	WAS_AREA	DPLASCHW	Constant	4.2000E+01	4.2000E+01	4.2000E+01	4.2000E+01
CRA1	2275	WAS_AREA	DPLASRHW	Constant	7.0000E+00	7.0000E+00	7.0000E+00	7.0000E+00
CRA1	2275	WAS_AREA	DPLASRHW	Constant	4.9000E+00	4.9000E+00	4.9000E+00	4.9000E+00
CRA1	1995	WAS_AREA	DPLSCCHW	Constant	2.1000E+01	2.1000E+01	2.1000E+01	2.1000E+01
CRA1	1995	WAS_AREA	DPLSCCHW	Constant	1.6000E+01	1.6000E+01	1.6000E+01	1.6000E+01
CRA1	2228	WAS_AREA	DPLSCRHW	Constant	1.2000E+00	1.2000E+00	1.2000E+00	1.2000E+00
CRA1	2228	WAS_AREA	DPLSCRHW	Constant	1.4000E+00	1.4000E+00	1.4000E+00	1.4000E+00
CRA1	2042	WAS_AREA	DRUBBCHW	Constant	1.9000E+01	1.9000E+01	1.9000E+01	1.9000E+01
CRA1	2042	WAS_AREA	DRUBBCHW	Constant	1.4000E+01	1.4000E+01	1.4000E+01	1.4000E+01
CRA1	2046	WAS_AREA	DRUBBRHW	Constant	3.6000E+00	3.6000E+00	3.6000E+00	3.6000E+00
CRA1	2046	WAS_AREA	DRUBBRHW	Constant	3.1000E+00	3.1000E+00	3.1000E+00	3.1000E+00
CRA1	3682	SPALLMOD	DRZTCK	Constant	8.5000E-01	8.5000E-01	8.5000E-01	8.5000E-01
CRA1	3681	SPALLMOD	FRCHBETA	Constant	1.1500E-06	1.1500E-06	1.1500E-06	1.1500E-06
CRA1	3680	SPALLMOD	REPOSTCK	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
CRA1	3679	SPALLMOD	REPOTRAD	Constant	3.8500E+02	3.8500E+02	3.8500E+02	3.8500E+02
TBM	3482	AM+3	MKD_AM	Loguniform	1.3000E-01	9.0000E-02	2.0000E-02	4.0000E-01
TBM	3482	AM+3	MKD_AM	Loguniform	1.0000E-01	6.0000E-02	9.0000E-03	4.0000E-01
TBM	3480	PU+3	MKD_PU	Loguniform	1.0000E-01	6.0000E-02	9.0000E-03	4.0000E-01
TBM	3480	PU+3	MKD_PU	Loguniform	1.3000E-01	9.0000E-02	2.0000E-02	4.0000E-01
TBM	3402	SOLMOD3	SOLCIM	Constant	1.3800E-08	1.3800E-08	1.3800E-08	1.3800E-08
TBM	3402	SOLMOD3	SOLCIM	Constant	1.3000E-08	1.3000E-08	1.3000E-08	1.3000E-08

Table 1 Section 2

Table 1. Section 2. Parameters That Have Changed Since the Technical Baseline Migration (TBM).

Analy-sis	Param. ID No.	Material ID	Property ID	Param. Record No.	Date	Replaces Param. Record	Replaced by Param. Record	Previous Value				Date	Prev. Analy-sis
								Mean	Median	Minimum	Maximum		
CRA1	4	AM241	INVCHD	1685	2003-05-09		1806	4.7800E+05	4.7800E+05	4.7800E+05	4.7800E+05	1996-10-29	CCA
CRA1	4	AM241	INVCHD	1806	2003-08-29	1685		4.7800E+05	4.7800E+05	4.7800E+05	4.7800E+05	2003-05-09	CRA1
CRA1	5	AM241	INVRHD	1686	2003-05-09	1542	1807	9.4300E+03	9.4300E+03	9.4300E+03	9.4300E+03	2002-06-12	TBM
CRA1	5	AM241	INVRHD	1807	2003-08-29	1686		3.9600E+04	3.9600E+04	3.9600E+04	3.9600E+04	2003-05-09	CRA1
CRA1	3504	AM241L	INVCHD	1760	2003-05-12	1553	1796	4.9000E+05	4.9000E+05	4.9000E+05	4.9000E+05	2002-06-18	TBM
CRA1	3504	AM241L	INVCHD	1796	2003-08-29	1760		4.9500E+05	4.9500E+05	4.9500E+05	4.9500E+05	2003-05-12	CRA1
CRA1	3509	AM241L	INVRHD	1761	2003-05-12	1554	1797	1.0200E+04	1.0200E+04	1.0200E+04	1.0200E+04	2002-06-18	TBM
CRA1	3509	AM241L	INVRHD	1797	2003-08-29	1761		4.4600E+04	4.4600E+04	4.4600E+04	4.4600E+04	2003-05-12	CRA1
CRA1	3415	AM243	INVCHD	1687	2003-05-09		1808	3.2500E+01	3.2500E+01	3.2500E+01	3.2500E+01	1996-05-24	CCA
CRA1	3415	AM243	INVCHD	1808	2003-08-29	1687		3.3400E+01	3.3400E+01	3.3400E+01	3.3400E+01	2003-05-09	CRA1
CRA1	3416	AM243	INVRHD	1688	2003-05-09		1809	2.2700E-04	2.2700E-04	2.2700E-04	2.2700E-04	1996-05-24	CCA
CRA1	3416	AM243	INVRHD	1809	2003-08-29	1688		7.9800E-01	7.9800E-01	7.9800E-01	7.9800E-01	2003-05-09	CRA1
CRA1	2277	ASPHALT	COMP_RCK	1605	2003-03-31			2.9700E-08	2.9700E-08	2.9700E-08	2.9700E-08	1996-02-13	CCA
CRA1	3473	BLOWOUT	THCK_CAS	1774	2003-08-01			1.2340E+01	1.2340E+01	1.2340E+01	1.2340E+01	1996-06-06	CCA
CRA1	3414	BOREHOLE	WUF	1759	2003-05-12	1018	1795	3.5900E+00	3.5900E+00	3.5900E+00	3.5900E+00	2002-02-14	TBM
CRA1	3414	BOREHOLE	WUF	1795	2003-08-29	1759		2.9600E+00	2.9600E+00	2.9600E+00	2.9600E+00	2003-05-12	CRA1
CRA1	108	CF252	INVCHD	1689	2003-05-09		1810	1.1200E-04	1.1200E-04	1.1200E-04	1.1200E-04	1996-10-29	CCA
CRA1	108	CF252	INVCHD	1810	2003-08-29	1689		6.4000E-05	6.4000E-05	6.4000E-05	6.4000E-05	2003-05-09	CRA1
CRA1	109	CF252	INVRHD	1690	2003-05-09	1543	1811	5.9500E-05	5.9500E-05	5.9500E-05	5.9500E-05	2002-06-12	TBM
CRA1	109	CF252	INVRHD	1811	2003-08-29	1690		5.6000E-06	5.6000E-06	5.6000E-06	5.6000E-06	2003-05-09	CRA1
CRA1	2328	CL_L_T1	COMP_RCK	1613	2003-03-31			1.5900E-09	1.5900E-09	1.5900E-09	1.5900E-09	1996-02-13	CCA
CRA1	2345	CL_L_T2	COMP_RCK	1614	2003-03-31			1.5900E-09	1.5900E-09	1.5900E-09	1.5900E-09	1996-02-14	CCA
CRA1	2362	CL_L_T3	COMP_RCK	1615	2003-03-31			1.5900E-09	1.5900E-09	1.5900E-09	1.5900E-09	1996-02-14	CCA
CRA1	3071	CL_L_T4	COMP_RCK	1616	2003-03-31			1.5900E-09	1.5900E-09	1.5900E-09	1.5900E-09	1996-02-15	CCA
CRA1	2379	CL_M_T1	COMP_RCK	1608	2003-03-31			1.8100E-09	1.8100E-09	1.8100E-09	1.8100E-09	1996-02-15	CCA

Table 1. Section 2. Parameters That Have Changed Since the Technical Baseline Migration (TBM).

CRA1	2396	CL_M_T2	COMP_RCK	1609	2003-03-31			1.8100E-09	1.8100E-09	1.8100E-09	1.8100E-09	1996-02-15	CCA
CRA1	2413	CL_M_T3	COMP_RCK	1610	2003-03-31			1.8100E-09	1.8100E-09	1.8100E-09	1.8100E-09	1996-02-15	CCA
CRA1	2430	CL_M_T4	COMP_RCK	1611	2003-03-31			1.8100E-09	1.8100E-09	1.8100E-09	1.8100E-09	1996-02-13	CCA
CRA1	2447	CL_M_T5	COMP_RCK	1612	2003-03-31			1.8100E-09	1.8100E-09	1.8100E-09	1.8100E-09	1996-02-13	CCA
CRA1	2311	CLAY_BOT	COMP_RCK	1623	2003-03-31			1.5900E-09	1.5900E-09	1.5900E-09	1.5900E-09	1996-02-21	CCA
CRA1	3001	CLAY_RUS	COMP_RCK	1604	2003-03-31			1.9600E-09	1.9600E-09	1.9600E-09	1.9600E-09	1996-02-13	CCA
CRA1	3410	CM243	INVCHD	1691	2003-05-09			1.0800E+00	1.0800E+00	1.0800E+00	1.0800E+00	1996-05-24	CCA
CRA1	3410	CM243	INVCHD		2003-08-29								
CRA1	3411	CM243	INVRHD	1692	2003-05-09		1812	1.9700E+01	1.9700E+01	1.9700E+01	1.9700E+01	1996-05-24	CCA
CRA1	3411	CM243	INVRHD	1812	2003-08-29	1692		2.3100E-01	2.3100E-01	2.3100E-01	2.3100E-01	2003-05-09	CRA1
CRA1	112	CM244	INVCHD	1693	2003-05-09		1813	7.3600E+03	7.3600E+03	7.3600E+03	7.3600E+03	1996-10-29	CCA
CRA1	112	CM244	INVCHD	1813	2003-08-29	1693	1863	4.8200E+03	4.8200E+03	4.8200E+03	4.8200E+03	2003-05-09	CRA1
CRA1	112	CM244	INVCHD	1863	2003-09-03	1813		2.4300E+03	2.4300E+03	2.4300E+03	2.4300E+03	2003-08-29	CRA1
CRA1	113	CM244	INVRHD	1694	2003-05-09		1814	7.3600E+01	7.3600E+01	7.3600E+01	7.3600E+01	1996-10-29	CCA
CRA1	113	CM244	INVRHD	1814	2003-08-29	1694		1.0500E+02	1.0500E+02	1.0500E+02	1.0500E+02	2003-05-09	CRA1
CRA1	3412	CM245	INVCHD	1695	2003-05-09	1544	1815	1.1500E-02	1.1500E-02	1.1500E-02	1.1500E-02	2002-06-12	TBM
CRA1	3412	CM245	INVCHD	1815	2003-08-29	1695		1.3900E-02	1.3900E-02	1.3900E-02	1.3900E-02	2003-05-09	CRA1
CRA1	3413	CM245	INVRHD	1696	2003-05-09		1816	1.4800E-05	1.4800E-05	1.4800E-05	1.4800E-05	1996-05-24	CCA
CRA1	3413	CM245	INVRHD	1816	2003-08-29	1696		1.0900E-02	1.0900E-02	1.0900E-02	1.0900E-02	2003-05-09	CRA1
CRA1	2265	CM248	INVCHD	1697	2003-05-09		1817	3.6900E-02	3.6900E-02	3.6900E-02	3.6900E-02	1996-10-29	CCA
CRA1	2265	CM248	INVCHD	1817	2003-08-29	1697		1.4900E-01	1.4900E-01	1.4900E-01	1.4900E-01	2003-05-09	CRA1
CRA1	2266	CM248	INVRHD	1698	2003-05-09		1818	2.1500E-04	2.1500E-04	2.1500E-04	2.1500E-04	1996-10-29	CCA
CRA1	2266	CM248	INVRHD	1818	2003-08-29	1698		2.5900E-03	2.5900E-03	2.5900E-03	2.5900E-03	2003-05-09	CRA1
CRA1	3052	CONC_MON	COMP_RCK	1624	2003-03-31			1.2000E-09	1.2000E-09	1.2000E-09	1.2000E-09	1996-05-02	CCA
CRA1	3515	CONC_PCS	COMP_RCK	1626	2003-03-31	982		1.2000E-09	1.2000E-09	1.2000E-09	1.2000E-09	2002-02-14	TBM
CRA1	3148	CONC_PLG	COMP_RCK	1625	2003-03-31			1.2000E-09	1.2000E-09	1.2000E-09	1.2000E-09	1996-05-02	CCA
CRA1	2464	CONC_T1	COMP_RCK	1606	2003-03-31			1.2000E-09	1.2000E-09	1.2000E-09	1.2000E-09	1996-05-02	CCA

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CRA1	2481	CONC_T2	COMP_RCK	1607	2003-03-31			1.2000E-09	1.2000E-09	1.2000E-09	1.2000E-09	1996-05-02	CCA
CRA1	2037	CS137	INVCHD	1699	2003-05-09		1819	3.3500E+03	3.3500E+03	3.3500E+03	3.3500E+03	1996-10-29	CCA
CRA1	2037	CS137	INVCHD	1819	2003-08-29	1699		6.9300E+03	6.9300E+03	6.9300E+03	6.9300E+03	2003-05-09	CRA1
CRA1	118	CS137	INVRHD	1700	2003-05-09		1820	8.9800E+04	8.9800E+04	8.9800E+04	8.9800E+04	1996-10-29	CCA
CRA1	118	CS137	INVRHD	1820	2003-08-29	1700		1.7700E+05	1.7700E+05	1.7700E+05	1.7700E+05	2003-05-09	CRA1
CRA1	142	CULEBRA	PRESSURE	1787	2003-08-20			8.2200E+05	8.2200E+05	8.2200E+05	8.2200E+05	1996-02-08	CCA
CRA1	143	CULEBRA	PRMX_LOG	1789	2003-08-20			-1.3678E+01	-1.3678E+01	-1.3678E+01	-1.3678E+01	1996-02-13	CCA
CRA1	144	CULEBRA	PRMY_LOG	1790	2003-08-20			-1.3678E+01	-1.3678E+01	-1.3678E+01	-1.3678E+01	1996-02-13	CCA
CRA1	145	CULEBRA	PRMZ_LOG	1791	2003-08-20			-1.3678E+01	-1.3678E+01	-1.3678E+01	-1.3678E+01	1996-02-13	CCA
CRA1	2497	EARTH	COMP_RCK	1603	2003-03-31			3.1000E-08	3.1000E-08	3.1000E-08	3.1000E-08	1996-02-14	CCA
CRA1	3494	GLOBAL	LAMBDAD	1864	2003-09-08			4.6800E-03	4.6800E-03	4.6800E-03	4.6800E-03	1996-06-26	CCA
CRA1	3644	GLOBAL	ONEPLG	1770	2003-09-08				new				
CRA1	3646	GLOBAL	THREEPLG	1772	2003-09-08				new				
CRA1	3645	GLOBAL	TWOPLG	1771	2003-09-08				new				
CRA1	2101	MAGENTA	PRESSURE	1788	2003-08-20			9.1700E+05	9.1700E+05	9.1700E+05	9.1700E+05	1996-02-08	CCA
CRA1	248	NP237	INVCHD	1701	2003-05-09		1821	6.1900E+01	6.1900E+01	6.1900E+01	6.1900E+01	1996-10-29	CCA
CRA1	248	NP237	INVCHD	1821	2003-08-29	1701		1.1300E+01	1.1300E+01	1.1300E+01	1.1300E+01	2003-05-09	CRA1
CRA1	249	NP237	INVRHD	1702	2003-05-09		1822	2.9500E+00	2.9500E+00	2.9500E+00	2.9500E+00	1996-10-29	CCA
CRA1	249	NP237	INVRHD	1822	2003-08-29	1702		1.0100E+00	1.0100E+00	1.0100E+00	1.0100E+00	2003-05-09	CRA1
CRA1	2267	PA231	INVCHD	1703	2003-05-09		1823	4.6200E-01	4.6200E-01	4.6200E-01	4.6200E-01	1996-10-29	CCA
CRA1	2267	PA231	INVCHD	1823	2003-08-29	1703		1.9700E+00	1.9700E+00	1.9700E+00	1.9700E+00	2003-05-09	CRA1
CRA1	2268	PA231	INVRHD	1704	2003-05-09		1824	5.6300E-03	5.6300E-03	5.6300E-03	5.6300E-03	1996-10-29	CCA
CRA1	2268	PA231	INVRHD	1824	2003-08-29	1704		6.8600E-04	6.8600E-04	6.8600E-04	6.8600E-04	2003-05-09	CRA1
CRA1	253	PAN_SEAL	COMP_RCK	1627	2003-03-31			2.6400E-09	2.6400E-09	2.6400E-09	2.6400E-09	1996-02-20	CCA
CRA1	285	PB210	INVCHD	1705	2003-05-09		1825	8.7500E+00	8.7500E+00	8.7500E+00	8.7500E+00	1996-10-29	CCA
CRA1	285	PB210	INVCHD	1825	2003-08-29	1705		7.9000E+00	7.9000E+00	7.9000E+00	7.9000E+00	2003-05-09	CRA1
CRA1	286	PB210	INVRHD	1706	2003-05-09		1826	1.1400E-04	1.1400E-04	1.1400E-04	1.1400E-04	1996-10-29	CCA
CRA1	286	PB210	INVRHD	1826	2003-08-29	1706		1.6200E-05	1.6200E-05	1.6200E-05	1.6200E-05	2003-05-09	CRA1

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CRA1	2038	PM147	INVCHD	1707	2003-05-09		1827	3.4300E-04	3.4300E-04	3.4300E-04	3.4300E-04	1996-10-29	CCA
CRA1	2038	PM147	INVCHD	1827	2003-08-29	1707		4.1300E-04	4.1300E-04	4.1300E-04	4.1300E-04	2003-05-09	CRA1
CRA1	289	PM147	INVRHD	1708	2003-05-09		1828	4.6700E-04	4.6700E-04	4.6700E-04	4.6700E-04	1996-10-29	CCA
CRA1	289	PM147	INVRHD	1828	2003-08-29	1708		8.0500E-02	8.0500E-02	8.0500E-02	8.0500E-02	2003-05-09	CRA1
CRA1	293	PU238	INVCHD	1709	2003-05-09	1547	1829	2.0900E+06	2.0900E+06	2.0900E+06	2.0900E+06	2002-06-12	TBM
CRA1	293	PU238	INVCHD	1829	2003-08-29	1709		1.5300E+06	1.5300E+06	1.5300E+06	1.5300E+06	2003-05-09	CRA1
CRA1	294	PU238	INVRHD	1710	2003-05-09		1830	1.0800E+03	1.0800E+03	1.0800E+03	1.0800E+03	1996-10-29	CCA
CRA1	294	PU238	INVRHD	1830	2003-08-29	1710		3.4800E+03	3.4800E+03	3.4800E+03	3.4800E+03	2003-05-09	CRA1
CRA1	3506	PU238L	INVCHD	1762	2003-05-12	1555	1798	2.0900E+06	2.0900E+06	2.0900E+06	2.0900E+06	2002-06-18	TBM
CRA1	3506	PU238L	INVCHD	1798	2003-08-29	1762		1.5300E+06	1.5300E+06	1.5300E+06	1.5300E+06	2003-05-12	CRA1
CRA1	3511	PU238L	INVRHD	1763	2003-05-12	1556	1799	1.0800E+03	1.0800E+03	1.0800E+03	1.0800E+03	2002-06-18	TBM
CRA1	3511	PU238L	INVRHD	1799	2003-08-29	1763		3.4800E+03	3.4800E+03	3.4800E+03	3.4800E+03	2003-05-12	CRA1
CRA1	297	PU239	INVCHD	1711	2003-05-09		1831	7.8500E+05	7.8500E+05	7.8500E+05	7.8500E+05	1996-04-25	CCA
CRA1	297	PU239	INVCHD	1831	2003-08-29	1711		7.7700E+05	7.7700E+05	7.7700E+05	7.7700E+05	2003-05-09	CRA1
CRA1	298	PU239	INVRHD	1712	2003-05-09		1832	1.0300E+04	1.0300E+04	1.0300E+04	1.0300E+04	1996-04-25	CCA
CRA1	298	PU239	INVRHD	1832	2003-08-29	1712		5.6400E+03	5.6400E+03	5.6400E+03	5.6400E+03	2003-05-09	CRA1
CRA1	3505	PU239L	INVCHD	1764	2003-05-12	1557	1800	1.0100E+06	1.0100E+06	1.0100E+06	1.0100E+06	2002-06-18	TBM
CRA1	3505	PU239L	INVCHD	1800	2003-08-29	1764		9.1000E+05	9.1000E+05	9.1000E+05	9.1000E+05	2003-05-12	CRA1
CRA1	3510	PU239L	INVRHD	1765	2003-05-12	1559	1801	1.5400E+04	1.5400E+04	1.5400E+04	1.5400E+04	2002-06-18	TBM
CRA1	3510	PU239L	INVRHD	1801	2003-08-29	1765		7.4700E+03	7.4700E+03	7.4700E+03	7.4700E+03	2003-05-12	CRA1
CRA1	301	PU240	INVCHD	1713	2003-05-09		1833	2.0900E+05	2.0900E+05	2.0900E+05	2.0900E+05	1996-10-29	CCA
CRA1	301	PU240	INVCHD	1833	2003-08-29	1713		1.3200E+05	1.3200E+05	1.3200E+05	1.3200E+05	2003-05-09	CRA1
CRA1	302	PU240	INVRHD	1714	2003-05-09		1834	5.0500E+03	5.0500E+03	5.0500E+03	5.0500E+03	1996-10-29	CCA
CRA1	302	PU240	INVRHD	1834	2003-08-29	1714		1.8200E+03	1.8200E+03	1.8200E+03	1.8200E+03	2003-05-09	CRA1
CRA1	305	PU241	INVCHD	1715	2003-05-09		1835	3.7100E+05	3.7100E+05	3.7100E+05	3.7100E+05	1996-10-29	CCA
CRA1	305	PU241	INVCHD	1835	2003-08-29	1715		5.1700E+05	5.1700E+05	5.1700E+05	5.1700E+05	2003-05-09	CRA1
CRA1	306	PU241	INVRHD	1716	2003-05-09		1836	2.2800E+04	2.2800E+04	2.2800E+04	2.2800E+04	1996-10-29	CCA
CRA1	306	PU241	INVRHD	1836	2003-08-29	1716		1.4900E+05	1.4900E+05	1.4900E+05	1.4900E+05	2003-05-09	CRA1

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CRA1	309	PU242	INVCHD	1717	2003-05-09		1837	1.1700E+03	1.1700E+03	1.1700E+03	1.1700E+03	1996-04-25	CCA
CRA1	309	PU242	INVCHD	1837	2003-08-29	1717		3.2700E+01	3.2700E+01	3.2700E+01	3.2700E+01	2003-05-09	CRA1
CRA1	310	PU242	INVRHD	1718	2003-05-09		1838	1.5000E-01	1.5000E-01	1.5000E-01	1.5000E-01	1996-04-25	CCA
CRA1	310	PU242	INVRHD	1838	2003-08-29	1718		5.0200E-01	5.0200E-01	5.0200E-01	5.0200E-01	2003-05-09	CRA1
CRA1	2269	PU244	INVCHD	1719	2003-05-09		1839	1.5100E-06	1.5100E-06	1.5100E-06	1.5100E-06	1996-10-29	CCA
CRA1	2269	PU244	INVCHD	1839	2003-08-29	1719		1.4500E-06	1.4500E-06	1.4500E-06	1.4500E-06	2003-05-09	CRA1
CRA1	2270	PU244	INVRHD	1720	2003-05-09		1840	8.5000E-11	8.5000E-11	8.5000E-11	8.5000E-11	1996-10-29	CCA
CRA1	2270	PU244	INVRHD	1840	2003-08-29	1720		1.5600E-03	1.5600E-03	1.5600E-03	1.5600E-03	2003-05-09	CRA1
CRA1	316	RA226	INVCHD	1721	2003-05-09		1841	1.1400E+01	1.1400E+01	1.1400E+01	1.1400E+01	1996-10-29	CCA
CRA1	316	RA226	INVCHD	1841	2003-08-29	1721		1.0000E+01	1.0000E+01	1.0000E+01	1.0000E+01	2003-05-09	CRA1
CRA1	317	RA226	INVRHD	1722	2003-05-09		1842	2.7900E-04	2.7900E-04	2.7900E-04	2.7900E-04	1996-10-29	CCA
CRA1	317	RA226	INVRHD	1842	2003-08-29	1722		5.5500E-05	5.5500E-05	5.5500E-05	5.5500E-05	2003-05-09	CRA1
CRA1	2271	RA228	INVCHD	1723	2003-05-09		1843	9.1000E-01	9.1000E-01	9.1000E-01	9.1000E-01	1996-10-29	CCA
CRA1	2271	RA228	INVCHD	1843	2003-08-29	1723		7.6500E+00	7.6500E+00	7.6500E+00	7.6500E+00	2003-05-09	CRA1
CRA1	2272	RA228	INVRHD	1724	2003-05-09		1844	9.2300E-02	9.2300E-02	9.2300E-02	9.2300E-02	1996-10-29	CCA
CRA1	2272	RA228	INVRHD	1844	2003-08-29	1724		3.3600E-01	3.3600E-01	3.3600E-01	3.3600E-01	2003-05-09	CRA1
CRA1-B	3590	REFCON	BIP_11	1635	2003-04-01				new				
CRA1-B	3591	REFCON	BIP_12	1636	2003-04-01				new				
CRA1-B	3592	REFCON	BIP_13	1637	2003-04-01				new				
CRA1-B	3593	REFCON	BIP_14	1638	2003-04-01				new				
CRA1-B	3594	REFCON	BIP_15	1639	2003-04-01				new				
CRA1-B	3595	REFCON	BIP_16	1640	2003-04-01				new				
CRA1-B	3596	REFCON	BIP_21	1641	2003-04-01				new				

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CRA1-B	3597	REFCON	BIP_22	1642	2003-04-01				new				
CRA1-B	3598	REFCON	BIP_23	1643	2003-04-01				new				
CRA1-B	3599	REFCON	BIP_24	1644	2003-04-01				new				
CRA1-B	3600	REFCON	BIP_25	1645	2003-04-01				new				
CRA1-B	3601	REFCON	BIP_26	1646	2003-04-01				new				
CRA1-B	3602	REFCON	BIP_31	1647	2003-04-01				new				
CRA1-B	3603	REFCON	BIP_32	1648	2003-04-01				new				
CRA1-B	3604	REFCON	BIP_33	1649	2003-04-01				new				
CRA1-B	3605	REFCON	BIP_34	1650	2003-04-01				new				
CRA1-B	3606	REFCON	BIP_35	1651	2003-04-01				new				
CRA1-B	3607	REFCON	BIP_36	1652	2003-04-01				new				
CRA1-B	3608	REFCON	BIP_41	1653	2003-04-01				new				
CRA1-B	3609	REFCON	BIP_42	1654	2003-04-01				new				
CRA1-B	3610	REFCON	BIP_43	1655	2003-04-01				new				
CRA1-B	3611	REFCON	BIP_44	1656	2003-04-01				new				
CRA1-B	3612	REFCON	BIP_45	1657	2003-04-01				new				
CRA1-B	3613	REFCON	BIP_46	1658	2003-04-01				new				

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CRA1-B	3614	REFCON	BIP_51	1659	2003-04-01				new				
CRA1-B	3615	REFCON	BIP_52	1660	2003-04-01				new				
CRA1-B	3616	REFCON	BIP_53	1661	2003-04-01				new				
CRA1-B	3617	REFCON	BIP_54	1662	2003-04-01				new				
CRA1-B	3618	REFCON	BIP_55	1663	2003-04-01				new				
CRA1-B	3619	REFCON	BIP_56	1664	2003-04-01				new				
CRA1-B	3620	REFCON	BIP_61	1670	2003-04-01				new				
CRA1-B	3621	REFCON	BIP_62	1665	2003-04-01				new				
CRA1-B	3622	REFCON	BIP_63	1666	2003-04-01				new				
CRA1-B	3623	REFCON	BIP_64	1667	2003-04-01				new				
CRA1-B	3624	REFCON	BIP_65	1668	2003-04-01				new				
CRA1-B	3625	REFCON	BIP_66	1669	2003-04-01				new				
CRA1-B	3647	REFCON	FVRW	1773	2003-06-26				new				
CRA1-B	3582	REFCON	LHSBLANK	1602	2003-03-27				new				
CRA1-B	3589	REFCON	MW_CELL	1634	2003-04-01				new				
CRA1-B	3585	REFCON	MW_CH4	1630	2003-04-01				new				
CRA1-B	3584	REFCON	MW_CO2	1629	2003-04-01				new				

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CRA1-B	3587	REFCON	MW_H2S	1632	2003-04-01				new				
CRA1-B	3586	REFCON	MW_N2	1631	2003-04-01				new				
CRA1-B	3583	REFCON	MW_NACL	1628	2003-04-01				new				
CRA1-B	3588	REFCON	MW_O2	1633	2003-04-01				new				
CRA1	3108	REFCON	VREPOS	1601	2003-03-27			4.3602E+05	4.3602E+05	4.3602E+05	4.3602E+05	1996-02-17	CCA
CRA1	2514	SALT_T1	COMP_RCK	1617	2003-03-31			1.6000E-09	1.6000E-09	1.6000E-09	1.6000E-09	1996-02-13	CCA
CRA1	2531	SALT_T2	COMP_RCK	1618	2003-03-31			1.6000E-09	1.6000E-09	1.6000E-09	1.6000E-09	1996-02-14	CCA
CRA1	2548	SALT_T3	COMP_RCK	1619	2003-03-31			1.6000E-09	1.6000E-09	1.6000E-09	1.6000E-09	1996-02-14	CCA
CRA1	2565	SALT_T4	COMP_RCK	1620	2003-03-31			1.6000E-09	1.6000E-09	1.6000E-09	1.6000E-09	1996-02-14	CCA
CRA1	2582	SALT_T5	COMP_RCK	1621	2003-03-31			1.6000E-09	1.6000E-09	1.6000E-09	1.6000E-09	1996-02-14	CCA
CRA1	2984	SALT_T6	COMP_RCK	1622	2003-03-31			1.6000E-09	1.6000E-09	1.6000E-09	1.6000E-09	1996-02-13	CCA
AP106	3550	SHFTU	COMP_POR	1567	2003-01-27				new				
AP106	3562	SHFTL_T1	COMP_POR	1579	2003-01-27				new				
AP106	3563	SHFTL_T1	KPT	1580	2003-01-27				new				
AP106	3564	SHFTL_T1	PC_MAX	1581	2003-01-27				new				
AP106	3565	SHFTL_T1	PCT_A	1582	2003-01-27				new				
AP106	3566	SHFTL_T1	PCT_EXP	1583	2003-01-27				new				
AP106	3567	SHFTL_T1	PO_MIN	1584	2003-01-27				new				
AP106	3568	SHFTL_T1	POROSITY	1585	2003-01-27				new				
AP106	3569	SHFTL_T1	PRMX_LOG	1586	2003-01-27				new				
AP106	3570	SHFTL_T1	RELP_MOD	1587	2003-01-27				new				
AP106	3571	SHFTL_T1	SAT_IBRN	1588	2003-01-27				new				
AP106	3572	SHFTL_T2	COMP_POR	1589	2003-01-27				new				
AP106	3573	SHFTL_T2	KPT	1590	2003-01-27				new				
AP106	3574	SHFTL_T2	PC_MAX	1591	2003-01-27				new				

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AP106	3575	SHFTL_T2	PCT_A	1592	2003-01-27				new				
AP106	3576	SHFTL_T2	PCT_EXP	1593	2003-01-27				new				
AP106	3577	SHFTL_T2	PO_MIN	1594	2003-01-27				new				
AP106	3578	SHFTL_T2	POROSITY	1595	2003-01-27				new				
AP106	3579	SHFTL_T2	PRMX_LOG	1596	2003-01-27				new				
AP106	3580	SHFTL_T2	RELP_MOD	1597	2003-01-27				new				
AP106	3581	SHFTL_T2	SAT_IBRN	1598	2003-01-27				new				
AP106	3551	SHFTU	KPT	1568	2003-01-27				new				
AP106	3552	SHFTU	PC_MAX	1569	2003-01-27				new				
AP106	3553	SHFTU	PCT_A	1570	2003-01-27				new				
AP106	3554	SHFTU	PCT_EXP	1571	2003-01-27				new				
AP106	3555	SHFTU	PO_MIN	1572	2003-01-27				new				
AP106	3556	SHFTU	POROSITY	1573	2003-01-27				new				
AP106	3557	SHFTU	PRMX_LOG	1574	2003-01-27				new				
AP106	3558	SHFTU	RELP_MOD	1575	2003-01-27				new				
AP106	3559	SHFTU	SAT_IBRN	1576	2003-01-27				new				
AP106	3560	SHFTU	SAT_RBRN	1577	2003-01-27				new				
AP106	3561	SHFTU	SAT_RGAS	1578	2003-01-27				new				
CRA1	3628	SOLMOD3	SOLCOC	1743	2003-05-12				new				
CRA1	3629	SOLMOD3	SOLCOH	1744	2003-05-12				new				
CRA1	3630	SOLMOD3	SOLSOC	1745	2003-05-12				new				
CRA1	3631	SOLMOD3	SOLSOH	1746	2003-05-12				new				
CRA1	3632	SOLMOD4	SOLCOC	1747	2003-05-12				new				
CRA1	3633	SOLMOD4	SOLCOH	1748	2003-05-12				new				
CRA1	3634	SOLMOD4	SOLSOC	1749	2003-05-12				new				
CRA1	3635	SOLMOD4	SOLSOH	1750	2003-05-12				new				
CRA1	3636	SOLMOD5	SOLCOC	1751	2003-05-12				new				
CRA1	3637	SOLMOD5	SOLCOH	1752	2003-05-12				new				
CRA1	3638	SOLMOD5	SOLSOC	1753	2003-05-12				new				

Table 1. Section 2. Parameters That Have Changed Since the Technical Baseline Migration (TBM).

CRA1	3639	SOLMOD5	SOLSOH	1754	2003-05-12				new				
CRA1	3640	SOLMOD6	SOLCOC	1755	2003-05-12				new				
CRA1	3641	SOLMOD6	SOLCOH	1756	2003-05-12				new				
CRA1	3642	SOLMOD6	SOLSOC	1757	2003-05-12				new				
CRA1	3643	SOLMOD6	SOLSOH	1758	2003-05-12				new				
CRA1	3627	SOLTH4	SOLCIM	1684	2003-05-09				new				
CRA1	3626	SOLU4	SOLCIM	1683	2003-05-09				new				
CRA1	3675	SPALLMO	ANNUROUG	1889	2003-09-30				new				
CRA1	3662	SPALLMO	BIOTBETA	1876	2003-09-18				new				
CRA1	3665	SPALLMO	BITNZDIA	1879	2003-09-18				new				
CRA1	3653	SPALLMO	BITNZNO	1867	2003-09-17				new				
CRA1	3652	SPALLMO	COHESION	1866	2003-09-17				new				
CRA1	3677	SPALLMO	DDZPERM	1891	2003-10-06				new				
CRA1	3659	SPALLMO	DDZTHICK	1873	2003-09-17				new				
CRA1	3674	SPALLMO	DRILRATE	1888	2003-09-30				new				
CRA1	3668	SPALLMO	DRZPERM	1880	2003-09-18				new				
CRA1	3654	SPALLMO	FFSTRESS	1868	2003-09-17				new				
CRA1	3657	SPALLMO	FRICTANG	1871	2003-09-17				new				
CRA1	3671	SPALLMO	MUDPRATE	1885	2003-09-30				new				
CRA1	3673	SPALLMO	MUDSOLMX	1887	2003-09-30				new				
CRA1	3670	SPALLMO	MUDSOLVE	1884	2003-09-30				new				
CRA1	3667	SPALLMO	PARTDIAM	1882	2003-09-22				new				
CRA1	3660	SPALLMO	PIPEID	1874	2003-09-17				new				
CRA1	3663	SPALLMO	PIPEROUG	1877	2003-09-18				new				
CRA1	3672	SPALLMO	POISRAT	1886	2003-09-30				new				
CRA1	3651	SPALLMO	REFPRS	1865	2003-09-17				new				
CRA1	3666	SPALLMO	REPIPERM	1883	2003-09-22				new				
CRA1	3655	SPALLMO	REPOSTOP	1869	2003-09-17				new				
CRA1	3664	SPALLMO	SALTDENS	1878	2003-09-18				new				

Table 1. Section 2. Parameters That Have Changed Since the Technical Baseline Migration (TBM).

CRA1	3669	SPALLMO	SHAPEFAC	1881	2003-09-18				new				
CRA1	3661	SPALLMO	STPDVOLR	1875	2003-09-17				new				
CRA1	3656	SPALLMO	STPPVOLR	1870	2003-09-17				new				
CRA1	3658	SPALLMO	SURFELEV	1872	2003-09-17				new				
CRA1	3676	SPALLMO	TENSLSTR	1890	2003-09-30				new				
CRA1	2039	SR90	INVCHD	1725	2003-05-09		1845	2.7700E+03	2.7700E+03	2.7700E+03	2.7700E+03	1996-10-29	CCA
CRA1	2039	SR90	INVCHD	1845	2003-08-29	1725		2.8200E+04	2.8200E+04	2.8200E+04	2.8200E+04	2003-05-09	CRA1
CRA1	518	SR90	INVRHD	1726	2003-05-09		1846	8.4500E+04	8.4500E+04	8.4500E+04	8.4500E+04	1996-10-29	CCA
CRA1	518	SR90	INVRHD	1846	2003-08-29	1726		1.1800E+05	1.1800E+05	1.1800E+05	1.1800E+05	2003-05-09	CRA1
CRA1	605	TH229	INVCHD	1727	2003-05-09		1847	9.2900E+00	9.2900E+00	9.2900E+00	9.2900E+00	1996-10-29	CCA
CRA1	605	TH229	INVCHD	1847	2003-08-29	1727		6.1200E+00	6.1200E+00	6.1200E+00	6.1200E+00	2003-05-09	CRA1
CRA1	606	TH229	INVRHD	1728	2003-05-09		1848	6.8300E-01	6.8300E-01	6.8300E-01	6.8300E-01	1996-10-29	CCA
CRA1	606	TH229	INVRHD	1848	2003-08-29	1728		1.8300E-01	1.8300E-01	1.8300E-01	1.8300E-01	2003-05-09	CRA1
CRA1	609	TH230	INVCHD	1729	2003-05-09	1546	1849	2.9000E-01	2.9000E-01	2.9000E-01	2.9000E-01	2002-06-12	TBM
CRA1	609	TH230	INVCHD	1849	2003-08-29	1729		2.2600E-01	2.2600E-01	2.2600E-01	2.2600E-01	2003-05-09	CRA1
CRA1	610	TH230	INVRHD	1730	2003-05-09		1850	2.2200E-02	2.2200E-02	2.2200E-02	2.2200E-02	1996-10-29	CCA
CRA1	610	TH230	INVRHD	1850	2003-08-29	1730		7.2400E-03	7.2400E-03	7.2400E-03	7.2400E-03	2003-05-09	CRA1
CRA1	3508	TH230L	INVCHD	1766	2003-05-12	1558	1802	9.5800E+00	9.5800E+00	9.5800E+00	9.5800E+00	2002-06-18	TBM
CRA1	3508	TH230L	INVCHD	1802	2003-08-29	1766		6.3500E+00	6.3500E+00	6.3500E+00	6.3500E+00	2003-05-12	CRA1
CRA1	3513	TH230L	INVRHD	1767	2003-05-12	1560	1803	7.0500E-01	7.0500E-01	7.0500E-01	7.0500E-01	2002-06-18	TBM
CRA1	3513	TH230L	INVRHD	1803	2003-08-29	1767		1.9000E-01	1.9000E-01	1.9000E-01	1.9000E-01	2003-05-12	CRA1
CRA1	613	TH232	INVCHD	1731	2003-05-09		1851	9.1400E-01	9.1400E-01	9.1400E-01	9.1400E-01	1996-10-29	CCA
CRA1	613	TH232	INVCHD	1851	2003-08-29	1731		6.6300E+00	6.6300E+00	6.6300E+00	6.6300E+00	2003-05-09	CRA1
CRA1	614	TH232	INVRHD	1732	2003-05-09		1852	9.2600E-02	9.2600E-02	9.2600E-02	9.2600E-02	1996-10-29	CCA
CRA1	614	TH232	INVRHD	1852	2003-08-29	1732		2.9100E-01	2.9100E-01	2.9100E-01	2.9100E-01	2003-05-09	CRA1
CRA1	634	U233	INVCHD	1733	2003-05-09		1853	1.7900E+03	1.7900E+03	1.7900E+03	1.7900E+03	1996-04-26	CCA
CRA1	634	U233	INVCHD	1853	2003-08-29	1733		1.4300E+03	1.4300E+03	1.4300E+03	1.4300E+03	2003-05-09	CRA1
CRA1	635	U233	INVRHD	1734	2003-05-09		1854	1.5800E+02	1.5800E+02	1.5800E+02	1.5800E+02	1996-04-26	CCA
CRA1	635	U233	INVRHD	1854	2003-08-29	1734		4.3800E+01	4.3800E+01	4.3800E+01	4.3800E+01	2003-05-09	CRA1

Table 1. Section 2. Parameters That Have Changed Since the Technical Baseline Migration (TBM).

CRA1	638	U234	INVCHD	1735	2003-05-09	1545	1855	7.2700E+02	7.2700E+02	7.2700E+02	7.2700E+02	2002-06-12	TBM
CRA1	638	U234	INVCHD	1855	2003-08-29	1735		3.6400E+02	3.6400E+02	3.6400E+02	3.6400E+02	2003-05-09	CRA1
CRA1	639	U234	INVRHD	1736	2003-05-09		1856	4.2900E+01	4.2900E+01	4.2900E+01	4.2900E+01	1996-10-29	CCA
CRA1	639	U234	INVRHD	1856	2003-08-29	1736		2.3500E+01	2.3500E+01	2.3500E+01	2.3500E+01	2003-05-09	CRA1
CRA1	3507	U234L	INVCHD	1768	2003-05-12	1561	1804	2.5200E+03	2.5200E+03	2.5200E+03	2.5200E+03	2002-06-18	TBM
CRA1	3507	U234L	INVCHD	1804	2003-08-29	1768		1.7900E+03	1.7900E+03	1.7900E+03	1.7900E+03	2003-05-12	CRA1
CRA1	3512	U234L	INVRHD	1769	2003-05-12	1562	1805	2.0100E+02	2.0100E+02	2.0100E+02	2.0100E+02	2002-06-18	TBM
CRA1	3512	U234L	INVRHD	1805	2003-08-29	1769		6.7300E+01	6.7300E+01	6.7300E+01	6.7300E+01	2003-05-12	CRA1
CRA1	642	U235	INVCHD	1737	2003-05-09		1857	1.2800E+01	1.2800E+01	1.2800E+01	1.2800E+01	1996-04-26	CCA
CRA1	642	U235	INVCHD	1857	2003-08-29	1737		1.3800E+00	1.3800E+00	1.3800E+00	1.3800E+00	2003-05-09	CRA1
CRA1	643	U235	INVRHD	1738	2003-05-09		1858	4.6300E+00	4.6300E+00	4.6300E+00	4.6300E+00	1996-04-26	CCA
CRA1	643	U235	INVRHD	1858	2003-08-29	1738		9.7900E-01	9.7900E-01	9.7900E-01	9.7900E-01	2003-05-09	CRA1
CRA1	2216	U236	INVCHD	1739	2003-05-09		1859	5.6900E-01	5.6900E-01	5.6900E-01	5.6900E-01	1996-10-29	CCA
CRA1	2216	U236	INVCHD	1859	2003-08-29	1739		2.6000E-01	2.6000E-01	2.6000E-01	2.6000E-01	2003-05-09	CRA1
CRA1	646	U236	INVRHD	1740	2003-05-09		1860	1.0300E-01	1.0300E-01	1.0300E-01	1.0300E-01	1996-10-29	CCA
CRA1	646	U236	INVRHD	1860	2003-08-29	1740		1.4800E+00	1.4800E+00	1.4800E+00	1.4800E+00	2003-05-09	CRA1
CRA1	649	U238	INVCHD	1741	2003-05-09		1861	3.9600E+01	3.9600E+01	3.9600E+01	3.9600E+01	1996-04-26	CCA
CRA1	649	U238	INVCHD	1861	2003-08-29	1741		2.4600E+01	2.4600E+01	2.4600E+01	2.4600E+01	2003-05-09	CRA1
CRA1	650	U238	INVRHD	1742	2003-05-09		1862	1.0500E+01	1.0500E+01	1.0500E+01	1.0500E+01	1996-04-25	CCA
CRA1	650	U238	INVRHD	1862	2003-08-29	1742		1.3100E+02	1.3100E+02	1.3100E+02	1.3100E+02	2003-05-09	CRA1
AMW	3649	WAS_AMW	CLOSMOD1	1793	2003-08-28				new				
AMW	3650	WAS_AMW	CLOSMOD2	1794	2003-08-28				new				
AMW	3648	WAS_AMW	FRACAMW	1792	2003-08-28				new				
CRA1	2041	WAS_ARE	DCELLCHW	1682	2003-04-08		1779	5.4000E+01	5.4000E+01	5.4000E+01	5.4000E+01	1996-02-13	CCA
CRA1	2041	WAS_ARE	DCELLCHW	1779	2003-08-19	1682		7.5000E+01	7.5000E+01	7.5000E+01	7.5000E+01	2003-04-08	CRA1
CRA1	2274	WAS_ARE	DCELLRHW	1681	2003-04-08		1780	1.7000E+01	1.7000E+01	1.7000E+01	1.7000E+01	1996-02-13	CCA
CRA1	2274	WAS_ARE	DCELLRHW	1780	2003-08-19	1681		6.1000E+00	6.1000E+00	6.1000E+00	6.1000E+00	2003-04-08	CRA1
CRA1	1992	WAS_ARE	DIRNCCHW	1680	2003-04-08		1775	1.3900E+02	1.3900E+02	1.3900E+02	1.3900E+02	1996-02-13	CCA
CRA1	1992	WAS_ARE	DIRNCCHW	1775	2003-08-19	1680		2.3000E+02	2.3000E+02	2.3000E+02	2.3000E+02	2003-04-08	CRA1

Table 1. Section 2. Parameters That Have Changed Since the Technical Baseline Migration (TBM).

CRA1	1993	WAS_ARE	DIRNCRHW	1679	2003-04-08		1776	2.5910E+03	2.5910E+03	2.5910E+03	2.5910E+03	1996-02-13	CCA
CRA1	1993	WAS_ARE	DIRNCRHW	1776	2003-08-19	1679		3.9000E+02	3.9000E+02	3.9000E+02	3.9000E+02	2003-04-08	CRA1
CRA1	2040	WAS_ARE	DIRONCHW	1678	2003-04-08		1781	1.7000E+02	1.7000E+02	1.7000E+02	1.7000E+02	1996-02-13	CCA
CRA1	2040	WAS_ARE	DIRONCHW	1781	2003-08-19	1678		1.4000E+02	1.4000E+02	1.4000E+02	1.4000E+02	2003-04-08	CRA1
CRA1	2044	WAS_ARE	DIRONRHW	1677	2003-04-08		1782	1.0000E+02	1.0000E+02	1.0000E+02	1.0000E+02	1996-02-13	CCA
CRA1	2044	WAS_ARE	DIRONRHW	1782	2003-08-19	1677		1.2000E+02	1.2000E+02	1.2000E+02	1.2000E+02	2003-04-08	CRA1
CRA1	2043	WAS_ARE	DPLASCHW	1676	2003-04-08		1783	3.4000E+01	3.4000E+01	3.4000E+01	3.4000E+01	1996-02-13	CCA
CRA1	2043	WAS_ARE	DPLASCHW	1783	2003-08-19	1676		5.5000E+01	5.5000E+01	5.5000E+01	5.5000E+01	2003-04-08	CRA1
CRA1	2275	WAS_ARE	DPLASRHW	1675	2003-04-08		1784	1.5000E+01	1.5000E+01	1.5000E+01	1.5000E+01	1996-02-13	CCA
CRA1	2275	WAS_ARE	DPLASRHW	1784	2003-08-19	1675		7.0000E+00	7.0000E+00	7.0000E+00	7.0000E+00	2003-04-08	CRA1
CRA1	1995	WAS_ARE	DPLSCCHW	1674	2003-04-08		1777	2.6000E+01	2.6000E+01	2.6000E+01	2.6000E+01	1996-02-13	CCA
CRA1	1995	WAS_ARE	DPLSCCHW	1777	2003-08-19	1674		2.1000E+01	2.1000E+01	2.1000E+01	2.1000E+01	2003-04-08	CRA1
CRA1	2228	WAS_ARE	DPLSCRHW	1673	2003-04-08		1778	3.1000E+00	3.1000E+00	3.1000E+00	3.1000E+00	1996-02-13	CCA
CRA1	2228	WAS_ARE	DPLSCRHW	1778	2003-08-19	1673		1.2000E+00	1.2000E+00	1.2000E+00	1.2000E+00	2003-04-08	CRA1
CRA1	2042	WAS_ARE	DRUBBCHW	1672	2003-04-08		1785	1.0000E+01	1.0000E+01	1.0000E+01	1.0000E+01	1996-02-13	CCA
CRA1	2042	WAS_ARE	DRUBBCHW	1785	2003-08-19	1672		1.9000E+01	1.9000E+01	1.9000E+01	1.9000E+01	2003-04-08	CRA1
CRA1	2046	WAS_ARE	DRUBBRHW	1671	2003-04-08		1786	3.3000E+00	3.3000E+00	3.3000E+00	3.3000E+00	1996-02-13	CCA
CRA1	2046	WAS_ARE	DRUBBRHW	1786	2003-08-19	1671		3.6000E+00	3.6000E+00	3.6000E+00	3.6000E+00	2003-04-08	CRA1
CRA1	3682	SPALLMO	DRZTCK	1898	2004/03/26								CRA1
CRA1	3681	SPALLMO	FRCHBETA	1897	2004/03/26								CRA1
CRA1	3680	SPALLMO	REPOSTCK	1896	2004/03/26								CRA1
CRA1	3679	SPALLMO	REPOTRAD	1895	2004/03/26								CRA1
TBM	3482	AM+3	MKD_AM	1600	2003-02-05	1015		1.0000E-01	6.0000E-02	9.0000E-03	4.0000E-01	2002-02-14	TBM
TBM	3482	AM+3	MKD_AM	1015	2002-02-14		1600	2.6000E-01	2.6000E-01	2.0000E-02	5.0000E-01	1996-06-12	CCA
TBM	3480	PU+3	MKD_PU	1027	2002-02-14		1599	2.6000E-01	2.6000E-01	2.0000E-02	5.0000E-01	1996-06-12	CCA
TBM	3480	PU+3	MKD_PU	1599	2003-02-05	1027		1.0000E-01	6.0000E-02	9.0000E-03	4.0000E-01	2002-02-14	TBM
TBM	3402	SOLMOD3	SOLCIM	1029	2002-02-14		1566	6.5200E-08	6.5200E-08	6.5200E-08	6.5200E-08	1996-05-24	CCA
TBM	3402	SOLMOD3	SOLCIM	1566	2002-12-24	1029		1.3800E-08	1.3800E-08	1.3800E-08	1.3800E-08	2002-02-14	TBM

Table 1 Section 3

Table 1. Section 3. Parameters That Have Changed Since the Technical Baseline Migration (TBM)

Analy-sis	Param. ID No.	Material ID	Property ID	Support ERMS #	Date	PDE Check	PDE ERMS#	Date	Comments
CRA1	4	AM241	INVCHD	529130	8-May-03	1	529449	9-May-03	
CRA1	4	AM241	INVCHD	531103	28-Aug-03	1	531234	29-Aug-03	
CRA1	5	AM241	INVRHD	529130	8-May-03	1	529450	9-May-03	
CRA1	5	AM241	INVRHD	531103	28-Aug-03	1	531235	29-Aug-03	
CRA1	3504	AM241L	INVCHD	529289	12-May-03	1	529420	12-May-03	
CRA1	3504	AM241L	INVCHD	531090	28-Aug-03	1	531306	29-Aug-03	
CRA1	3509	AM241L	INVRHD	529289	12-May-03	1	529421	12-May-03	
CRA1	3509	AM241L	INVRHD	531090	28-Aug-03	1	531307	29-Aug-03	
CRA1	3415	AM243	INVCHD	529130	8-May-03	1	529451	9-May-03	
CRA1	3415	AM243	INVCHD	531103	28-Aug-03	1	531236	29-Aug-03	
CRA1	3416	AM243	INVRHD	529130	8-May-03	1	529452	9-May-03	
CRA1	3416	AM243	INVRHD	531103	28-Aug-03	1	531237	29-Aug-03	
CRA1	2277	ASPHALT	COMP_RCK	526661	29-Mar-03	1	527574	31-Mar-03	
CRA1	3473	BLOWOUT	THCK_CAS	530503	1-Aug-03	3	530605	1-Aug-03	PDE param type changed by data entry person, not PDE requester; checked support ERMS document, and change is correct
CRA1	3414	BOREHOLE	WUF	529148	9-May-03	1	529446	12-May-03	
CRA1	3414	BOREHOLE	WUF	531099	28-Aug-03	1	531318	29-Aug-03	
CRA1	108	CF252	INVCHD	529130	8-May-03	1	529453	9-May-03	
CRA1	108	CF252	INVCHD	531103	28-Aug-03	1	531238	29-Aug-03	
CRA1	109	CF252	INVRHD	529130	8-May-03	1	529454	9-May-03	
CRA1	109	CF252	INVRHD	531103	28-Aug-03	1	531239	29-Aug-03	
CRA1	2328	CL_L_T1	COMP_RCK	526661	19-Mar-03	1	527583	31-Mar-03	
CRA1	2345	CL_L_T2	COMP_RCK	526661	19-Mar-03	1	527584	31-Mar-03	
CRA1	2362	CL_L_T3	COMP_RCK	526661	19-Mar-03	1	527585	31-Mar-03	
CRA1	3071	CL_L_T4	COMP_RCK	526661	19-Mar-03	1	527586	31-Mar-03	
CRA1	2379	CL_M_T1	COMP_RCK	526661	19-Mar-03	1	527577	31-Mar-03	

Table 1. Section 3. Parameters That Have Changed Since the Technical Baseline Migration (TBM)

CRA1	2396	CL_M_T2	COMP_RCK	526661	19-Mar-03	1	527578	31-Mar-03	
CRA1	2413	CL_M_T3	COMP_RCK	526661	19-Mar-03	1	527579	31-Mar-03	
CRA1	2430	CL_M_T4	COMP_RCK	526661	19-Mar-03	1	527580	31-Mar-03	
CRA1	2447	CL_M_T5	COMP_RCK	526661	19-Mar-03	1	527581	31-Mar-03	
CRA1	2311	CLAY_BOT	COMP_RCK	526661	19-Mar-03	1	527594	31-Mar-03	
CRA1	3001	CLAY_RUS	COMP_RCK	526661	19-Mar-03	1	527573	31-Mar-03	
CRA1	3410	CM243	INVCHD	529130	8-May-03	1	520455	9-May-03	
CRA1	3410	CM243	INVCHD	531103	28-Aug-03	1	531241	29-Aug-03	No change from May values
CRA1	3411	CM243	INVRHD	529130	8-May-03	1	529456	9-May-03	
CRA1	3411	CM243	INVRHD	531103	28-Aug-03	1	531242	29-Aug-03	
CRA1	112	CM244	INVCHD	529130	8-May-03	1	529457	9-May-03	
CRA1	112	CM244	INVCHD	531103	28-Aug-03	1	531244	29-Aug-03	
CRA1	112	CM244	INVCHD	531187	3-Sep-03	1	531232	3-Sep-03	PPR ERMS # 531232, correcting value from 0 to 3.39E3
CRA1	113	CM244	INVRHD	529130	8-May-03	1	529458	9-May-03	
CRA1	113	CM244	INVRHD	531103	28-Aug-03	1	531245	29-Aug-03	
CRA1	3412	CM245	INVCHD	529130	08 MAY 03	1	529459	9-May-03	
CRA1	3412	CM245	INVCHD	531103	28-Aug-03	1	531247	29-Aug-03	
CRA1	3413	CM245	INVRHD	529130	8-May-03	1	529460	9-May-03	
CRA1	3413	CM245	INVRHD	531103	28-Aug-03	1	531248	29-Aug-03	
CRA1	2265	CM248	INVCHD	529130	8-May-03	1	529461	9-May-03	
CRA1	2265	CM248	INVCHD	531103	28-Aug-03	1	531250	29-Aug-03	
CRA1	2266	CM248	INVRHD	529130	8-May-03	1	529462	9-May-03	
CRA1	2266	CM248	INVRHD	531103	28-Aug-03	1	531251	29-Aug-03	
CRA1	3052	CONC_MON	COMP_RCK	526661	19-Mar-03	1	527596	31-Mar-03	
CRA1	3515	CONC_PCS	COMP_RCK	526661	19-Mar-03	1	527598	31-Mar-03	
CRA1	3148	CONC_PLG	COMP_RCK	526661	19-Mar-03	1	527597	31-Mar-03	
CRA1	2464	CONC_T1	COMP_RCK	526661	19-Mar-03	1	527575	31-Mar-03	
CRA1	2481	CONC_T2	COMP_RCK	526661	19-Mar-03	1	527576	31-Mar-03	

Table 1. Section 3. Parameters That Have Changed Since the Technical Baseline Migration (TBM)

CRA1	2037	CS137	INVCHD	529130	8-May-03	1	529463	9-May-03	
CRA1	2037	CS137	INVCHD	531103	28-Aug-03	1	531253	29-Aug-03	
CRA1	118	CS137	INVRHD	529130	8-May-03	1	529464	9-May-03	
CRA1	118	CS137	INVRHD	531103	28-Aug-03	1	531254	29-Aug-03	
CRA1	142	CULEBRA	PRESSURE	530903	19-Aug-03	1	530956	20-Aug-03	
CRA1	143	CULEBRA	PRMX_LOG	530899	19-Aug-03	1	530953	20-Aug-03	
CRA1	144	CULEBRA	PRMY_LOG	530899	19-Aug-03	1	530955	20-Aug-03	
CRA1	145	CULEBRA	PRMZ_LOG	530899	19-Aug-03	1	530954	20-Aug-03	
CRA1	2497	EARTH	COMP_RCK	526661	19-Aug-03	1	527571	31-Mar-03	
CRA1	3494	GLOBAL	LAMBDAD	527192	26-Nov-02	1	531502	8-Sep-03	
CRA1	3644	GLOBAL	ONEPLG	531352	5-Sep-03	1	531501	8-Sep-03	
CRA1	3646	GLOBAL	THREEPLG	531352	5-Sep-03	1	531499	8-Sep-03	
CRA1	3645	GLOBAL	TWOPLG	531352	5-Sep-03	1	531500	8-Sep-03	
CRA1	2101	MAGENTA	PRESSURE	530903	19-Aug-03	1	530957	20-Aug-03	
CRA1	248	NP237	INVCHD	529130	8-May-03	1	529465	9-May-03	
CRA1	248	NP237	INVCHD	531103	28-Aug-03	1	531257	29-Aug-03	
CRA1	249	NP237	INVRHD	529130	8-May-03	1	529466	9-May-03	
CRA1	249	NP237	INVRHD	531103	28-Aug-03	1	531258	29-Aug-03	
CRA1	2267	PA231	INVCHD	529130	8-May-03	1	529467	9-May-03	
CRA1	2267	PA231	INVCHD	531103	28-Aug-03	1	531259	29-Aug-03	
CRA1	2268	PA231	INVRHD	529130	8-May-03	1	529468	9-May-03	
CRA1	2268	PA231	INVRHD	531103	28-Aug-03	1	531260	29-Aug-03	
CRA1	253	PAN_SEAL	COMP_RCK	526661	19-Mar-03	1	527599	31-Mar-03	
CRA1	285	PB210	INVCHD	529130	8-May-03	1	529469	9-May-03	
CRA1	285	PB210	INVCHD	531103	28-Aug-03	1	531261	29-Aug-03	
CRA1	286	PB210	INVRHD	529130	8-May-03	1	529470	9-May-03	
CRA1	286	PB210	INVRHD	531103	28-Aug-03	1	531262	29-Aug-03	
CRA1	2038	PM147	INVCHD	529130	8-May-03	1	529471	9-May-03	

Table 1. Section 3. Parameters That Have Changed Since the Technical Baseline Migration (TBM)

CRA1	2038	PM147	INVCHD	531103	28-Aug-03	1	531263	29-Aug-03	
CRA1	289	PM147	INVRHD	529130	8-May-03	1	529472	9-May-03	
CRA1	289	PM147	INVRHD	531103	28-Aug-03	1	531264	29-Aug-03	
CRA1	293	PU238	INVCHD	529130	8-May-03	1	529473	9-May-03	
CRA1	293	PU238	INVCHD	531103	28-Aug-03	1	531265	29-Aug-03	
CRA1	294	PU238	INVRHD	529130	8-May-03	1	529474	9-May-03	
CRA1	294	PU238	INVRHD	531103	28-Aug-03	1	531267	29-Aug-03	
CRA1	3506	PU238L	INVCHD	529130	8-May-03	1	529422	12-May-03	
CRA1	3506	PU238L	INVCHD	531103	28-Aug-03	1	531308	29-Aug-03	
CRA1	3511	PU238L	INVRHD	529130	8-May-03	1	529423	12-May-03	
CRA1	3511	PU238L	INVRHD	531103	28-Aug-03	1	531309	29-Aug-03	
CRA1	297	PU239	INVCHD	529130	8-May-03	1	529475	9-May-03	
CRA1	297	PU239	INVCHD	531103	28-Aug-03	1	531268	29-Aug-03	
CRA1	298	PU239	INVRHD	529130	8-May-03	1	529476	9-May-03	
CRA1	298	PU239	INVRHD	531103	28-Aug-03	1	531270	29-Aug-03	
CRA1	3505	PU239L	INVCHD	529130	8-May-03	1	529424	12-May-03	
CRA1	3505	PU239L	INVCHD	531103	28-Aug-03	1	531310	29-Aug-03	
CRA1	3510	PU239L	INVRHD	529130	8-May-03	1	529425	12-May-03	
CRA1	3510	PU239L	INVRHD	531103	28-Aug-03	1	531312	29-Aug-03	
CRA1	301	PU240	INVCHD	529130	8-May-03	1	529477	9-May-03	
CRA1	301	PU240	INVCHD	531103	28-Aug-03	1	531271	29-Aug-03	
CRA1	302	PU240	INVRHD	529130	8-May-03	1	529478	9-May-03	
CRA1	302	PU240	INVRHD	531103	28-Aug-03	1	531272	29-Aug-03	
CRA1	305	PU241	INVCHD	529130	8-May-03	1	529479	9-May-03	
CRA1	305	PU241	INVCHD	531103	28-Aug-03	1	531273	29-Aug-03	
CRA1	306	PU241	INVRHD	529130	8-May-03	1	529480	9-May-03	
CRA1	306	PU241	INVRHD	531103	28-Aug-03	1	531274	29-Aug-03	
CRA1	309	PU242	INVCHD	529130	8-May-03	1	529481	9-May-03	

Table 1. Section 3. Parameters That Have Changed Since the Technical Baseline Migration (TBM)

CRA1	309	PU242	INVCHD	531103	28-Aug-03	1	531279	29-Aug-03	
CRA1	310	PU242	INVRHD	529130	8-May-03	1	529482	9-May-03	
CRA1	310	PU242	INVRHD	531103	28-Aug-03	1	531280	29-Aug-03	
CRA1	2269	PU244	INVCHD	529130	8-May-03	1	529483	9-May-03	
CRA1	2269	PU244	INVCHD	531103	28-Aug-03	1	531281	29-Aug-03	
CRA1	2270	PU244	INVRHD	529130	8-May-03	1	529484	9-May-03	
CRA1	2270	PU244	INVRHD	531103	28-Aug-03	1	531282	29-Aug-03	
CRA1	316	RA226	INVCHD	529130	8-May-03	1	529485	9-May-03	
CRA1	316	RA226	INVCHD	531103	28-Aug-03	1	531283	29-Aug-03	
CRA1	317	RA226	INVRHD	529130	8-May-03	1	529486	9-May-03	
CRA1	317	RA226	INVRHD	531103	28-Aug-03	1	531284	29-Aug-03	
CRA1	2271	RA228	INVCHD	529130	8-May-03	1	529487	9-May-03	
CRA1	2271	RA228	INVCHD	531103	28-Aug-03	1	531285	29-Aug-03	
CRA1	2272	RA228	INVRHD	529130	8-May-03	1	529488	9-May-03	
CRA1	2272	RA228	INVRHD	531103	28-Aug-03	1	531286	29-Aug-03	
CRA1-B	3590	REFCON	BIP_11	526858	24-Mar-03	1	527628	1-Apr-03	
CRA1-B	3591	REFCON	BIP_12	526858	24-Mar-03	1	527630	1-Apr-03	
CRA1-B	3592	REFCON	BIP_13	526858	24-Mar-03	1	527631	1-Apr-03	
CRA1-B	3593	REFCON	BIP_14	526858	24-Mar-03	1	527632	1-Apr-03	
CRA1-B	3594	REFCON	BIP_15	526858	24-Mar-03	1	527633	1-Apr-03	
CRA1-B	3595	REFCON	BIP_16	526858	24-Mar-03	1	527634	1-Apr-03	
CRA1-B	3596	REFCON	BIP_21	526858	24-Mar-03	1	527635	1-Apr-03	
CRA1-B	3597	REFCON	BIP_22	526858	24-Mar-03	1	527636	1-Apr-03	

Table 1. Section 3. Parameters That Have Changed Since the Technical Baseline Migration (TBM)

CRA1-B	3598	REFCON	BIP_23	526858	24-Mar-03	1	527637	1-Apr-03	
CRA1-B	3599	REFCON	BIP_24	526858	24-Mar-03	1	527638	1-Apr-03	
CRA1-B	3600	REFCON	BIP_25	526858	24-Mar-03	1	527639	1-Apr-03	
CRA1-B	3601	REFCON	BIP_26	526858	24-Mar-03	1	527640	1-Apr-03	
CRA1-B	3602	REFCON	BIP_31	526858	24-Mar-03	1	527641	1-Apr-03	
CRA1-B	3603	REFCON	BIP_32	526858	24-Mar-03	1	527642	1-Apr-03	
CRA1-B	3604	REFCON	BIP_33	526858	24-Mar-03	1	527643	1-Apr-03	
CRA1-B	3605	REFCON	BIP_34	526858	24-Mar-03	1	527644	1-Apr-03	
CRA1-B	3606	REFCON	BIP_35	526858	24-Mar-03	1	527645	1-Apr-03	
CRA1-B	3607	REFCON	BIP_36	526858	24-Mar-03	1	527646	1-Apr-03	
CRA1-B	3608	REFCON	BIP_41	526858	24-Mar-03	1	527649	1-Apr-03	
CRA1-B	3609	REFCON	BIP_42	526858	24-Mar-03	1	527600	1-Apr-03	
CRA1-B	3610	REFCON	BIP_43	526858	24-Mar-03	1	527602	1-Apr-03	
CRA1-B	3611	REFCON	BIP_44	526858	24-Mar-03	1	527603	1-Apr-03	
CRA1-B	3612	REFCON	BIP_45	526858	24-Mar-03	1	527604	1-Apr-03	
CRA1-B	3613	REFCON	BIP_46	526858	24-Mar-03	1	527605	1-Apr-03	
CRA1-B	3614	REFCON	BIP_51	526858	24-Mar-03	1	527606	1-Apr-03	

Table 1. Section 3. Parameters That Have Changed Since the Technical Baseline Migration (TBM)

CRA1-B	3615	REFCON	BIP_52	526858	24-Mar-03	1	527608	1-Apr-03	
CRA1-B	3616	REFCON	BIP_53	526858	24-Mar-03	1	527609	1-Apr-03	
CRA1-B	3617	REFCON	BIP_54	526858	24-Mar-03	1	527610	1-Apr-03	
CRA1-B	3618	REFCON	BIP_55	526858	24-Mar-03	1	527611	1-Apr-03	
CRA1-B	3619	REFCON	BIP_56	526858	24-Mar-03	1	527612	1-Apr-03	
CRA1-B	3620	REFCON	BIP_61	526858	24-Mar-03	1	527614	1-Apr-03	
CRA1-B	3621	REFCON	BIP_62	526858	24-Mar-03	1	527615	1-Apr-03	
CRA1-B	3622	REFCON	BIP_63	526858	24-Mar-03	1	527616	1-Apr-03	
CRA1-B	3623	REFCON	BIP_64	526858	24-Mar-03	1	527617	1-Apr-03	
CRA1-B	3624	REFCON	BIP_65	526858	24-Mar-03	1	527618	1-Apr-03	
CRA1-B	3625	REFCON	BIP_66	526858	24-Mar-03	1	527619	1-Apr-03	
CRA1-B	3647	REFCON	FVRW	529865	17-Jun-03	1	530276	26-Jun-03	
CRA1-B	3582	REFCON	LHSBLANK	525047	6-Jan-03	1	527692	27-Mar-03	
CRA1-B	3589	REFCON	MW_CELL	526858	24-Mar-03	1	527627	1-Apr-03	
CRA1-B	3585	REFCON	MW_CH4	526858	24-Mar-03	1	527623	1-Apr-03	
CRA1-B	3584	REFCON	MW_CO2	526858	24-Mar-03	1	527622	1-Apr-03	
CRA1-B	3587	REFCON	MW_H2S	526858	24-Mar-03	1	527625	1-Apr-03	

Table 1. Section 3. Parameters That Have Changed Since the Technical Baseline Migration (TBM)

CRA1-B	3586	REFCON	MW_N2	526858	24-Mar-03	1	527624	1-Apr-03	
CRA1-B	3583	REFCON	MW_NACL	526858	24-Mar-03	1	527620	1-Apr-03	
CRA1-B	3588	REFCON	MW_O2	526858	24-Mar-03	1	527626	1-Apr-03	
CRA1	3108	REFCON	VREPOS	523760	17-Sep-02	3	527693	27-Mar-03	No contemporaneous document reference to support March entry (change in value), checked references--value correct and references sufficient.
CRA1	2514	SALT_T1	COMP_RCK	526661	19-Mar-03	1	527587	31-Mar-03	
CRA1	2531	SALT_T2	COMP_RCK	526661	19-Mar-03	1	527589	31-Mar-03	
CRA1	2548	SALT_T3	COMP_RCK	526661	19-Mar-03	1	527590	31-Mar-03	
CRA1	2565	SALT_T4	COMP_RCK	526661	19-Mar-03	1	527591	31-Mar-03	
CRA1	2582	SALT_T5	COMP_RCK	526661	19-Mar-03	1	527592	31-Mar-03	
CRA1	2984	SALT_T6	COMP_RCK	526661	19-Mar-03	1	527593	31-Mar-03	
AP106	3550	SHFTU	COMP_POR	525203	23-Jan-03	1	527657	27-Jan-03	
AP106	3562	SHFTL_T1	COMP_POR	525203	23-Jan-03	1	527673	27-Jan-03	
AP106	3563	SHFTL_T1	KPT	525203	23-Jan-03	1	527674	27-Jan-03	
AP106	3564	SHFTL_T1	PC_MAX	525203	23-Jan-03	1	527675	27-Jan-03	
AP106	3565	SHFTL_T1	PCT_A	525203	23-Jan-03	1	527676	27-Jan-03	
AP106	3566	SHFTL_T1	PCT_EXP	525203	23-Jan-03	1	527677	27-Jan-03	
AP106	3567	SHFTL_T1	PO_MIN	525203	23-Jan-03	1	527678	27-Jan-03	
AP106	3568	SHFTL_T1	POROSITY	525203	23-Jan-03	1	527679	27-Jan-03	
AP106	3569	SHFTL_T1	PRMX_LOG	525203	23-Jan-03	1	527672	27-Jan-03	
AP106	3570	SHFTL_T1	RELP_MOD	525203	23-Jan-03	2	527680	27-Jan-03	Value is struck out, initialed by data entry person; value changed from 40 to 4.0, no reference to a check with data requestor; supporting documentation references Excel spreadsheets in CMS, check of spreadsheets indicates value is correct.
AP106	3571	SHFTL_T1	SAT_IBRN	525203	23-Jan-03	1	527681	27-Jan-03	
AP106	3572	SHFTL_T2	COMP_POR	525203	23-Jan-03	1	527683	27-Jan-03	

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AP106	3573	SHFTL_T2	KPT	525203	23-Jan-03	1	527684	27-Jan-03	
AP106	3574	SHFTL_T2	PC_MAX	525203	23-Jan-03	1	527685	27-Jan-03	
AP106	3575	SHFTL_T2	PCT_A	525203	23-Jan-03	1	527686	27-Jan-03	
AP106	3576	SHFTL_T2	PCT_EXP	525203	23-Jan-03	1	527687	27-Jan-03	
AP106	3577	SHFTL_T2	PO_MIN	525203	23-Jan-03	1	527688	27-Jan-03	
AP106	3578	SHFTL_T2	POROSITY	525203	23-Jan-03	1	527689	27-Jan-03	
AP106	3579	SHFTL_T2	PRMX_LOG	525203	23-Jan-03	1	572682	27-Jan-03	
AP106	3580	SHFTL_T2	RELP_MOD	525203	23-Jan-03	1	527690	27-Jan-03	
AP106	3581	SHFTL_T2	SAT_IBRN	525203	23-Jan-03	1	527691	27-Jan-03	
AP106	3551	SHFTU	KPT	525203	23-Jan-03	1	527659	27-Jan-03	
AP106	3552	SHFTU	PC_MAX	525203	23-Jan-03	1	527660	27-Jan-03	
AP106	3553	SHFTU	PCT_A	525203	23-Jan-03	1	527661	27-Jan-03	
AP106	3554	SHFTU	PCT_EXP	525203	23-Jan-03	1	527663	27-Jan-03	
AP106	3555	SHFTU	PO_MIN	525203	23-Jan-03	1	527664	27-Jan-03	
AP106	3556	SHFTU	POROSITY	525203	23-Jan-03	1	527666	27-Jan-03	
AP106	3557	SHFTU	PRMX_LOG	525203	23-Jan-03	1	527656	27-Jan-03	
AP106	3558	SHFTU	RELP_MOD	525203	23-Jan-03	1	527667	27-Jan-03	
AP106	3559	SHFTU	SAT_IBRN	525203	23-Jan-03	1	527669	27-Jan-03	
AP106	3560	SHFTU	SAT_RBRN	525203	23-Jan-03	1	527670	27-Jan-03	
AP106	3561	SHFTU	SAT_RGAS	525203	23-Jan-03	1	527671	27-Jan-03	
CRA1	3628	SOLMOD3	SOLCOC	529131	8-May-03	1	529430	12-May-03	
CRA1	3629	SOLMOD3	SOLCOH	529131	8-May-03	1	529431	12-May-03	
CRA1	3630	SOLMOD3	SOLSOC	529131	8-May-03	1	529432	12-May-03	
CRA1	3631	SOLMOD3	SOLSOH	529131	8-May-03	1	529433	12-May-03	
CRA1	3632	SOLMOD4	SOLCOC	529131	8-May-03	1	529435	12-May-03	
CRA1	3633	SOLMOD4	SOLCOH	529131	8-May-03	1	529434	12-May-03	
CRA1	3634	SOLMOD4	SOLSOC	529131	8-May-03	1	529436	12-May-03	
CRA1	3635	SOLMOD4	SOLSOH	529131	8-May-03	1	529437	12-May-03	

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CRA1	3636	SOLMOD5	SOLCOC	529131	8-May-03	1	520438	12-May-03	
CRA1	3637	SOLMOD5	SOLCOH	529131	8-May-03	1	529439	12-May-03	
CRA1	3638	SOLMOD5	SOLSOC	529131	8-May-03	1	529440	12-May-03	
CRA1	3639	SOLMOD5	SOLSOH	529131	8-May-03	1	529441	12-May-03	
CRA1	3640	SOLMOD6	SOLCOC	529131	8-May-03	1	529442	12-May-03	
CRA1	3641	SOLMOD6	SOLCOH	529131	8-May-03	1	529443	12-May-03	
CRA1	3642	SOLMOD6	SOLSOC	529131	8-May-03	1	529444	12-May-03	
CRA1	3643	SOLMOD6	SOLSOH	529131	8-May-03	1	529445	12-May-03	
CRA1	3627	SOLTH4	SOLCIM	237791	23-May-96	3	529448	9-May-03	Date on support documentation is 23 May 1996; entry date 9 May 03; checked support documentation, value and supporting reference is correct.
CRA1	3626	SOLU4	SOLCIM	237791	23-May-96	3	529447	9-May-03	Date on support documentation is 23 May 1996; entry date 9 May 03; checked support documentation, value and supporting reference is correct.
CRA1	3675	SPALLMOD	ANNUROUG	531914, 531057	1 Sep 03, 11 Aug 03	1	531363	30-Sep-03	
CRA1	3662	SPALLMOD	BIOTBETA	531057	11-Aug-03	1	531923	18-Sep-03	
CRA1	3665	SPALLMOD	BITNZDIA	531057	11-Aug-03	1	531926	18-Sep-03	
CRA1	3653	SPALLMOD	BITNZNO	531057	11-Aug-03	1	531572	17-Sep-03	
CRA1	3652	SPALLMOD	COHESION	531057	11-Aug-03	1	531571	17-Sep-03	
CRA1	3677	SPALLMOD	DDZPERM	532259, 531914, 531057	30 Sep 03, 1 Sep 03, 11 Aug 03	1	531928	18-Sep-03	
CRA1	3659	SPALLMOD	DDZTHICK	531057	11-Aug-03	1	531578	17-Sep-03	
CRA1	3674	SPALLMOD	DRILRATE	531914, 531057	1 Sep 03, 11 Aug 03	1	532362	30-Sep-03	
CRA1	3668	SPALLMOD	DRZPERM	531481	11-Sep-03	1	532357	10-Oct-03	
CRA1	3654	SPALLMOD	FFSTRESS	531057	11-Aug-03	1	531573	17-Sep-03	
CRA1	3657	SPALLMOD	FRICTANG	531057	11-Aug-03	1	531576	17-Sep-03	

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CRA1	3671	SPALLMOD	MUDPRATE	531914, 531057	1 Sep 03, 11 Aug 03	1	532359	30-Sep-03	
CRA1	3673	SPALLMOD	MUDSOLMX	531914, 531057	1 Sep 03, 11 Aug 03	1	532361	30-Sep-03	
CRA1	3670	SPALLMOD	MUDSOLVE	531914, 531057	1 Sep 03, 11 Aug 03	1	532358	30-Sep-03	
CRA1	3667	SPALLMOD	PARTDIAM	531057	11-Aug-03	2	531932	22-Sep-03	Mean and Std. Dev. Values provided by data entry staff, not data requestor. Values checked and are correct.
CRA1	3660	SPALLMOD	PIPEID	531057	11-Aug-03	1	531580	17-Sep-03	
CRA1	3663	SPALLMOD	PIPEROUG	531057	11-Aug-03	1	531924	18-Sep-03	
CRA1	3672	SPALLMOD	POISRAT	531914, 531057	1 Sep 03, 11 Aug 03	1	532360	30-Sep-03	
CRA1	3651	SPALLMOD	REFPRS	531057	11-Aug-03	1	531570	17-Sep-03	
CRA1	3666	SPALLMOD	REPIPERM	531057	11-Aug-03	2	531931	22-Sep-03	Mean and Std. Deviation values calculated by data entry staff, not data requestor, handwritten values. Values checked and are correct.
CRA1	3655	SPALLMOD	REPOSTOP	531057	11-Aug-03	1	531574	17-Sep-03	
CRA1	3664	SPALLMOD	SALTDENS	531057	11-Aug-03	1	531925	18-Sep-03	
CRA1	3669	SPALLMOD	SHAPEFAC	531477, 530157	10 Sep 03, 11 Aug 03	1	531929	18-Sep-03	
CRA1	3661	SPALLMOD	STPDVOLR	531057	11-Aug-03	1	531579	17-Sep-03	
CRA1	3656	SPALLMOD	STPPVOLR	531057	11-Aug-03	1	531575	17-Sep-03	
CRA1	3658	SPALLMOD	SURFELEV	531057	11-Aug-03	1	531577	17-Sep-03	
CRA1	3676	SPALLMOD	TENSLSTR	531057	11-Aug-03	2	532364	30-Sep-03	The PDE had numerous changes to the original data entry values calculated by the data entry person with no reference to consultation with data requestor; max and min values agree with values in supporting ERMS # 531057, but distribution is listed as loguniform, not uniform. See Table 2 for this parameter for subsequent

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									resolution.
CRA1	2039	SR90	INVCHD	529130	8-May-03	1	529489	9-May-03	
CRA1	2039	SR90	INVCHD	531103	28-Aug-03	1	531287	29-Aug-03	
CRA1	518	SR90	INVRHD	529130	8-May-03	1	529490	9-May-03	
CRA1	518	SR90	INVRHD	531103	28-Aug-03	1	531288	29-Aug-03	
CRA1	605	TH229	INVCHD	529130	8-May-03	1	529491	9-May-03	
CRA1	605	TH229	INVCHD	531103	28-Aug-03	1	531289	29-Aug-03	
CRA1	606	TH229	INVRHD	529130	8-May-03	1	529482	9-May-03	
CRA1	606	TH229	INVRHD	531103	28-Aug-03	1	531290	29-Aug-03	
CRA1	609	TH230	INVCHD	529130	8-May-03	1	529493	9-May-03	
CRA1	609	TH230	INVCHD	531103	28-Aug-03	1	531291	29-Aug-03	
CRA1	610	TH230	INVRHD	529130	8-May-03	1	529494	9-May-03	
CRA1	610	TH230	INVRHD	531103	28-Aug-03	1	531292	29-Aug-03	
CRA1	3508	TH230L	INVCHD	529289	12-May-03	1	529426	12-May-03	
CRA1	3508	TH230L	INVCHD	531090	28-Aug-03	1	531314	29-Aug-03	
CRA1	3513	TH230L	INVRHD	529289	12-May-03	1	529427	12-May-03	
CRA1	3513	TH230L	INVRHD	529130	8-May-03	1	531315	29-Aug-03	
CRA1	613	TH232	INVCHD	529130	8-May-03	1	529495	9-May-03	
CRA1	613	TH232	INVCHD	531103	28-Aug-03	1	531293	29-Aug-03	
CRA1	614	TH232	INVRHD	529130	8-May-03	1	529496	9-May-03	
CRA1	614	TH232	INVRHD	531103	28-Aug-03	1	531294	29-Aug-03	
CRA1	634	U233	INVCHD	529130	8-May-03	1	529497	9-May-03	
CRA1	634	U233	INVCHD	531103	28-Aug-03	1	531295	29-Aug-03	
CRA1	635	U233	INVRHD	529130	8-May-03	1	529498	9-May-03	
CRA1	635	U233	INVRHD	531103	28-Aug-03	1	531296	29-Aug-03	
CRA1	638	U234	INVCHD	529130	8-May-03	1	529499	9-May-03	
CRA1	638	U234	INVCHD	531103	28-Aug-03	1	531297	29-Aug-03	
CRA1	639	U234	INVRHD	529130	8-May-03	1	529500	9-May-03	

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CRA1	639	U234	INVRHD	531103	28-Aug-03	1	531298	29-Aug-03	
CRA1	3507	U234L	INVCHD	529130	8-May-03	1	529428	12-May-03	
CRA1	3507	U234L	INVCHD	531103	28-Aug-03	1	531316	29-Aug-03	
CRA1	3512	U234L	INVRHD	529130	8-May-03	1	529429	12-May-03	
CRA1	3512	U234L	INVRHD	531103	28-Aug-03	1	531317	29-Aug-03	
CRA1	642	U235	INVCHD	529130	8-May-03	1	529501	9-May-03	
CRA1	642	U235	INVCHD	531103	28-Aug-03	1	531299	29-Aug-03	
CRA1	643	U235	INVRHD	529130	8-May-03	1	529502	9-May-03	
CRA1	643	U235	INVRHD	531103	28-Aug-03	1	531300	29-Aug-03	
CRA1	2216	U236	INVCHD	529130	8-May-03	1	529503	9-May-03	
CRA1	2216	U236	INVCHD	531103	28-Aug-03	1	531302	29-Aug-03	
CRA1	646	U236	INVRHD	529130	8-May-03	1	529504	9-May-03	
CRA1	646	U236	INVRHD	531103	28-Aug-03	1	531303	29-Aug-03	
CRA1	649	U238	INVCHD	529130	8-May-03	1	529505	9-May-03	
CRA1	649	U238	INVCHD	531103	28-Aug-03	1	531304	29-Aug-03	
CRA1	650	U238	INVRHD	529130	8-May-03	1	529506	9-May-03	
CRA1	650	U238	INVRHD	531103	28-Aug-03	1	531305	29-Aug-03	
AMW	3649	WAS_AMW	CLOSMOD1	531077	27-Aug-03	1	531122	28-Aug-03	
AMW	3650	WAS_AMW	CLOSMOD2	531077	27-Aug-03	1	531123	28-Aug-03	
AMW	3648	WAS_AMW	FRACAMW	531073	27-Aug-03	1	531121	28-Aug-03	
CRA1	2041	WAS_AREA	DCELLCHW	527270	2-Apr-03	1	527668	8-Apr-03	
CRA1	2041	WAS_AREA	DCELLCHW	530767	18-Aug-03	3	530966	19-Aug-03	Handwritten corrections by QA Manager on Reference: ver 3.12 instead of D.4.08--check of reference indicates that change is correct.
CRA1	2274	WAS_AREA	DCELLRHW	527270	2-Apr-03	1	527665	8-Apr-03	
CRA1	2274	WAS_AREA	DCELLRHW	530767	18-Aug-03	3	530967	19-Aug-03	QA Manager corrected data version to 3.13 and reference corrected to 530767 from 525270--check of references indicate change is correct.
CRA1	1992	WAS_AREA	DIRNCCHW	527270	2-Apr-03	1	527662	8-Apr-03	

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CRA1	1992	WAS_AREA	DIRNCCHW	530767	18-Aug-03	1	530958	19-Aug-03	
CRA1	1993	WAS_AREA	DIRNCRHW	527270	2-Apr-03	1	527659	8-Apr-03	
CRA1	1993	WAS_AREA	DIRNCRHW	530767	18-Aug-03	1	530963	19-Aug-03	
CRA1	2040	WAS_AREA	DIRONCHW	527270	2-Apr-03	1	527655	8-Apr-03	
CRA1	2040	WAS_AREA	DIRONCHW	530767	18-Aug-03	1	530968	19-Aug-03	
CRA1	2044	WAS_AREA	DIRONRHW	527270	2-Apr-03	1	527654	8-Apr-03	
CRA1	2044	WAS_AREA	DIRONRHW	530767	18-Aug-03	1	530969	19-Aug-03	
CRA1	2043	WAS_AREA	DPLASCHW	527270	2-Apr-03	1	527653	8-Apr-03	
CRA1	2043	WAS_AREA	DPLASCHW	530767	18-Aug-03	1	530970	19-Aug-03	
CRA1	2275	WAS_AREA	DPLASRHW	527270	2-Apr-03	1	527652	8-Apr-03	
CRA1	2275	WAS_AREA	DPLASRHW	530767	18-Aug-03	1	530971	19-Aug-03	
CRA1	1995	WAS_AREA	DPLSCCHW	527270	2-Apr-03	1	527651	8-Apr-03	
CRA1	1995	WAS_AREA	DPLSCCHW	530767	18-Aug-03	1	530964	19-Aug-03	
CRA1	2228	WAS_AREA	DPLSCRHW	527270	2-Apr-03	1	527650	8-Apr-03	
CRA1	2228	WAS_AREA	DPLSCRHW	530767	18-Aug-03	1	530965	19-Aug-03	
CRA1	2042	WAS_AREA	DRUBBCHW	527270	2-Apr-03	1	527648	8-Apr-03	
CRA1	2042	WAS_AREA	DRUBBCHW	530767	18-Aug-03	1	530972	19-Aug-03	
CRA1	2046	WAS_AREA	DRUBBRHW	527270	2-Apr-03	1	527647	8-Apr-03	
CRA1	2046	WAS_AREA	DRUBBRHW	530767	18-Aug-03	1	530973	19-Aug-03	
CRA1	3682	SPALLMOD	DRZTCK	536134	26-Mar-04	1	534364	26-Mar-04	
CRA1	3681	SPALLMOD	FRCHBETA	534287	26-Mar-04	1	534365	26-Mar-04	
CRA1	3680	SPALLMOD	REPOSTCK	534287	26-Mar-04	1	534363	26-Mar-04	
CRA1	3679	SPALLMOD	REPOTRAD	534287	26-Mar-04	1	354362	26-Mar-04	
TBM	3482	AM+3	MKD_AM	514688, 241561	3 Nov 00, 24 Jul 96	1	527706	5-Feb-03	PPR ERMS#527703 documents correction of Max & Min values entered incorrectly in TBM (ERMS # 519513)
TBM	3482	AM+3	MKD_AM	238801	10-Jun-96	1	238351	11 Jun 96	
TBM	3480	PU+3	MKD_PU	238801	10-Jun-96	1	238353	11 Jun 96	

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TBM	3480	PU+3	MKD_PU	241561	24 Jul 96	1	257707	5-Feb-03	PPR ERMS#527703 documents correction of Max & Min values entered incorrectly in TBM (ERMS # 519513)
TBM	3402	SOLMOD3	SOLCIM	237791	23-May-96	1			
TBM	3402	SOLMOD3	SOLCIM	524971, 524694, 514688	20 Dec 0 2, 15 Nov 02, 3 Nov 00	1	524998	24-Dec-02	

Table 2

Table 2. Accuracy/Justification Check for Parameters That Have Changed Since the Technical Baseline Migration (TBM)

Anal-ysis	Param. ID No.	Material ID	Property ID	Dist-ribution Type	Current Value				Support ERMS#	Doc. OK?	Date	Supporting Document Comments
					Mean	Median	Minimum	Maximum				
CRA1	4	AM241	INVCHD	Constant	4.7800E+05	4.7800E+05	4.7800E+05	4.7800E+05	529130	2	8-May-03	Justification for inventory change not provided in ERMS# 529130, justification information is in AP-092, Rev. 2, 2/2003, Analysis Plan for Transuranic Waste Inventory Update Report, 2003, letter dated 22 April 2002, E Giambalvo to J. Harvill: Sandia's WIPP Inventory Data Needs for Performance Assessment (ERMS# 521948) which requests updated inventory data for the CRA to address revisions to inventory estimates since CCA, accounts for currently emplaced waste and to be emplaced waste, and addresses heterogeneous waste emplacement. ERMS# 528679 states that these inventory numbers are based on TWBID, Rev. 2.1, Ver. 3.11. ERMS# 528748, Table 2 provides Inventory Numbers decayed to 12/31/2033, entered into PAPDB as does referenced ERMS # 529130.
CRA1	4	AM241	INVCHD	Constant	4.4200E+05	4.4200E+05	4.4200E+05	4.4200E+05	531103	2	28-Aug-03	Justification for inventory change provided in AP-092,Rev. 2, 2/2003, Analysis Plan for Transuranic Waste Inventory Update Report, 2003, and ERMS# 530918 which provides updated inventory data from TWBID Rev. 2.1, Ver. 3.12, Data Ver D.4.08.--update requested by Sandia to reflect most recent changes to LANL database (ERMS# 530688). ERMS# 530992, Table 2 provides Inventory numbers decayed to 12/31/2033, entered into PAPDB as does referenced ERMS # 531103.
CRA1	5	AM241	INVRHD	Constant	3.9600E+04	3.9600E+04	3.9600E+04	3.9600E+04	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	5	AM241	INVRHD	Constant	1.5800E+04	1.5800E+04	1.5800E+04	1.5800E+04	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	3504	AM241L	INVCHD	Constant	4.9500E+05	4.9500E+05	4.9500E+05	4.9500E+05	529289	1	12-May-03	Represents combined activities of

Table 2. Accuracy/Justification Check for Parameters That Have Changed Since the Technical Baseline Migration (TBM)

												AM241 + PU241, per AP-097, Rev. 0, Analysis Plan for Deriving Radionuclide Inventory Information for PA Calculations: CRA, 1/2003. NUTS is computationally intensive and minimizing number of radionuclides is required (ERMS# 529289)--based on TWBID Rev. 2.1, Ver. 3.11.
CRA1	3504	AM241L	INVCHD	Constant	4.5900E+05	4.5900E+05	4.5900E+05	4.5900E+05	531090	1	28-Aug-03	Represents updated combined activities of AM241 + PU241, per AP-097, Rev. 0, Analysis Plan for Deriving Radionuclide Inventory Information for PA Calculations: CRA, 1/2003. NUTS is computationally intensive and minimizing number of radionuclides is required (ERMS# 529289)--based on TWBID Rev. 2.1, Ver. 3.12--ERMS # 530918.
CRA1	3509	AM241L	INVRHD	Constant	4.4600E+04	4.4600E+04	4.4600E+04	4.4600E+04	529289	1	12-May-03	Represents combined activities of AM241 + PU241, per AP-097, Rev. 0, Analysis Plan for Deriving Radionuclide Inventory Information for PA Calculations: CRA, 1/2003. NUTS is computationally intensive and minimizing number of radionuclides is required (ERMS# 529289)--based on TWBID Rev. 2.1, Ver. 3.11.
CRA1	3509	AM241L	INVRHD	Constant	1.6600E+04	1.6600E+04	1.6600E+04	1.6600E+04	531090	1	28-Aug-03	Represents updated combined activities of AM241 + PU241, per AP-097, Rev. 0, Analysis Plan for Deriving Radionuclide Inventory Information for PA Calculations: CRA, 1/2003. NUTS is computationally intensive and minimizing number of radionuclides is required (ERMS# 529289)--based on TWBID Rev. 2.1, Ver. 3.12--ERMS # 530918.
CRA1	3415	AM243	INVCHD	Constant	3.3400E+01	3.3400E+01	3.3400E+01	3.3400E+01	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	3415	AM243	INVCHD	Constant	2.1000E+01	2.1000E+01	2.1000E+01	2.1000E+01	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03

Table 2. Accuracy/Justification Check for Parameters That Have Changed Since the Technical Baseline Migration (TBM)

CRA1	3416	AM243	INVRHD	Constant	7.9800E-01	7.9800E-01	7.9800E-01	7.9800E-01	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	3416	AM243	INVRHD	Constant	7.4200E-01	7.4200E-01	7.4200E-01	7.4200E-01	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	2277	ASPHALT	COMP_RCK	Constant	3.0000E-10	3.0000E-10	3.0000E-10	3.0000E-10	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	3473	BLOWOUT	THCK_CAS	Constant	1.2583E+02	1.2583E+02	1.2583E+02	1.2583E+02	530503	1	1-Aug-03	Value of 12.34m was used for CCA for undisturbed scenario by BRAGFLO, and 125.83m used for the disturbed scenario. For all analyses since CCA, brine pocket thickness has been held constant at 125.83m, thus change required to PAPDB.
CRA1	3414	BOREHOLE	WUF	Constant	2.9600E+00	2.9600E+00	2.9600E+00	2.9600E+00	529148	1	9-May-03	Waste Unit Factor (WUF) value updated to reflect inventory update (ERMS# 528679, 528748, 522348) TWBID Rev. 2.1, Ver 3.11. It is the number of millions of curies of alpha emitting TRU with half lives > 20 years decayed to 2033.
CRA1	3414	BOREHOLE	WUF	Constant	2.4800E+00	2.4800E+00	2.4800E+00	2.4800E+00	531099	1	28-Aug-03	Waste Unit Factor (WUF) value updated to reflect inventory update (ERMS# 528679, 528748) TWBID Rev. 2.1, Ver 3.12. It is the number of millions of curies of alpha emitting TRU with half lives > 20 years decayed to 2033.
CRA1	108	CF252	INVCHD	Constant	6.4000E-05	6.4000E-05	6.4000E-05	6.4000E-05	529130	1	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	108	CF252	INVCHD	Constant	4.6400E-05	4.6400E-05	4.6400E-05	4.6400E-05	531103	1	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03

Table 2. Accuracy/Justification Check for Parameters That Have Changed Since the Technical Baseline Migration (TBM)

CRA1	109	CF252	INVRHD	Constant	5.6000E-06	5.6000E-06	5.6000E-06	5.6000E-06	529130	1	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	109	CF252	INVRHD	Constant	3.9500E-06	3.9500E-06	3.9500E-06	3.9500E-06	531103	1	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	2328	CL_L_T1	COMP_RCK	Constant	3.8000E-10	3.8000E-10	3.8000E-10	3.8000E-10	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	2345	CL_L_T2	COMP_RCK	Constant	3.8000E-10	3.8000E-10	3.8000E-10	3.8000E-10	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	2362	CL_L_T3	COMP_RCK	Constant	3.8000E-10	3.8000E-10	3.8000E-10	3.8000E-10	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.

Table 2. Accuracy/Justification Check for Parameters That Have Changed Since the Technical Baseline Migration (TBM)

CRA1	3071	CL_L_T4	COMP_RCK	Constant	3.8000E-10	3.8000E-10	3.8000E-10	3.8000E-10	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	2379	CL_M_T1	COMP_RCK	Constant	4.3000E-10	4.3000E-10	4.3000E-10	4.3000E-10	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	2396	CL_M_T2	COMP_RCK	Constant	4.3000E-10	4.3000E-10	4.3000E-10	4.3000E-10	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	2413	CL_M_T3	COMP_RCK	Constant	4.3000E-10	4.3000E-10	4.3000E-10	4.3000E-10	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying

Table 2. Accuracy/Justification Check for Parameters That Have Changed Since the Technical Baseline Migration (TBM)

												pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	2430	CL_M_T4	COMP_RCK	Constant	4.3000E-10	4.3000E-10	4.3000E-10	4.3000E-10	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	2447	CL_M_T5	COMP_RCK	Constant	4.3000E-10	4.3000E-10	4.3000E-10	4.3000E-10	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	2311	CLAY_BOT	COMP_RCK	Constant	3.8000E-10	3.8000E-10	3.8000E-10	3.8000E-10	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were

Table 2. Accuracy/Justification Check for Parameters That Have Changed Since the Technical Baseline Migration (TBM)

												erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	3001	CLAY_RUS	COMP_RCK	Constant	4.7000E-10	4.7000E-10	4.7000E-10	4.7000E-10	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	3410	CM243	INVCHD	Constant	1.8200E-01	1.8200E-01	1.8200E-01	1.8200E-01	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	3410	CM243	INVCHD	Constant	1.8200E-01	1.8200E-01	1.8200E-01	1.8200E-01	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	3411	CM243	INVRHD	Constant	2.3100E-01	2.3100E-01	2.3100E-01	2.3100E-01	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	3411	CM243	INVRHD	Constant	2.2500E-01	2.2500E-01	2.2500E-01	2.2500E-01	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	112	CM244	INVCHD	Constant	4.8200E+03	4.8200E+03	4.8200E+03	4.8200E+03	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	112	CM244	INVCHD	Constant	2.4300E+03	2.4300E+03	2.4300E+03	2.4300E+03	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	112	CM244	INVCHD	Constant	3.3900E+03	3.3900E+03	3.3900E+03	3.3900E+03	531187	1	3-Sep-03	Value changed due to error in TWBID Rev. 2 V. 3.12 Data Version D.4.08--waste stream data set to zero incorrectly, CM244 only radionuclide significantly affected
CRA1	113	CM244	INVRHD	Constant	1.0500E+02	1.0500E+02	1.0500E+02	1.0500E+02	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	113	CM244	INVRHD	Constant	7.9400E+01	7.9400E+01	7.9400E+01	7.9400E+01	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03

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CRA1	3412	CM245	INVCHD	Constant	1.3900E-02	1.3900E-02	1.3900E-02	1.3900E-02	529130	2	08 MAY 03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	3412	CM245	INVCHD	Constant	8.5900E-03	8.5900E-03	8.5900E-03	8.5900E-03	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	3413	CM245	INVRHD	Constant	1.0900E-02	1.0900E-02	1.0900E-02	1.0900E-02	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	3413	CM245	INVRHD	Constant	1.0600E-02	1.0600E-02	1.0600E-02	1.0600E-02	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	2265	CM248	INVCHD	Constant	1.4900E-01	1.4900E-01	1.4900E-01	1.4900E-01	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	2265	CM248	INVCHD	Constant	9.1400E-02	9.1400E-02	9.1400E-02	9.1400E-02	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	2266	CM248	INVRHD	Constant	2.5900E-03	2.5900E-03	2.5900E-03	2.5900E-03	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	2266	CM248	INVRHD	Constant	1.8300E-03	1.8300E-03	1.8300E-03	1.8300E-03	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	3052	CONC_MON	COMP_RCK	Constant	6.0000E-11	6.0000E-11	6.0000E-11	6.0000E-11	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	3515	CONC_PCS	COMP_RCK	Constant	6.0000E-11	6.0000E-11	6.0000E-11	6.0000E-11	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within

Table 2. Accuracy/Justification Check for Parameters That Have Changed Since the Technical Baseline Migration (TBM)

												analysis runs.
CRA1	3148	CONC_PLG	COMP_RCK	Constant	3.8000E-10	3.8000E-10	3.8000E-10	3.8000E-10	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	2464	CONC_T1	COMP_RCK	Constant	6.0000E-11	6.0000E-11	6.0000E-11	6.0000E-11	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	2481	CONC_T2	COMP_RCK	Constant	6.0000E-11	6.0000E-11	6.0000E-11	6.0000E-11	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	2037	CS137	INVCHD	Constant	6.9300E+03	6.9300E+03	6.9300E+03	6.9300E+03	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03

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CRA1	2037	CS137	INVCHD	Constant	4.6100E+03	4.6100E+03	4.6100E+03	4.6100E+03	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	118	CS137	INVRHD	Constant	1.7700E+05	1.7700E+05	1.7700E+05	1.7700E+05	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	118	CS137	INVRHD	Constant	1.7400E+05	1.7400E+05	1.7400E+05	1.7400E+05	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	142	CULEBRA	PRESSURE	Constant	9.1410E+05	9.1410E+05	9.1410E+05	9.1410E+05	530903	1	19-Aug-03	Values are based on calculations from updated Culebra water levels (December 2002) in ERMS# 530887
CRA1	143	CULEBRA	PRMX_LOG	Constant	- 1.3112E+01	-1.3112E+01	-1.3112E+01	-1.3112E+01	530899	1	19-Aug-03	Permeability values updated to reflect newly developed T-fields-calculations provided in referenced ERMS with only transmissivity value changing from CCA.
CRA1	144	CULEBRA	PRMY_LOG	Constant	- 1.3112E+01	-1.3112E+01	-1.3112E+01	-1.3112E+01	530899	1	19-Aug-03	Permeability values updated to reflect newly developed T-fields-calculations provided in referenced ERMS with only transmissivity value changing from CCA.
CRA1	145	CULEBRA	PRMZ_LOG	Constant	- 1.3112E+01	-1.3112E+01	-1.3112E+01	-1.3112E+01	530899	1	19-Aug-03	Permeability values updated to reflect newly developed T-fields-calculations provided in referenced ERMS with only transmissivity value changing from CCA.
CRA1	2497	EARTH	COMP_RCK	Constant	9.9000E-09	9.9000E-09	9.9000E-09	9.9000E-09	526661	1	19-Aug-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	3494	GLOBAL	LAMBDAD	Constant	5.2500E-03	5.2500E-03	5.2500E-03	5.2500E-03	527192	1	26-Nov-02	Value calculated as number deep (>2150 ft) holes X 10000 yrs/Delaware Basin Area/100yrs. Value is 52.5 boreholes/km2 over 10000 years.

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CRA1	3644	GLOBAL	ONEPLG	Constant	1.5000E-02	1.5000E-02	1.5000E-02	1.5000E-02	531352	1	5-Sep-03	Calculations used same method/plug configurations as CCA, updated to reflect most recent plugging data from Delaware Basin Monitoring Program (ERMS # 530845).
CRA1	3646	GLOBAL	THREEPLG	Constant	2.8900E-01	2.8900E-01	2.8900E-01	2.8900E-01	531352	1	5-Sep-03	Calculations used same method/plug configurations as CCA, updated to reflect most recent plugging data from Delaware Basin Monitoring Program (ERMS # 530845).
CRA1	3645	GLOBAL	TWOPLG	Constant	6.9600E-01	6.9600E-01	6.9600E-01	6.9600E-01	531352	1	5-Sep-03	Calculations used same method/plug configurations as CCA, updated to reflect most recent plugging data from Delaware Basin Monitoring Program (ERMS # 530845).
CRA1	2101	MAGENTA	PRESSURE	Constant	9.4650E+05	9.4650E+05	9.4650E+05	9.4650E+05	530903	1	19-Aug-03	Values are based on calculations from updated Magenta water levels (December 2002) in C2737 (ERMS# 530887)
CRA1	248	NP237	INVCHD	Constant	1.1300E+01	1.1300E+01	1.1300E+01	1.1300E+01	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	248	NP237	INVCHD	Constant	9.2500E+00	9.2500E+00	9.2500E+00	9.2500E+00	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	249	NP237	INVRHD	Constant	1.0100E+00	1.0100E+00	1.0100E+00	1.0100E+00	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	249	NP237	INVRHD	Constant	8.2200E-01	8.2200E-01	8.2200E-01	8.2200E-01	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	2267	PA231	INVCHD	Constant	1.9700E+00	1.9700E+00	1.9700E+00	1.9700E+00	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	2267	PA231	INVCHD	Constant	1.2100E+00	1.2100E+00	1.2100E+00	1.2100E+00	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	2268	PA231	INVRHD	Constant	6.8600E-04	6.8600E-04	6.8600E-04	6.8600E-04	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	2268	PA231	INVRHD	Constant	6.5500E-04	6.5500E-04	6.5500E-04	6.5500E-04	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	253	PAN_SEAL	COMP_RCK	Constant	2.0000E-10	2.0000E-10	2.0000E-10	2.0000E-10	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by

Table 2. Accuracy/Justification Check for Parameters That Have Changed Since the Technical Baseline Migration (TBM)

												ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	285	PB210	INVCHD	Constant	7.9000E+00	7.9000E+00	7.9000E+00	7.9000E+00	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	285	PB210	INVCHD	Constant	4.9400E+00	4.9400E+00	4.9400E+00	4.9400E+00	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	286	PB210	INVRHD	Constant	1.6200E-05	1.6200E-05	1.6200E-05	1.6200E-05	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	286	PB210	INVRHD	Constant	1.4200E-05	1.4200E-05	1.4200E-05	1.4200E-05	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	2038	PM147	INVCHD	Constant	4.1300E-04	4.1300E-04	4.1300E-04	4.1300E-04	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	2038	PM147	INVCHD	Constant	3.8600E-04	3.8600E-04	3.8600E-04	3.8600E-04	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	289	PM147	INVRHD	Constant	8.0500E-02	8.0500E-02	8.0500E-02	8.0500E-02	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	289	PM147	INVRHD	Constant	7.4700E-02	7.4700E-02	7.4700E-02	7.4700E-02	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	293	PU238	INVCHD	Constant	1.5300E+06	1.5300E+06	1.5300E+06	1.5300E+06	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	293	PU238	INVCHD	Constant	1.2500E+06	1.2500E+06	1.2500E+06	1.2500E+06	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	294	PU238	INVRHD	Constant	3.4800E+03	3.4800E+03	3.4800E+03	3.4800E+03	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	294	PU238	INVRHD	Constant	2.8000E+03	2.8000E+03	2.8000E+03	2.8000E+03	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	3506	PU238L	INVCHD	Constant	1.5300E+06	1.5300E+06	1.5300E+06	1.5300E+06	529130	1	8-May-03	Value is same as for PU238--no combination required for NUTS.
CRA1	3506	PU238L	INVCHD	Constant	1.2500E+06	1.2500E+06	1.2500E+06	1.2500E+06	531103	1	28-Aug-03	Value is same as for PU238--no combination required for NUTS.
CRA1	3511	PU238L	INVRHD	Constant	3.4800E+03	3.4800E+03	3.4800E+03	3.4800E+03	529130	1	8-May-03	Value is same as for PU238--no combination required for NUTS.

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CRA1	3511	PU238L	INVRHD	Constant	2.8000E+03	2.8000E+03	2.8000E+03	2.8000E+03	531103	1	28-Aug-03	Value is same as for PU238--no combination required for NUTS.
CRA1	297	PU239	INVCHD	Constant	7.7700E+05	7.7700E+05	7.7700E+05	7.7700E+05	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	297	PU239	INVCHD	Constant	6.5900E+05	6.5900E+05	6.5900E+05	6.5900E+05	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	298	PU239	INVRHD	Constant	5.6400E+03	5.6400E+03	5.6400E+03	5.6400E+03	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	298	PU239	INVRHD	Constant	5.3700E+03	5.3700E+03	5.3700E+03	5.3700E+03	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	3505	PU239L	INVCHD	Constant	9.1000E+05	9.1000E+05	9.1000E+05	9.1000E+05	529130	1	8-May-03	Represents combined activities of PU239, PU240, and PU 242, per AP-097, Rev. 0, Analysis Plan for Deriving Radionuclide Inventory Information for PA Calculations: CRA, 1/2003. NUTS is computationally intensive and minimizing number of radionuclides is required (ERMS# 529289)--based on TWBID Rev. 2.1, Ver. 3.11.
CRA1	3505	PU239L	INVCHD	Constant	7.6600E+05	7.6600E+05	7.6600E+05	7.6600E+05	531103	1	28-Aug-03	Represents updated combined activities of PU239, PU240 and PU242, per AP-097, Rev. 0, Analysis Plan for Deriving Radionuclide Inventory Information for PA Calculations: CRA, 1/2003. NUTS is computationally intensive and minimizing number of radionuclides is required (ERMS# 529289)--based on TWBID Rev. 2.1, Ver. 3.12--ERMS # 530918.
CRA1	3510	PU239L	INVRHD	Constant	7.4700E+03	7.4700E+03	7.4700E+03	7.4700E+03	529130	1	8-May-03	Represents combined activities of PU239, PU240, and PU 242, per AP-097, Rev. 0, Analysis Plan for Deriving Radionuclide Inventory Information for PA Calculations: CRA, 1/2003. NUTS is computationally intensive and minimizing number of radionuclides is required (ERMS# 529289)--based on TWBID Rev. 2.1, Ver. 3.11.
CRA1	3510	PU239L	INVRHD	Constant	7.0500E+03	7.0500E+03	7.0500E+03	7.0500E+03	531103	1	28-Aug-03	Represents updated combined activities of PU239, PU240 and

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												PU242, per AP-097, Rev. 0, Analysis Plan for Deriving Radionuclide Inventory Information for PA Calculations: CRA, 1/2003. NUTS is computationally intensive and minimizing number of radionuclides is required (ERMS# 529289)--based on TWBID Rev. 2.1, Ver. 3.12--ERMS # 530918.
CRA1	301	PU240	INVCHD	Constant	1.3200E+05	1.3200E+05	1.3200E+05	1.3200E+05	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	301	PU240	INVCHD	Constant	1.0700E+05	1.0700E+05	1.0700E+05	1.0700E+05	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	302	PU240	INVRHD	Constant	1.8200E+03	1.8200E+03	1.8200E+03	1.8200E+03	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	302	PU240	INVRHD	Constant	1.6700E+03	1.6700E+03	1.6700E+03	1.6700E+03	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	305	PU241	INVCHD	Constant	5.1700E+05	5.1700E+05	5.1700E+05	5.1700E+05	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	305	PU241	INVCHD	Constant	5.1400E+05	5.1400E+05	5.1400E+05	5.1400E+05	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	306	PU241	INVRHD	Constant	1.4900E+05	1.4900E+05	1.4900E+05	1.4900E+05	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	306	PU241	INVRHD	Constant	2.3900E+04	2.3900E+04	2.3900E+04	2.3900E+04	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	309	PU242	INVCHD	Constant	3.2700E+01	3.2700E+01	3.2700E+01	3.2700E+01	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	309	PU242	INVCHD	Constant	2.6600E+01	2.6600E+01	2.6600E+01	2.6600E+01	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	310	PU242	INVRHD	Constant	5.0200E-01	5.0200E-01	5.0200E-01	5.0200E-01	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	310	PU242	INVRHD	Constant	4.7400E-01	4.7400E-01	4.7400E-01	4.7400E-01	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	2269	PU244	INVCHD	Constant	1.4500E-06	1.4500E-06	1.4500E-06	1.4500E-06	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	2269	PU244	INVCHD	Constant	1.3200E-06	1.3200E-06	1.3200E-06	1.3200E-06	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	2270	PU244	INVRHD	Constant	1.5600E-03	1.5600E-03	1.5600E-03	1.5600E-03	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03

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CRA1	2270	PU244	INVRHD	Constant	1.1000E-03	1.1000E-03	1.1000E-03	1.1000E-03	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	316	RA226	INVCHD	Constant	1.0000E+01	1.0000E+01	1.0000E+01	1.0000E+01	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	316	RA226	INVCHD	Constant	6.2800E+00	6.2800E+00	6.2800E+00	6.2800E+00	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	317	RA226	INVRHD	Constant	5.5500E-05	5.5500E-05	5.5500E-05	5.5500E-05	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	317	RA226	INVRHD	Constant	4.9900E-05	4.9900E-05	4.9900E-05	4.9900E-05	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	2271	RA228	INVCHD	Constant	7.6500E+00	7.6500E+00	7.6500E+00	7.6500E+00	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	2271	RA228	INVCHD	Constant	7.6300E+00	7.6300E+00	7.6300E+00	7.6300E+00	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	2272	RA228	INVRHD	Constant	3.3600E-01	3.3600E-01	3.3600E-01	3.3600E-01	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	2272	RA228	INVRHD	Constant	2.5100E-01	2.5100E-01	2.5100E-01	2.5100E-01	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1 -B	3590	REFCON	BIP_11	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	526858	1	24-Mar-03	Parameter added to PAPDB for CRA. In CCA, parameter was included as a data statement in BRAGFLO Ver. 4.10.1 independent of CCA PA database. It is not in BRAGFLO Ver. 5.0. Values are compared to data statements in BRAGFLO 4.10.1 to verify. Values for H2, H2O and Fe not transferred to PAPDB.
CRA1 -B	3591	REFCON	BIP_12	Constant	-3.4260E-01	-3.4260E-01	-3.4260E-01	-3.4260E-01	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3592	REFCON	BIP_13	Constant	-2.2200E-02	-2.2200E-02	-2.2200E-02	-2.2200E-02	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3593	REFCON	BIP_14	Constant	9.7800E-02	9.7800E-02	9.7800E-02	9.7800E-02	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3594	REFCON	BIP_15	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3595	REFCON	BIP_16	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3596	REFCON	BIP_21	Constant	-3.4260E-01	-3.4260E-01	-3.4260E-01	-3.4260E-01	526858	1	24-Mar-03	Same as above statement for Param ID 3590.

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CRA1 -B	3597	REFCON	BIP_22	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3598	REFCON	BIP_23	Constant	9.3300E-02	9.3300E-02	9.3300E-02	9.3300E-02	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3599	REFCON	BIP_24	Constant	-3.1500E-02	-3.1500E-02	-3.1500E-02	-3.1500E-02	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3600	REFCON	BIP_25	Constant	9.8900E-02	9.8900E-02	9.8900E-02	9.8900E-02	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3601	REFCON	BIP_26	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3602	REFCON	BIP_31	Constant	-2.2200E-02	-2.2200E-02	-2.2200E-02	-2.2200E-02	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3603	REFCON	BIP_32	Constant	9.3300E-02	9.3300E-02	9.3300E-02	9.3300E-02	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3604	REFCON	BIP_33	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3605	REFCON	BIP_34	Constant	2.7800E-02	2.7800E-02	2.7800E-02	2.7800E-02	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3606	REFCON	BIP_35	Constant	8.5000E-02	8.5000E-02	8.5000E-02	8.5000E-02	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3607	REFCON	BIP_36	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3608	REFCON	BIP_41	Constant	9.7800E-02	9.7800E-02	9.7800E-02	9.7800E-02	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3609	REFCON	BIP_42	Constant	-3.1500E-02	-3.1500E-02	-3.1500E-02	-3.1500E-02	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3610	REFCON	BIP_43	Constant	2.7800E-02	2.7800E-02	2.7800E-02	2.7800E-02	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3611											
CRA1 -B	3612	REFCON	BIP_45	Constant	1.6960E-01	1.6960E-01	1.6960E-01	1.6960E-01	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3613	REFCON	BIP_46	Constant	-7.8000E-03	-7.8000E-03	-7.8000E-03	-7.8000E-03	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3614	REFCON	BIP_51	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	526858	1	24-Mar-03	Same as above statement for Param ID 3590.

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CRA1 -B	3615	REFCON	BIP_52	Constant	9.8900E-02	9.8900E-02	9.8900E-02	9.8900E-02	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3616	REFCON	BIP_53	Constant	8.5000E-02	8.5000E-02	8.5000E-02	8.5000E-02	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3617	REFCON	BIP_54	Constant	1.6960E-01	1.6960E-01	1.6960E-01	1.6960E-01	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3618	REFCON	BIP_55	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3619	REFCON	BIP_56	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3620	REFCON	BIP_61	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3621	REFCON	BIP_62	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3622	REFCON	BIP_63	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3623	REFCON	BIP_64	Constant	-7.8000E-03	-7.8000E-03	-7.8000E-03	-7.8000E-03	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3624	REFCON	BIP_65	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3625	REFCON	BIP_66	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	526858	1	24-Mar-03	Same as above statement for Param ID 3590.
CRA1 -B	3647	REFCON	FVRW	Constant	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	529865	1	17-Jun-03	New parameter similar to REFCON FVW which is for CH-TRU waste. This is the fraction of solid material removed as cuttings and cavings by a drilling intrusion into the RH waste regions that is actually RH-TRU waste. This value was used implicitly in all previous PA calculations, but no parameter was established in the CCA database.
CRA1 -B	3582	REFCON	LHSBLANK	Uniform	5.0000E-01	5.0000E-01	0.0000E+00	1.0000E+00	525047	1	6-Jan-03	New parameter established to act as a placeholder parameter to be used with LHS. Previously GLOBAL-TRANSIDX was used when a placeholder was needed to operate LHS–but resulted in output ambiguities. This corrects the problem.

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CRA1-B	3589	REFCON	MW_CELL	Constant	2.7023E-02	2.7023E-02	2.7023E-02	2.7023E-02	526858	1	24-Mar-03	Same as statement for Param ID 3590.
CRA1-B	3585	REFCON	MW_CH4	Constant	1.6043E-02	1.6043E-02	1.6043E-02	1.6043E-02	526858	1	24-Mar-03	Same as statement for Param ID 3590.
CRA1-B	3584	REFCON	MW_CO2	Constant	4.4010E-02	4.4010E-02	4.4010E-02	4.4010E-02	526858	1	24-Mar-03	Same as statement for Param ID 3590.
CRA1-B	3587	REFCON	MW_H2S	Constant	3.4082E-02	3.4082E-02	3.4082E-02	3.4082E-02	526858	1	24-Mar-03	Same as statement for Param ID 3590.
CRA1-B	3586	REFCON	MW_N2	Constant	2.8013E-02	2.8013E-02	2.8013E-02	2.8013E-02	526858	1	24-Mar-03	Same as statement for Param ID 3590.
CRA1-B	3583	REFCON	MW_NACL	Constant	5.8442E-02	5.8442E-02	5.8442E-02	5.8442E-02	526858	1	24-Mar-03	Same as statement for Param ID 3590.
CRA1-B	3588	REFCON	MW_O2	Constant	3.1999E-02	3.1999E-02	3.1999E-02	3.1999E-02	526858	1	24-Mar-03	Same as statement for Param ID 3590.
CRA1	3108	REFCON	VREPOS	Constant	4.3841E+05	4.3841E+05	4.3841E+05	4.3841E+05	523760 527694	1	17-Sep-02	The waste storage volume used by BRAGFLO in CCA and PAVT did not include volumes from three exhaust and three intake drifts. The volumes for these drifts were inadvertently left out of the summation of volumes. The corrected volume increase is ~0.5% of waste filled regions resulting in minor impact on CCA/PAVT PA results as it is used in ALGEBRA to convert mass of Fe and biodegradable materials to density units required by BRAGFLO. The new values includes these 6 drift volumes.
CRA1	2514	SALT_T1	COMP_RCK	Constant	8.0000E-11	8.0000E-11	8.0000E-11	8.0000E-11	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	2531	SALT_T2	COMP_RCK	Constant	8.0000E-11	8.0000E-11	8.0000E-11	8.0000E-11	526661	1	19-Mar-03	Values for COMP-RCK were

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												discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	2548	SALT_T3	COMP_RCK	Constant	8.0000E-11	8.0000E-11	8.0000E-11	8.0000E-11	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	2565	SALT_T4	COMP_RCK	Constant	8.0000E-11	8.0000E-11	8.0000E-11	8.0000E-11	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	2582	SALT_T5	COMP_RCK	Constant	8.0000E-11	8.0000E-11	8.0000E-11	8.0000E-11	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the

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												analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
CRA1	2984	SALT_T6	COMP_RCK	Constant	8.0000E-11	8.0000E-11	8.0000E-11	8.0000E-11	526661	1	19-Mar-03	Values for COMP-RCK were discovered to be pore compressibility rather than bulk compressibility, values were corrected by multiplying pore compressibility by porosity in the analyses. Correct values were used by ALGEBRA in PAVT, AP106 and subsequent analyses. There were erroneous values for POR_COMP used for some materials in the TBM analyses. This entry corrects values to bulk compressibility values eliminating need for correction within analysis runs.
AP10 6	3550	SHFTU	COMP_POR	Constant	2.0500E-08	2.0500E-08	2.0500E-08	2.0500E-08	525203, 530631	1	23-Jan-03	Values are for Simplified Shaft Seal Model--11 separate material layers are reduced to two equivalent layers((Salado and non-Salado) and 6 time intervals reduced to 2 time intervals (first 200 years and 200-10000 years). Simplified values are the volume-weighted arithmetic mean of the values of each original shaft's components.
AP10 6	3562	SHFTL_T1	COMP_POR	Constant	4.2800E-09	4.2800E-09	4.2800E-09	4.2800E-09	525203, 530631	1	23-Jan-03	Values are for Simplified Shaft Seal Model--11 separate material layers are reduced to two equivalent layers((Salado and non-Salado) and 6 time intervals reduced to 2 time intervals (first 200 years and 200-10000 years). Simplified values are the volume-weighted arithmetic mean of the values of each original shaft's components.
AP10 6	3563	SHFTL_T1	KPT	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	525203, 533428	1	23-Jan-03	Values for simplified model are constant and uniform for all shaft seal materials.

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AP106	3564	SHFTL_T1	PC_MAX	Constant	1.0000E+08	1.0000E+08	1.0000E+08	1.0000E+08	525203, 533428	1	23-Jan-03	Values for simplified model are constant and uniform for all shaft seal materials.
AP106	3565	SHFTL_T1	PCT_A	Constant	5.6000E-01	5.6000E-01	5.6000E-01	5.6000E-01	525203, 533428	1	23-Jan-03	Values for simplified model are constant and uniform for all shaft seal materials.
AP106	3566	SHFTL_T1	PCT_EXP	Constant	-3.4600E-01	-3.4600E-01	-3.4600E-01	-3.4600E-01	525203, 533428	1	23-Jan-03	Values for simplified model are constant and uniform for all shaft seal materials.
AP106	3567	SHFTL_T1	PO_MIN	Constant	1.0100E+05	1.0100E+05	1.0100E+05	1.0100E+05	525203, 533428	1	23-Jan-03	Values for simplified model are constant and uniform for all shaft seal materials.
AP106	3568	SHFTL_T1	POROSITY	Constant	1.1300E-01	1.1300E-01	1.1300E-01	1.1300E-01	525203	1	23-Jan-03	Values are for Simplified Shaft Seal Model--11 separate material layers are reduced to two equivalent layers((Salado and non-Salado) and 6 time intervals reduced to 2 time intervals (first 200 years and 200-10000 years). Simplified values are the volume-weighted arithmetic mean of the values of each original shaft's components.
AP106	3569	SHFTL_T1	PRMX_LOG	Cumulative	-1.8000E+01	-1.8200E+01	-2.0000E+01	-1.6500E+01	525203	1	23-Jan-03	Values are for Simplified Shaft Seal Model--11 separate material layers are reduced to two equivalent layers((Salado and non-Salado) and 6 time intervals reduced to 2 time intervals (first 200 years and 200-10000 years). Permeabilities are derived from the weighted harmonic mean of the permeabilities of each layer comprising the new composite layer.
AP106	3570	SHFTL_T1	RELP_MOD	Constant	4.0000E+00	4.0000E+00	4.0000E+00	4.0000E+00	525203 533428	1	23-Jan-03	Values for simplified model are constant and uniform for all shaft seal materials.
AP106	3571	SHFTL_T1	SAT_IBRN	Constant	5.3400E-01	5.3400E-01	5.3400E-01	5.3400E-01	525203	1	23-Jan-03	Values are for Simplified Shaft Seal Model--11 separate material layers are reduced to two equivalent layers((Salado and non-Salado) and 6 time intervals reduced to 2 time intervals (first 200 years and 200-10000 years). Simplified values are the volume-weighted arithmetic mean

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												of the values of each original shaft's components.
AP106	3572	SHFTL_T2	COMP_POR	Constant	4.2800E-09	4.2800E-09	4.2800E-09	4.2800E-09	525203, 530631	1	23-Jan-03	Values are for Simplified Shaft Seal Model--11 separate material layers are reduced to two equivalent layers((Salado and non-Salado) and 6 time intervals reduced to 2 time intervals (first 200 years and 200-10000 years). Simplified values are the volume-weighted arithmetic mean of the values of each original shaft's components.
AP106	3573	SHFTL_T2	KPT	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	525203, 533428	1	23-Jan-03	Values for simplified model are constant and uniform for all shaft seal materials.
AP106	3574	SHFTL_T2	PC_MAX	Constant	1.0000E+08	1.0000E+08	1.0000E+08	1.0000E+08	525203, 533428	1	23-Jan-03	Values for simplified model are constant and uniform for all shaft seal materials.
AP106	3575	SHFTL_T2	PCT_A	Constant	5.6000E-01	5.6000E-01	5.6000E-01	5.6000E-01	525203, 533428	1	23-Jan-03	Values for simplified model are constant and uniform for all shaft seal materials.
AP106	3576	SHFTL_T2	PCT_EXP	Constant	-3.4600E-01	-3.4600E-01	-3.4600E-01	-3.4600E-01	525203, 533428	1	23-Jan-03	Values for simplified model are constant and uniform for all shaft seal materials.
AP106	3577	SHFTL_T2	PO_MIN	Constant	1.0100E+05	1.0100E+05	1.0100E+05	1.0100E+05	525203, 533428	1	23-Jan-03	Values for simplified model are constant and uniform for all shaft seal materials.
AP106	3578	SHFTL_T2	POROSITY	Constant	1.1300E-01	1.1300E-01	1.1300E-01	1.1300E-01	525203	1	23-Jan-03	Values are for Simplified Shaft Seal Model--11 separate material layers are reduced to two equivalent layers((Salado and non-Salado) and 6 time intervals reduced to 2 time intervals (first 200 years and 200-10000 years). Simplified values are the volume-weighted arithmetic mean of the values of each original shaft's components.
AP106	3579	SHFTL_T2	PRMX_LOG	Cumulative	-1.9800E+01	-2.0100E+01	-2.2500E+01	-1.8000E+01	525203	1	23-Jan-03	Values are for Simplified Shaft Seal Model--11 separate material layers are reduced to two equivalent layers((Salado and non-Salado) and 6 time intervals reduced to 2 time intervals (first 200 years and 200-

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												10000 years). Permeabilities are derived from the weighted harmonic mean of the permeabilities of each layer comprising the new composite layer.
AP106	3580	SHFTL_T2	RELP_MOD	Constant	4.0000E+00	4.0000E+00	4.0000E+00	4.0000E+00	525203, 533428	1	23-Jan-03	Values for simplified model are constant and uniform for all shaft seal materials.
AP106	3581	SHFTL_T2	SAT_IBRN	Constant	5.3400E-01	5.3400E-01	5.3400E-01	5.3400E-01	525203	1	23-Jan-03	Values are for Simplified Shaft Seal Model--11 separate material layers are reduced to two equivalent layers((Salado and non-Salado) and 6 time intervals reduced to 2 time intervals (first 200 years and 200-10000 years). Simplified values are the volume-weighted arithmetic mean of the values of each original shaft's components.
AP106	3551	SHFTU	KPT	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	525203, 533428	1	23-Jan-03	Values for simplified model are constant and uniform for all shaft seal materials.
AP106	3552	SHFTU	PC_MAX	Constant	1.0000E+08	1.0000E+08	1.0000E+08	1.0000E+08	525203, 533428	1	23-Jan-03	Values for simplified model are constant and uniform for all shaft seal materials.
AP106	3553	SHFTU	PCT_A	Constant	5.6000E-01	5.6000E-01	5.6000E-01	5.6000E-01	525203, 533428	1	23-Jan-03	Values for simplified model are constant and uniform for all shaft seal materials.
AP106	3554	SHFTU	PCT_EXP	Constant	-3.4600E-01	-3.4600E-01	-3.4600E-01	-3.4600E-01	525203, 533428	1	23-Jan-03	Values for simplified model are constant and uniform for all shaft seal materials.
AP106	3555	SHFTU	PO_MIN	Constant	1.0100E+05	1.0100E+05	1.0100E+05	1.0100E+05	525203, 533428	1	23-Jan-03	Values for simplified model are constant and uniform for all shaft seal materials.
AP106	3556	SHFTU	POROSITY	Constant	2.9100E-01	2.9100E-01	2.9100E-01	2.9100E-01	525203	1	23-Jan-03	Values are for Simplified Shaft Seal Model--11 separate material layers are reduced to two equivalent layers((Salado and non-Salado) and 6 time intervals reduced to 2 time intervals (first 200 years and 200-10000 years). Simplified values are the volume-weighted arithmetic mean of the values of each original shaft's components.

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AP106	3557	SHFTU	PRMX_LOG	Cumulative	-1.8200E+01	-1.8300E+01	-2.0500E+01	-1.6500E+01	525203	1	23-Jan-03	Values are for Simplified Shaft Seal Model--11 separate material layers are reduced to two equivalent layers((Salado and non-Salado) and 6 time intervals reduced to 2 time intervals (first 200 years and 200-10000 years). Permabilities are derived from the weighted harmonic mean of the permeabilities of each layer comprising the new composite layer.
AP106	3558	SHFTU	RELP_MOD	Constant	4.0000E+00	4.0000E+00	4.0000E+00	4.0000E+00	525203, 533428	1	23-Jan-03	Values for simplified model are constant and uniform for all shaft seal materials.
AP106	3559	SHFTU	SAT_IBRN	Constant	7.9600E-01	7.9600E-01	7.9600E-01	7.9600E-01	525203	1	23-Jan-03	Values are for Simplified Shaft Seal Model--11 separate material layers are reduced to two equivalent layers((Salado and non-Salado) and 6 time intervals reduced to 2 time intervals (first 200 years and 200-10000 years). Simplified values are the volume-weighted arithmetic mean of the values of each original shaft's components.
AP106	3560	SHFTU	SAT_RBRN	Cumulative	2.5000E-01	2.0000E-01	0.0000E+00	6.0000E-01	525203, 533428	1	23-Jan-03	Similar methodology to establish values to that used in CCA/PAVT. Distribution values are identical to CCA Material SALT_T1.
AP106	3561	SHFTU	SAT_RGAS	Uniform	2.0000E-01	2.0000E-01	0.0000E+00	4.0000E-01	525203, 533428	1	23-Jan-03	Similar methodology to establish values to that used in CCA/PAVT. Distribution values are identical to CCA Material SALT_T1.
CRA1	3628	SOLMOD3	SOLCOC	Constant	1.7700E-07	1.7700E-07	1.7700E-07	1.7700E-07	529131	1	8-May-03	Solubilities revised from those used in PAVT (SOLSIM and SOLCIM) and entered into PAPDB as new parameters as they incorporate the impact of organic ligands and microbes on solubilities. Solubilities are calculated using FMT code (geochemical speciation & solubility code-used in CCA/PAVT) for two brines: GWB (generic weep brine-new) and ERDA-6 (synthetic brine representative of Castile brine reservoirs) and considering acetate,

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												citrate, oxalate and EDTA organic ligands. Solubilities are for +III Oxidation state actinides with non-microbial vectors for ERDA-6 brine. Values calculated for AM+3 and used for Am+3 and Pu+3. Non-microbial realizations use brucite-calcite carbonation reaction buffer.
CRA1	3629	SOLMOD3	SOLCOH	Constant	1.6900E-07	1.6900E-07	1.6900E-07	1.6900E-07	529131	1	8-May-03	Solubilities revised from those used in PAVT and entered into PAPDB as new parameters as they incorporate the impact of organic ligands and microbes on solubilities. Solubilities are calculated using FMT code (geochemical speciation & solubility code) for two brines: GWB (generic weep brine) and ERDA-6 (synthetic brine representative of Castile brine reservoirs) and considering acetate, citrate, oxalate and EDTA organic ligands. Solubilities are for +III Oxidation state actinides with microbial vectors for ERDA-6 brine. Values calculated for AM+3 and used for Am+3 and Pu+3. Microbial vector represented by EPA mandated brucite-hydromagnesite carbonation reaction buffer.
CRA1	3630	SOLMOD3	SOLSOC	Constant	3.0700E-07	3.0700E-07	3.0700E-07	3.0700E-07	529131	1	8-May-03	Solubilities revised from those used in PAVT and entered into PAPDB as new parameters as they incorporate the impact of organic ligands and microbes on solubilities. Solubilities are calculated using FMT code (geochemical speciation & solubility code) for two brines: GWB (generic weep brine) and ERDA-6 (synthetic brine representative of Castile brine reservoirs) and considering acetate, citrate, oxalate and EDTA organic ligands. Solubilities are for +III Oxidation state actinides with non-microbial vectors for GWB brine. Values calculated for AM+3 and used for Am+3 and Pu+3. Non-microbial realizations use brucite-calcite carbonation reaction buffer.

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CRA1	3631	SOLMOD3	SOLSOH	Constant	3.0700E-07	3.0700E-07	3.0700E-07	3.0700E-07	529131	1	8-May-03	Solubilities revised from those used in PAVT and entered into PAPDB as new parameters as they incorporate the impact of organic ligands and microbes on solubilities. Solubilities are calculated using FMT code (geochemical speciation & solubility code) for two brines: GWB (generic weep brine) and ERDA-6 (synthetic brine representative of Castile brine reservoirs) and considering acetate, citrate, oxalate and EDTA organic ligands. Solubilities are for +III Oxidation state actinides with microbial vectors for GWB brine. Values calculated for AM+3 and used for Am+3 and Pu+3. Microbial vector represented by EPA mandated brucite-hydromagnesite carbonation reaction buffer.
CRA1	3632	SOLMOD4	SOLCOC	Constant	5.8400E-09	5.8400E-09	5.8400E-09	5.8400E-09	529131	1	8-May-03	Solubilities revised from those used in PAVT and entered into PAPDB as new parameters as they incorporate the impact of organic ligands and microbes on solubilities. Solubilities are calculated using FMT code (geochemical speciation & solubility code) for two brines: GWB (generic weep brine) and ERDA-6 (synthetic brine representative of Castile brine reservoirs) and considering acetate, citrate, oxalate and EDTA organic ligands. Solubilities are for +IV Oxidation state actinides with non-microbial vectors for ERDA-6 brine. Values calculated for TH +4 and used for TH+4, U+4, NP+4, and PU+4.
CRA1	3633	SOLMOD4	SOLCOH	Constant	2.4700E-08	2.4700E-08	2.4700E-08	2.4700E-08	529131	1	8-May-03	Solubilities revised from those used in PAVT and entered into PAPDB as new parameters as they incorporate the impact of organic ligands and microbes on solubilities. Solubilities are calculated using FMT code (geochemical speciation & solubility code) for two brines: GWB (generic weep brine) and ERDA-6 (synthetic brine representative of Castile brine

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												reservoirs) and considering acetate, citrate, oxalate and EDTA organic ligands. Solubilities are for +IV Oxidation state actinides with microbial vectors for ERDA-6 brine. Values calculated for TH +4 and used for TH+4, U+4, NP+4, and PU+4. Microbial vector represented by EPA mandated brucite-hydromagnesite carbonation reaction buffer.
CRA1	3634	SOLMOD4	SOLSOC	Constant	1.2400E-08	1.2400E-08	1.2400E-08	1.2400E-08	529131	1	8-May-03	Solubilities revised from those used in PAVT and entered into PAPDB as new parameters as they incorporate the impact of organic ligands and microbes on solubilities. Solubilities are calculated using FMT code (geochemical speciation & solubility code) for two brines: GWB (generic weep brine) and ERDA-6 (synthetic brine representative of Castile brine reservoirs) and considering acetate, citrate, oxalate and EDTA organic ligands. Solubilities are for +IV Oxidation state actinides with non-microbial vectors for GWB brine. Values calculated for TH +4 and used for TH+4, U+4, NP+4, and PU+4. Non-microbial realizations use brucite-calcite carbonation reaction buffer.
CRA1	3635	SOLMOD4	SOLSOH	Constant	1.1900E-08	1.1900E-08	1.1900E-08	1.1900E-08	529131	1	8-May-03	Solubilities revised from those used in PAVT and entered into PAPDB as new parameters as they incorporate the impact of organic ligands and microbes on solubilities. Solubilities are calculated using FMT code (geochemical speciation & solubility code) for two brines: GWB (generic weep brine) and ERDA-6 (synthetic brine representative of Castile brine reservoirs) and considering acetate, citrate, oxalate and EDTA organic ligands. Solubilities are for +IV Oxidation state actinides with microbial vectors for GWB brine. Values calculated for TH +4 and used for TH+4, U+4, NP+4, and PU+4.

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CRA1	3636	SOLMOD5	SOLCOC	Constant	2.1300E-05	2.1300E-05	2.1300E-05	2.1300E-05	529131	1	8-May-03	Solubilities revised from those used in PAVT and entered into PAPDB as new parameters as they incorporate the impact of organic ligands and microbes on solubilities. Solubilities are calculated using FMT code (geochemical speciation & solubility code) for two brines: GWB (generic weep brine) and ERDA-6 (synthetic brine representative of Castile brine reservoirs) and considering acetate, citrate, oxalate and EDTA organic ligands. Solubilities are for +IV Oxidation state actinides with non-microbial vectors for ERDA-6 brine. Values calculated for NP +V and used only for NP +5. Non-microbial realizations use brucite-calcite carbonation reaction buffer.
CRA1	3637	SOLMOD5	SOLCOH	Constant	5.0800E-06	5.0800E-06	5.0800E-06	5.0800E-06	529131	1	8-May-03	Solubilities revised from those used in PAVT and entered into PAPDB as new parameters as they incorporate the impact of organic ligands and microbes on solubilities. Solubilities are calculated using FMT code (geochemical speciation & solubility code) for two brines: GWB (generic weep brine) and ERDA-6 (synthetic brine representative of Castile brine reservoirs) and considering acetate, citrate, oxalate and EDTA organic ligands. Solubilities are for +IV Oxidation state actinides with microbial vectors for ERDA-6 brine. Values calculated for NP +V and used only for NP +5. Microbial vector represented by EPA mandated brucite-hydromagnesite carbonation reaction buffer.
CRA1	3638	SOLMOD5	SOLSOC	Constant	9.7200E-07	9.7200E-07	9.7200E-07	9.7200E-07	529131	1	8-May-03	Solubilities revised from those used in PAVT and entered into PAPDB as new parameters as they incorporate the impact of organic ligands and microbes on solubilities. Solubilities are calculated using FMT code (geochemical speciation & solubility code) for two brines: GWB (generic

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												weep brine) and ERDA-6 (synthetic brine representative of Castile brine reservoirs) and considering acetate, citrate, oxalate and EDTA organic ligands. Solubilities are for +IV Oxidation state actinides with non-microbial vectors for GWB brine. Values calculated for NP +V and used only for NP +5. Non-microbial realizations use brucite-calcite carbonation reaction buffer.
CRA1	3639	SOLMOD5	SOLSOH	Constant	1.0200E-06	1.0200E-06	1.0200E-06	1.0200E-06	529131	1	8-May-03	Solubilities revised from those used in PAVT and entered into PAPDB as new parameters as they incorporate the impact of organic ligands and microbes on solubilities. Solubilities are calculated using FMT code (geochemical speciation & solubility code) for two brines: GWB (generic weep brine) and ERDA-6 (synthetic brine representative of Castile brine reservoirs) and considering acetate, citrate, oxalate and EDTA organic ligands. Solubilities are for +IV Oxidation state actinides with microbial vectors for GWB brine. Values calculated for NP +V and used only for NP +5. Microbial vector represented by EPA mandated brucite-hydromagnesite carbonation reaction buffer.
CRA1	3640	SOLMOD6	SOLCOC	Constant	8.8000E-06	8.8000E-06	8.8000E-06	8.8000E-06	529131	1	8-May-03	Estimates of solubilities of U(VI) were taken from Hobart and Moore (1996) and USDOE 1996 (CCA, Appendix SOTERM, SOTERM-27-SOTERM-28). Values is the same as that used in PAVT for ERDA-6 brine. Solubility used only for U+6.
CRA1	3641	SOLMOD6	SOLCOH	Constant	8.8000E-06	8.8000E-06	8.8000E-06	8.8000E-06	529131	1	8-May-03	Estimates of solubilities of U(VI) were taken from Hobart and Moore (1996) and USDOE 1996 (CCA, Appendix SOTERM, SOTERM-27-SOTERM-28). Values is the same as that used in PAVT for ERDA-6 brine. Solubility used only for U+6.
CRA1	3642	SOLMOD6	SOLSOC	Constant	8.7000E-06	8.7000E-06	8.7000E-06	8.7000E-06	529131	1	8-May-03	Estimates of solubilities of U(VI) were

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												taken from Hobart and Moore (1996) and USDOE 1996 (CCA, Appendix SOTERM, SOTERM-27-SOTERM-28). Values is the same as that used in PAVT for a different brine--Brine A and applied to GWB brine. Solubility used only for U+6.
CRA1	3643	SOLMOD6	SOLSOH	Constant	8.7000E-06	8.7000E-06	8.7000E-06	8.7000E-06	529131	1	8-May-03	Estimates of solubilities of U(VI) were taken from Hobart and Moore (1996) and USDOE 1996 (CCA, Appendix SOTERM, SOTERM-27-SOTERM-28). Values is the same as that used in PAVT for a different brine--Brine A and applied to GWB brine. Solubility used only for U+6.
CRA1	3627	SOLTH4	SOLCIM	Cumulative	1.8000E-01	-9.0000E-02	-2.0000E+00	1.4000E+00	237791	1	23-May-96	Solubility multiplier added for TH+4 for use in NUTS calculations. Values are the same as those used in CCA/PAVT for Pu, Np and Am.
CRA1	3626	SOLU4	SOLCIM	Cumulative	1.8000E-01	-9.0000E-02	-2.0000E+00	1.4000E+00	237791	1	23-May-96	Solubility multiplier added for TH+4 for use in NUTS calculations. Values are the same as those used in CCA/PAVT for Pu, Np and Am.
CRA1	3675	SPALLMOD	ANNUROUG	Constant	5.0000E-05	5.0000E-05	5.0000E-05	5.0000E-05	531914, , 533995	1	1 Sep 03, 11 Aug 03	New parameters developed to support DRSPALL model to evaluate volume of WIPP solid waste subject to material failure and transport to surface as a result of inadvertent drilling intrusion.
CRA1	3662	SPALLMOD	BIOTBETA	Constant	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	531057, 533995	1	11-Aug-03	New parameters developed to support DRSPALL model to evaluate volume of WIPP solid waste subject to material failure and transport to surface as a result of inadvertent drilling intrusion.
CRA1	3665	SPALLMOD	BITNZDIA	Constant	1.1113E-02	1.1113E-02	1.1113E-02	1.1113E-02	533995 531057	1	11-Aug-03	New parameters developed to support DRSPALL model to evaluate volume of WIPP solid waste subject to material failure and transport to surface as a result of inadvertent drilling intrusion.
CRA1	3653	SPALLMOD	BITNZNO	Constant	3.0000E+00	3.0000E+00	3.0000E+00	3.0000E+00	531057, 533995	1	11-Aug-03	New parameters developed to support DRSPALL model to evaluate volume of WIPP solid waste subject to

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												material failure and transport to surface as a result of inadvertent drilling intrusion.
CRA1	3652	SPALLMOD	COHESION	Constant	1.4000E+05	1.4000E+05	1.4000E+05	1.4000E+05	531057, 533995	1	11-Aug-03	New parameters developed to support DRSPALL model to evaluate volume of WIPP solid waste subject to material failure and transport to surface as a result of inadvertent drilling intrusion.
CRA1	3677	SPALLMOD	DDZPERM	Constant	1.0000E-14	1.0000E-14	1.0000E-14	1.0000E-14	532259, 531914, 531057, 533995	1	30 Sep 03, 1 Sep 03, 11 Aug 03	Value established as a constant as sensitivity analyses indicated no conspicuous influence on spall output (ERMS# 532259).
CRA1	3659	SPALLMOD	DDZTHICK	Constant	1.6000E-01	1.6000E-01	1.6000E-01	1.6000E-01	531057, 533995	1	11-Aug-03	New parameters developed to support DRSPALL model to evaluate volume of WIPP solid waste subject to material failure and transport to surface as a result of inadvertent drilling intrusion.
CRA1	3674	SPALLMOD	DRILRATE	Constant	4.4450E-03	4.4450E-03	4.4450E-03	4.4450E-03	531914, 531057, 533995	1	1 Sep 03, 11 Aug 03	Value in DRSPALL Parameter Justification Report is Uniform distribution with same median, and min of 2.9633 E-3 and max of 5.9267E-3. Value used in Sensitivity Analysis Report (ERMS # 531914) is 04.45e-3 and constant, value in PAPDB–sensitivity analysis report states that this parameter is not a "driver" for tensile failure or spall releases and constant values are sufficient.
CRA1	3668	SPALLMOD	DRZPERM	Constant	1.0000E-15	1.0000E-15	1.0000E-15	1.0000E-15	531481, 533995, 531914	1	11-Sep-03	Values in DRSPALL Parameter Justification Report is Log Uniform distribution with Median of 1.122E-16, min of 3.9811E-20 and max of 3.1623E-13. However, DRSPALL gas flow does not "see" the DRZ permeability in its default configuration for WIPP, thus no impact on PA, but code requires input value, so constant value assigned.
CRA1	3654	SPALLMOD	FFSTRESS	Constant	1.4900E+07	1.4900E+07	1.4900E+07	1.4900E+07	531057, 533995	1	11-Aug-03	New parameters developed to support DRSPALL model to evaluate volume of WIPP solid waste subject to

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												material failure and transport to surface as a result of inadvertent drilling intrusion.
CRA1	3657	SPALLMOD	FRICTANG	Constant	4.5800E+01	4.5800E+01	4.5800E+01	4.5800E+01	531057, 533995	1	11-Aug-03	New parameters developed to support DRSPALL model to evaluate volume of WIPP solid waste subject to material failure and transport to surface as a result of inadvertent drilling intrusion.
CRA1	3671	SPALLMOD	MUDPRATE	Constant	2.0181E-02	2.0181E-02	2.0181E-02	2.0181E-02	531914, 531057, 533995	1	1 Sep 03, 11 Aug 03	Value in DRSPALL Parameter Justification Report is Uniform distribution with same median, and min of 1.6145E-2 and max of 2.4218E-2. Value used in Sensitivity Analysis Report (ERMS # 531914) is a constant 2.02E-2, value in PAPDB-sensitivity analysis report states that this parameter is not a "driver" for tensile failure or spall releases and constant values are sufficient..
CRA1	3673	SPALLMOD	MUDSOLMX	Constant	6.1500E-01	6.1500E-01	6.1500E-01	6.1500E-01	531914, 531057, 533995	1	1 Sep 03, 11 Aug 03	Value in DRSPALL Parameter Justification Report is Uniform distribution with same median, and min of 5.9E-1 and max of 6.4E-1. Value used in Sensitivity Analysis Report (ERMS # 531914) is a constant 0.615, value in PAPDB -sensitivity analysis report states that this parameter is not a "driver" for tensile failure or spall releases and constant values are sufficient..
CRA1	3670	SPALLMOD	MUDSOLVE	Constant	- 1.5000E+00	-1.5000E+00	-1.5000E+00	-1.5000E+00	531914, 531057, 533995	1	1 Sep 03, 11 Aug 03	Value in DRSPALL Parameter Justification Report is Uniform distribution with same median, and min of -1.8E0 and max of -1.2E0. Value used in Sensitivity Analysis Report (ERMS # 531914) is a constant -1.5, value in PAPDB -sensitivity analysis report states that this parameter is not a "driver" for tensile failure or spall releases and constant values are sufficient..
CRA1	3667	SPALLMOD	PARTDIAM	Loguniform	2.1500E-02	1.0000E-02	1.0000E-03	1.0000E-01	531057, 533995	2	11-Aug-03	Note: ERMS# 531477 states mean value is 1.00E-2; mean value not reported in DRSPALL Parameter

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												Justification Report. Value in PAPDB is correct based on max, min and distribution.
CRA1	3660	SPALLMOD	PIPEID	Constant	9.7180E-02	9.7180E-02	9.7180E-02	9.7180E-02	531057, 533995	1	11-Aug-03	New parameters developed to support DRSPALL model to evaluate volume of WIPP solid waste subject to material failure and transport to surface as a result of inadvertent drilling intrusion.
CRA1	3663	SPALLMOD	PIPEROUG	Constant	5.0000E-05	5.0000E-05	5.0000E-05	5.0000E-05	531057, 533995	1	11-Aug-03	New parameters developed to support DRSPALL model to evaluate volume of WIPP solid waste subject to material failure and transport to surface as a result of inadvertent drilling intrusion.
CRA1	3672	SPALLMOD	POISRAT	Constant	3.8000E-01	3.8000E-01	3.8000E-01	3.8000E-01	531914, 531057, 533995	1	1 Sep 03, 11 Aug 03	Value in DRSPALL Parameter Justification Report is Uniform distribution with median of 3.9E-1, min of 3.5E-1 and max of 4.3E-1. However text (p. 17) states it is equally valid to assign a constant value of 0.38--the value in the PAPDB. Also supported in Sensitivity Study report (ERMS 531914).
CRA1	3651	SPALLMOD	REFPRS	Constant	1.0177E+05	1.0177E+05	1.0177E+05	1.0177E+05	531057 534342, 533995	1	8/11/2003 30 Mar 04	Value in DRSPALL Parameter Justification Report Appendix A is 1.0177E+4 Pa, value in text, p. 42 is 1.0177E+5 Pa. Value in PAPDB is correct. SNL issued documentation to correct referenced document 3/30/04.
CRA1	3666	SPALLMOD	REPIPERM	Loguniform	5.1600E-13	2.4000E-13	2.4000E-14	2.4000E-12	531057 531931, 533995	1	8/11/2003 3/30/04	New parameters developed to support DRSPALL model to evaluate volume of WIPP solid waste subject to material failure and transport to surface as a result of inadvertent drilling intrusion. Mean value not provided in supporting documentation. Values in PAPDB are correct. SNL issued documentation to correct referenced documents in March 2004.
CRA1	3655	SPALLMOD	REPOSTOP	Constant	3.8470E+02	3.8470E+02	3.8470E+02	3.8470E+02	531057, 533995	1	11-Aug-03	New parameters developed to support DRSPALL model to evaluate volume of WIPP solid waste subject to material failure and transport to

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												surface as a result of inadvertent drilling intrusion.
CRA1	3664	SPALLMOD	SALTDENS	Constant	2.1800E+03	2.1800E+03	2.1800E+03	2.1800E+03	531057, 533995	1	11-Aug-03	New parameters developed to support DRSPALL model to evaluate volume of WIPP solid waste subject to material failure and transport to surface as a result of inadvertent drilling intrusion.
CRA1	3669	SPALLMOD	SHAPEFAC	Constant	1.0000E-01	1.0000E-01	1.0000E-01	1.0000E-01	531477, 530157, 531914, 533995	1	10 Sep 03, 11 Aug 03	Constrained to be constant. Appears in DRSPALL as product of shape factor and particle diameter. Particle diameter varied, and product is same range as that in the peer review analysis.
CRA1	3661	SPALLMOD	STPDVOLR	Constant	1.0000E+03	1.0000E+03	1.0000E+03	1.0000E+03	531057, 533995	1	11-Aug-03	New parameters developed to support DRSPALL model to evaluate volume of WIPP solid waste subject to material failure and transport to surface as a result of inadvertent drilling intrusion.
CRA1	3656	SPALLMOD	STPPVOLR	Constant	1.0000E+03	1.0000E+03	1.0000E+03	1.0000E+03	531057, 533995	1	11-Aug-03	New parameters developed to support DRSPALL model to evaluate volume of WIPP solid waste subject to material failure and transport to surface as a result of inadvertent drilling intrusion.
CRA1	3658	SPALLMOD	SURFELEV	Constant	1.0373E+03	1.0373E+03	1.0373E+03	1.0373E+03	531057, 533995	1	11-Aug-03	New parameters developed to support DRSPALL model to evaluate volume of WIPP solid waste subject to material failure and transport to surface as a result of inadvertent drilling intrusion.
CRA1	3676	SPALLMOD	TENSLSTR	Uniform	1.4500E+05	1.4500E+05	1.2000E+05	1.7000E+05	531057 532364	1	8/11/2003 3/30/04	New parameters developed to support DRSPALL model to evaluate volume of WIPP solid waste subject to material failure and transport to surface as a result of inadvertent drilling intrusion. Mean value not provided in supporting documentation. Values in PAPDB are correct. SNL issued documentation to correct referenced documents 3/30/04.
CRA1	2039	SR90	INVCHD	Constant	2.8200E+04	2.8200E+04	2.8200E+04	2.8200E+04	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03

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CRA1	2039	SR90	INVCHD	Constant	2.6800E+04	2.6800E+04	2.6800E+04	2.6800E+04	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	518	SR90	INVRHD	Constant	1.1800E+05	1.1800E+05	1.1800E+05	1.1800E+05	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	518	SR90	INVRHD	Constant	1.1500E+05	1.1500E+05	1.1500E+05	1.1500E+05	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	605	TH229	INVCHD	Constant	6.1200E+00	6.1200E+00	6.1200E+00	6.1200E+00	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	605	TH229	INVCHD	Constant	5.2500E+00	5.2500E+00	5.2500E+00	5.2500E+00	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	606	TH229	INVRHD	Constant	1.8300E-01	1.8300E-01	1.8300E-01	1.8300E-01	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	606	TH229	INVRHD	Constant	1.3900E-01	1.3900E-01	1.3900E-01	1.3900E-01	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	609	TH230	INVCHD	Constant	2.2600E-01	2.2600E-01	2.2600E-01	2.2600E-01	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	609	TH230	INVCHD	Constant	1.6900E-01	1.6900E-01	1.6900E-01	1.6900E-01	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	610	TH230	INVRHD	Constant	7.2400E-03	7.2400E-03	7.2400E-03	7.2400E-03	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	610	TH230	INVRHD	Constant	6.6700E-03	6.6700E-03	6.6700E-03	6.6700E-03	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	3508	TH230L	INVCHD	Constant	6.3500E+00	6.3500E+00	6.3500E+00	6.3500E+00	529289	1	12-May-03	Represents combined activities of TH230 + TH229, per AP-097, Rev. 0, Analysis Plan for Deriving Radionuclide Inventory Information for PA Calculations: CRA, 1/2003. NUTS is computationally intensive and minimizing number of radionuclides is required (ERMS# 529289)--based on TWBID Rev. 2.1, Ver. 3.11.
CRA1	3508	TH230L	INVCHD	Constant	5.4200E+00	5.4200E+00	5.4200E+00	5.4200E+00	531090	1	28-Aug-03	Represents updated combined activities of TH230 + TH229, per AP-097, Rev. 0, Analysis Plan for Deriving Radionuclide Inventory Information for PA Calculations: CRA, 1/2003. NUTS is computationally intensive and minimizing number of radionuclides is required (ERMS# 529289)--based on

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												TWBID Rev. 2.1, Ver. 3.12--ERMS # 530918.
CRA1	3513	TH230L	INVRHD	Constant	1.9000E-01	1.9000E-01	1.9000E-01	1.9000E-01	529289	1	12-May-03	Represents combined activities of TH230 + TH229, per AP-097, Rev. 0, Analysis Plan for Deriving Radionuclide Inventory Information for PA Calculations: CRA, 1/2003. NUTS is computationally intensive and minimizing number of radionuclides is required (ERMS# 529289)--based on TWBID Rev. 2.1, Ver. 3.11.
CRA1	3513	TH230L	INVRHD	Constant	1.4600E-01	1.4600E-01	1.4600E-01	1.4600E-01	529130	1	28-Aug-03	Represents updated combined activities of TH230 + TH229, per AP-097, Rev. 0, Analysis Plan for Deriving Radionuclide Inventory Information for PA Calculations: CRA, 1/2003. NUTS is computationally intensive and minimizing number of radionuclides is required (ERMS# 529289)--based on TWBID Rev. 2.1, Ver. 3.12--ERMS # 530918.
CRA1	613	TH232	INVCHD	Constant	6.6300E+00	6.6300E+00	6.6300E+00	6.6300E+00	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	613	TH232	INVCHD	Constant	6.6100E+00	6.6100E+00	6.6100E+00	6.6100E+00	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	614	TH232	INVRHD	Constant	2.9100E-01	2.9100E-01	2.9100E-01	2.9100E-01	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	614	TH232	INVRHD	Constant	2.1800E-01	2.1800E-01	2.1800E-01	2.1800E-01	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	634	U233	INVCHD	Constant	1.4300E+03	1.4300E+03	1.4300E+03	1.4300E+03	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	634	U233	INVCHD	Constant	1.2400E+03	1.2400E+03	1.2400E+03	1.2400E+03	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	635	U233	INVRHD	Constant	4.3800E+01	4.3800E+01	4.3800E+01	4.3800E+01	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	635	U233	INVRHD	Constant	3.4100E+01	3.4100E+01	3.4100E+01	3.4100E+01	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	638	U234	INVCHD	Constant	3.6400E+02	3.6400E+02	3.6400E+02	3.6400E+02	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03

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CRA1	638	U234	INVCHD	Constant	2.9700E+02	2.9700E+02	2.9700E+02	2.9700E+02	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	639	U234	INVRHD	Constant	2.3500E+01	2.3500E+01	2.3500E+01	2.3500E+01	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	639	U234	INVRHD	Constant	2.2000E+01	2.2000E+01	2.2000E+01	2.2000E+01	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	3507	U234L	INVCHD	Constant	1.7900E+03	1.7900E+03	1.7900E+03	1.7900E+03	529130	1	8-May-03	Represents combined activities of U234 + U233, per AP-097, Rev. 0, Analysis Plan for Deriving Radionuclide Inventory Information for PA Calculations: CRA, 1/2003. NUTS is computationally intensive and minimizing number of radionuclides is required (ERMS# 529289)--based on TWBID Rev. 2.1, Ver. 3.11.
CRA1	3507	U234L	INVCHD	Constant	1.5400E+03	1.5400E+03	1.5400E+03	1.5400E+03	531103	1	28-Aug-03	Represents updated combined activities of U234 + U233, per AP-097, Rev. 0, Analysis Plan for Deriving Radionuclide Inventory Information for PA Calculations: CRA, 1/2003. NUTS is computationally intensive and minimizing number of radionuclides is required (ERMS# 529289)--based on TWBID Rev. 2.1, Ver. 3.12--ERMS # 530918.
CRA1	3512	U234L	INVRHD	Constant	6.7300E+01	6.7300E+01	6.7300E+01	6.7300E+01	529130	1	8-May-03	Represents combined activities of U234 + U233, per AP-097, Rev. 0, Analysis Plan for Deriving Radionuclide Inventory Information for PA Calculations: CRA, 1/2003. NUTS is computationally intensive and minimizing number of radionuclides is required (ERMS# 529289)--based on TWBID Rev. 2.1, Ver. 3.11.
CRA1	3512	U234L	INVRHD	Constant	5.6100E+01	5.6100E+01	5.6100E+01	5.6100E+01	531103	1	28-Aug-03	Represents updated combined activities of U234 + U233, per AP-097, Rev. 0, Analysis Plan for Deriving Radionuclide Inventory Information for PA Calculations: CRA, 1/2003. NUTS is computationally intensive and

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												minimizing number of radionuclides is required (ERMS# 529289)--based on TWBID Rev. 2.1, Ver. 3.12--ERMS # 530918.
CRA1	642	U235	INVCHD	Constant	1.3800E+00	1.3800E+00	1.3800E+00	1.3800E+00	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	642	U235	INVCHD	Constant	1.3400E+00	1.3400E+00	1.3400E+00	1.3400E+00	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	643	U235	INVRHD	Constant	9.7900E-01	9.7900E-01	9.7900E-01	9.7900E-01	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	643	U235	INVRHD	Constant	9.4200E-01	9.4200E-01	9.4200E-01	9.4200E-01	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	2216	U236	INVCHD	Constant	2.6000E-01	2.6000E-01	2.6000E-01	2.6000E-01	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	2216	U236	INVCHD	Constant	2.3100E-01	2.3100E-01	2.3100E-01	2.3100E-01	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	646	U236	INVRHD	Constant	1.4800E+00	1.4800E+00	1.4800E+00	1.4800E+00	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	646	U236	INVRHD	Constant	1.4200E+00	1.4200E+00	1.4200E+00	1.4200E+00	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	649	U238	INVCHD	Constant	2.4600E+01	2.4600E+01	2.4600E+01	2.4600E+01	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	649	U238	INVCHD	Constant	2.4400E+01	2.4400E+01	2.4400E+01	2.4400E+01	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
CRA1	650	U238	INVRHD	Constant	1.3100E+02	1.3100E+02	1.3100E+02	1.3100E+02	529130	2	8-May-03	Same comment as for Parameter ID 4 for 8 May 03
CRA1	650	U238	INVRHD	Constant	1.3000E+02	1.3000E+02	1.3000E+02	1.3000E+02	531103	2	28-Aug-03	Same comment as for Parameter ID 4 for 28 Aug 03
AMW	3649	WAS_AMW	CLOSMOD1	Delta	2.0000E+00	2.0000E+00	1.0000E+00	4.0000E+00	531077, 534212	1	27-Aug-03	Supporting documentation justifies adding these new parameters to support evaluation of the effect of waste from the AMWTF, but does not provide any specific values (i.e. values on PDE forms), just probabilities. Subsequent documentation (ERMS # 534212, dtd 22 March 2004) provided by SNL confirms accuracy of values in PAPDB.
AMW	3650	WAS_AMW	CLOSMOD2	Delta	1.0000E+00	1.0000E+00	1.0000E+00	2.0000E+00	531077, 534212	1	27-Aug-03	Supporting documentation justifies adding these new parameters to

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												support evaluation of the effect of waste from the AMWTF, but does not provide any specific values (i.e. values on PDE forms), just probabilities. Subsequent documentation (ERMS # 534212, dtd 22 March 2004) provided by SNL confirms accuracy of values in PAPDB.
AMW	3648	WAS_AMW	FRACAMW	Uniform	6.0000E-01	6.0000E-01	2.0000E-01	1.0000E+00	531077, 534214	1	27-Aug-03	Supporting documentation justifies adding these new parameters to support evaluation of the effect of waste from the AMWTF, but does not provide any specific values (i.e. values on PDE forms), just probabilities. Subsequent documentation (ERMS # 534214, dtd 22 March 2004) provided by SNL confirms accuracy of values in PAPDB.
CRA1	2041	WAS_AREA	DCELLCHW	Constant	7.5000E+01	7.5000E+01	7.5000E+01	7.5000E+01	527270	1	2-Apr-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.11).
CRA1	2041	WAS_AREA	DCELLCHW	Constant	5.8000E+01	5.8000E+01	5.8000E+01	5.8000E+01	530767	1	18-Aug-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.12).
CRA1	2274	WAS_AREA	DCELLRHW	Constant	6.1000E+00	6.1000E+00	6.1000E+00	6.1000E+00	527270	1	2-Apr-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.11).
CRA1	2274	WAS_AREA	DCELLRHW	Constant	4.5000E+00	4.5000E+00	4.5000E+00	4.5000E+00	530767	1	18-Aug-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.12).
CRA1	1992	WAS_AREA	DIRNCCHW	Constant	2.3000E+02	2.3000E+02	2.3000E+02	2.3000E+02	527270	1	2-Apr-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.11).
CRA1	1992	WAS_AREA	DIRNCCHW	Constant	1.7000E+02	1.7000E+02	1.7000E+02	1.7000E+02	530767	1	18-Aug-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.12).
CRA1	1993	WAS_AREA	DIRNCRHW	Constant	3.9000E+02	3.9000E+02	3.9000E+02	3.9000E+02	527270	1	2-Apr-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.11).
CRA1	1993	WAS_AREA	DIRNCRHW	Constant	4.8000E+02	4.8000E+02	4.8000E+02	4.8000E+02	530767	1	18-Aug-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.12).

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CRA1	2040	WAS_AREA	DIRONCHW	Constant	1.4000E+02	1.4000E+02	1.4000E+02	1.4000E+02	527270	1	2-Apr-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.11).
CRA1	2040	WAS_AREA	DIRONCHW	Constant	1.1000E+02	1.1000E+02	1.1000E+02	1.1000E+02	530767	1	18-Aug-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.12).
CRA1	2044	WAS_AREA	DIRONRHW	Constant	1.2000E+02	1.2000E+02	1.2000E+02	1.2000E+02	527270	1	2-Apr-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.11).
CRA1	2044	WAS_AREA	DIRONRHW	Constant	1.1000E+02	1.1000E+02	1.1000E+02	1.1000E+02	530767	1	18-Aug-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.12).
CRA1	2043	WAS_AREA	DPLASCHW	Constant	5.5000E+01	5.5000E+01	5.5000E+01	5.5000E+01	527270	1	2-Apr-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.11).
CRA1	2043	WAS_AREA	DPLASCHW	Constant	4.2000E+01	4.2000E+01	4.2000E+01	4.2000E+01	530767	1	18-Aug-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.12).
CRA1	2275	WAS_AREA	DPLASRHW	Constant	7.0000E+00	7.0000E+00	7.0000E+00	7.0000E+00	527270	1	2-Apr-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.11).
CRA1	2275	WAS_AREA	DPLASRHW	Constant	4.9000E+00	4.9000E+00	4.9000E+00	4.9000E+00	530767	1	18-Aug-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.12).
CRA1	1995	WAS_AREA	DPLSCCHW	Constant	2.1000E+01	2.1000E+01	2.1000E+01	2.1000E+01	527270	1	2-Apr-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.11).
CRA1	1995	WAS_AREA	DPLSCCHW	Constant	1.6000E+01	1.6000E+01	1.6000E+01	1.6000E+01	530767	1	18-Aug-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.12).
CRA1	2228	WAS_AREA	DPLSCRHW	Constant	1.2000E+00	1.2000E+00	1.2000E+00	1.2000E+00	527270	1	2-Apr-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.11).
CRA1	2228	WAS_AREA	DPLSCRHW	Constant	1.4000E+00	1.4000E+00	1.4000E+00	1.4000E+00	530767	1	18-Aug-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.12).
CRA1	2042	WAS_AREA	DRUBBCHW	Constant	1.9000E+01	1.9000E+01	1.9000E+01	1.9000E+01	527270	1	2-Apr-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.11).
CRA1	2042	WAS_AREA	DRUBBCHW	Constant	1.4000E+01	1.4000E+01	1.4000E+01	1.4000E+01	530767	1	18-Aug-03	Revision to values resulting from

Table 2. Accuracy/Justification Check for Parameters That Have Changed Since the Technical Baseline Migration (TBM)

												updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.12).
CRA1	2046	WAS_AREA	DRUBBRHW	Constant	3.6000E+00	3.6000E+00	3.6000E+00	3.6000E+00	527270	1	2-Apr-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.11).
CRA1	2046	WAS_AREA	DRUBBRHW	Constant	3.1000E+00	3.1000E+00	3.1000E+00	3.1000E+00	530767	1	18-Aug-03	Revision to values resulting from updates to waste inventory updates (TWBID Rev. 2.1, Ver. 3.12).
CRA1		SPALLMOD	DRZTCK	Constant	8.5000E-01	8.5000E-01	8.5000E-01	8.5000E-01	534287, 533995	1	26-Mar-04	Parameter added to PAPDB at EPA request.
CRA1		SPALLMOD	FRCHBETA	Constant	1.1500E-06	1.1500E-06	1.1500E-06	1.1500E-06	534287 535944, 533995	1	26-Mar-04	Parameter added to PAPDB at EPA request.
CRA1		SPALLMOD	REPOSTCK	Constant	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	534287 534575, 533995	1	26-Mar-04	Parameter added to PAPDB at EPA request.
CRA1		SPALLMOD	REPOTRAD	Constant	3.8500E+02	3.8500E+02	3.8500E+02	3.8500E+02	534287 536134, 533995	1	26-Mar-04	Parameter added to PAPDB at EPA request.
TBM	3482	AM+3	MKD_AM	Loguniform	1.3000E-01	9.0000E-02	2.0000E-02	4.0000E-01	514688, 241561, 527703	1	28 Jan 03, 3 Nov 00, 24 Jul 96	Change made at request of EPA. Subsequent spreadsheet provided by B Buell, shows calculations of mean and median values missing in referenced documentation. ERMS 235268 provides formulas for calculations. Correction to 10 Jun 96 entry, wrong range input, per Parameter Problem Report PPR-2003-01 (ERMS 527703)
TBM	3482	AM+3	MKD_AM	Loguniform	1.0000E-01	6.0000E-02	9.0000E-03	4.0000E-01	238801	1	10-Jun-96	Change made at request of EPA. Subsequent spreadsheet provided by B Buell, shows calculations of mean and median values missing in referenced documentation. ERMS 235268 provides formulas for calculations.
TBM	3480	PU+3	MKD_PU	Loguniform	1.0000E-01	6.0000E-02	9.0000E-03	4.0000E-01	238801	1	10-Jun-96	Change made at request of EPA. Subsequent spreadsheet provided by B Buell, shows calculations of mean and median values missing in referenced documentation. ERMS 235268 provides formulas for calculations.

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TBM	3480	PU+3	MKD_PU	Loguniform	1.3000E-01	9.0000E-02	2.0000E-02	4.0000E-01	241561 514688 527703	1	24 Jul 96	Change made at request of EPA. Subsequent spreadsheet provided by B Buell, shows calculations of mean and median values missing in referenced documentation. ERMS 235268 provides formulas for calculations. Correction to 10 Jun 96 entry, wrong range input, per Parameter Problem Report PPR-2003-01.
TBM	3402	SOLMOD3	SOLCIM	Constant	1.3800E-08	1.3800E-08	1.3800E-08	1.3800E-08	524971, 524694, 522337	1	23-May-96	Change made at request of EPA.
TBM	3402	SOLMOD3	SOLCIM	Constant	1.3000E-08	1.3000E-08	1.3000E-08	1.3000E-08	524971, 524694, 514688	1	20 Dec 0 2, 15 Nov 02, 3 Nov 00	Change requested to correct incorrect value in original documentation for change (ERMS # 522337).

Table 3 Section 1

Table 3. Section 1. Technical Baseline Migration (TBM) Parameter Changes

Analysis	Parameter ID No.	Material ID	Property ID	Distribution Type	CURRENT VALUE			
					Mean	Median	Minimum	Maximum
TBM	5	AM241	INVRHD	Constant	9.430000E+03	9.430000E+03	9.430000E+03	9.430000E+03
TBM	3504	AM241L	INVCHD	Constant	4.900000E+05	4.900000E+05	4.900000E+05	4.900000E+05
TBM	3509	AM241L	INVRHD	Constant	1.020000E+04	1.020000E+04	1.020000E+04	1.020000E+04
TBM	3184	BH_SAND	PRMX_LOG	Uniform	-1.365000E+01	-1.365000E+01	-1.365000E+01	-1.100000E+01
TBM	3190	BH_SAND	PRMY_LOG	Uniform	-1.365000E+01	-1.365000E+01	-1.365000E+01	-1.100000E+01
TBM	3191	BH_SAND	PRMZ_LOG	Uniform	-1.365000E+01	-1.365000E+01	-1.365000E+01	-1.100000E+01
TBM	3259	BLOWOUT	APORO	Constant	2.400000E-13	2.400000E-13	2.400000E-13	2.400000E-13
TBM	3256	BLOWOUT	FGE	Uniform	9.550000E+00	9.550000E+00	1.000000E+00	1.810000E+01
TBM	2254	BOREHOLE	TAUFAIL	Loguniform	1.050000E+01	1.960000E+00	5.000000E-02	7.700000E+00
TBM	3414	BOREHOLE	WUF	Constant	3.590000E+00	3.590000E+00	3.590000E+00	3.590000E+00
TBM	61	CASTILER	COMP_RCK	Triangular	5.300000E-11	4.000000E-11	2.000000E-11	1.000000E-10
TBM	109	CF252	INVRHD	Constant	5.950000E-05	5.950000E-05	5.950000E-05	5.950000E-05
TBM	3412	CM245	INVCHD	Constant	1.150000E-02	1.150000E-02	1.150000E-02	1.150000E-02
TBM	3514	CONC_PCS	CAP_MOD	Constant	2.000000E+00	2.000000E+00	2.000000E+00	2.000000E+00
TBM	3515	CONC_PCS	COMP_RCK	Constant	1.200000E-09	1.200000E-09	1.200000E-09	1.200000E-09
TBM	3516	CONC_PCS	COMPRES	Constant	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
TBM	3517	CONC_PCS	KPT	Constant	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
TBM	3518	CONC_PCS	PC_MAX	Constant	1.000000E+08	1.000000E+08	1.000000E+08	1.000000E+08
TBM	3519	CONC_PCS	PCT_A	Constant	5.600000E-01	5.600000E-01	5.600000E-01	5.600000E-01
TBM	3520	CONC_PCS	PCT_EXP	Constant	-3.460000E-01	-3.460000E-01	-3.460000E-01	-3.460000E-01
TBM	3521	CONC_PCS	PO_MIN	Constant	1.013250E+05	1.013250E+05	1.013250E+05	1.013250E+05
TBM	3522	CONC_PCS	PORE_DIS	Cumulative	2.520000E+00	9.400000E-01	1.100000E-01	8.100000E+00
TBM	3523	CONC_PCS	POROSITY	Constant	5.000000E-02	5.000000E-02	5.000000E-02	5.000000E-02
TBM	3524	CONC_PCS	PRESSURE	Constant	1.013250E+05	1.013250E+05	1.013250E+05	1.013250E+05
TBM	3525	CONC_PCS	PRMX_LOG	Triangular	-1.881600E+01	-1.874960E+01	-2.069900E+01	-1.700000E+01

Table 3. Section 1. Technical Baseline Migration (TBM) Parameter Changes

TBM	3526	CONC_PCS	PRMY_LOG	Triangular	-1.881600E+01	-1.874960E+01	-2.069900E+01	-1.700000E+01
TBM	3527	CONC_PCS	PRMZ_LOG	Triangular	-1.881600E+01	-1.874960E+01	-2.069900E+01	-1.700000E+01
TBM	3528	CONC_PCS	REF_PRES	Constant	1.010000E+05	1.010000E+05	1.010000E+05	1.010000E+05
TBM	3529	CONC_PCS	RELP_MOD	Constant	4.000000E+00	4.000000E+00	4.000000E+00	4.000000E+00
TBM	3530	CONC_PCS	SAT_IBRN	Constant	9.999999E-01	9.999999E-01	9.999999E-01	9.999999E-01
TBM	3531	CONC_PCS	SAT_RBRN	Cumulative	2.500000E-01	2.000000E-01	0.000000E+00	6.000000E-01
TBM	3532	CONC_PCS	SAT_RGAS	Uniform	2.000000E-01	2.000000E-01	0.000000E+00	4.000000E-01
TBM	3185	CONC_PLG	PRMX_LOG	Uniform	-1.800000E+01	-1.800000E+01	-1.900000E+01	-1.700000E+01
TBM	3192	CONC_PLG	PRMY_LOG	Uniform	-1.800000E+01	-1.800000E+01	-1.900000E+01	-1.700000E+01
TBM	3193	CONC_PLG	PRMZ_LOG	Uniform	-1.800000E+01	-1.800000E+01	-1.900000E+01	-1.700000E+01
TBM	198	DRZ_1	PRMX_LOG	Uniform	-1.600000E+01	-1.600000E+01	-1.940000E+01	-1.250000E+01
TBM	199	DRZ_1	PRMY_LOG	Uniform	-1.600000E+01	-1.600000E+01	-1.940000E+01	-1.250000E+01
TBM	200	DRZ_1	PRMZ_LOG	Uniform	-1.600000E+01	-1.600000E+01	-1.940000E+01	-1.250000E+01
TBM	3533	DRZ_PCS	CAP_MOD	Constant	1.000000E+00	1.000000E+00	1.000000E+00	1.000000E+00
TBM	3534	DRZ_PCS	COMP_RCK	Constant	7.410000E-10	7.410000E-10	7.410000E-10	7.410000E-10
TBM	3535	DRZ_PCS	KPT	Constant	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
TBM	3536	DRZ_PCS	PC_MAX	Constant	1.000000E+08	1.000000E+08	1.000000E+08	1.000000E+08
TBM	3537	DRZ_PCS	PCT_A	Constant	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
TBM	3538	DRZ_PCS	PCT_EXP	Constant	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
TBM	3539	DRZ_PCS	PO_MIN	Constant	1.013250E+05	1.013250E+05	1.013250E+05	1.013250E+05
TBM	3540	DRZ_PCS	PORE_DIS	Constant	7.000000E-01	7.000000E-01	7.000000E-01	7.000000E-01
TBM	3541	DRZ_PCS	POROSITY	Cumulative	1.565000E-02	1.290000E-02	3.900000E-03	3.290000E-02
TBM	3542	DRZ_PCS	PRMX_LOG	Triangular	-1.874960E+01	-1.874960E+01	-2.069900E+01	-1.700000E+01
TBM	3543	DRZ_PCS	PRMY_LOG	Triangular	-1.874960E+01	-1.874960E+01	-2.069900E+01	-1.700000E+01
TBM	3544	DRZ_PCS	PRMZ_LOG	Triangular	-1.874960E+01	-1.874960E+01	-2.069900E+01	-1.700000E+01
TBM	3545	DRZ_PCS	RELP_MOD	Delta	0.000000E+00	0.000000E+00	1.000000E+00	4.000000E+00
TBM	3546	DRZ_PCS	SAT_RBRN	Constant	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00

Table 3. Section 1. Technical Baseline Migration (TBM) Parameter Changes

TBM	3547	DRZ_PCS	SAT_RGAS	Constant	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
TBM	3501	GLOBAL	FPICD	Constant	1.000000E+00	1.000000E+00	1.000000E+00	1.000000E+00
TBM	3500	GLOBAL	FPICM	Constant	1.000000E+00	1.000000E+00	1.000000E+00	1.000000E+00
TBM	3493	GLOBAL	PBRINE	Uniform	3.050000E-01	3.050000E-01	1.000000E-02	6.000000E-01
TBM	3477	NP+4	MKD_NP	Loguniform	3.500000E+00	2.600000E+00	7.000000E-01	1.000000E+01
TBM	3476	NP+5	MKD_NP	Loguniform	3.800000E-02	1.400000E-02	1.000000E-03	2.000000E-01
TBM	3481	PU+4	MKD_PU	Loguniform	3.500000E+00	2.600000E+00	7.000000E-01	1.000000E+01
TBM	293	PU238	INVCHD	Constant	2.090000E+06	2.090000E+06	2.090000E+06	2.090000E+06
TBM	3506	PU238L	INVCHD	Constant	2.090000E+06	2.090000E+06	2.090000E+06	2.090000E+06
TBM	3511	PU238L	INVRHD	Constant	1.080000E+03	1.080000E+03	1.080000E+03	1.080000E+03
TBM	3505	PU239L	INVCHD	Constant	1.010000E+06	1.010000E+06	1.010000E+06	1.010000E+06
TBM	3510	PU239L	INVRHD	Constant	1.540000E+04	1.540000E+04	1.540000E+04	1.540000E+04
TBM	2131	REPOSIT	PRMX_LOG	Constant	-1.261980E+01	-1.261980E+01	-1.261980E+01	-1.261980E+01
TBM	2132	REPOSIT	PRMY_LOG	Constant	-1.261980E+01	-1.261980E+01	-1.261980E+01	-1.261980E+01
TBM	2133	REPOSIT	PRMZ_LOG	Constant	-1.261980E+01	-1.261980E+01	-1.261980E+01	-1.261980E+01
TBM	3402	SOLMOD3	SOLCIM	Constant	1.380000E-08	1.380000E-08	1.380000E-08	1.380000E-08
TBM	3402	SOLMOD3	SOLCIM	Constant	1.300000E-08	1.300000E-08	1.300000E-08	1.300000E-08
TBM	3406	SOLMOD3	SOLSIM	Constant	1.200000E-07	1.200000E-07	1.200000E-07	1.200000E-07
TBM	3403	SOLMOD4	SOLCIM	Constant	4.100000E-08	4.100000E-08	4.100000E-08	4.100000E-08
TBM	3407	SOLMOD4	SOLSIM	Constant	1.300000E-08	1.300000E-08	1.300000E-08	1.300000E-08
TBM	3404	SOLMOD5	SOLCIM	Constant	4.800000E-07	4.800000E-07	4.800000E-07	4.800000E-07
TBM	3408	SOLMOD5	SOLSIM	Constant	2.400000E-07	2.400000E-07	2.400000E-07	2.400000E-07
TBM	2907	STEEL	CORRMCO2	Uniform	1.585000E-14	1.585000E-14	0.000000E+00	3.170000E-14
TBM	3478	TH+4	MKD_TH	Loguniform	3.500000E+00	2.600000E+00	7.000000E-01	1.000000E+01
TBM	609	TH230	INVCHD	Constant	2.900000E-01	2.900000E-01	2.900000E-01	2.900000E-01
TBM	3508	TH230L	INVCHD	Constant	9.580000E+00	9.580000E+00	9.580000E+00	9.580000E+00
TBM	3513	TH230L	INVRHD	Constant	7.050000E-01	7.050000E-01	7.050000E-01	7.050000E-01

Table 3. Section 1. Technical Baseline Migration (TBM) Parameter Changes

TBM	3479	U+4	MKD_U	Loguniform	3.500000E+00	2.600000E+00	7.000000E-01	1.000000E+01
TBM	3475	U+6	MKD_U	Loguniform	3.100000E-03	7.700000E-04	3.000000E-05	2.000000E-02
TBM	638	U234	INVCHD	Constant	7.270000E+02	7.270000E+02	7.270000E+02	7.270000E+02
TBM	3507	U234L	INVCHD	Constant	2.520000E+03	2.520000E+03	2.520000E+03	2.520000E+03
TBM	3512	U234L	INVRHD	Constant	2.010000E+02	2.010000E+02	2.010000E+02	2.010000E+02
TBM	663	WAS_AREA	PRMX_LOG	Constant	-1.261980E+01	-1.261980E+01	-1.261980E+01	-1.261980E+01
TBM	664	WAS_AREA	PRMY_LOG	Constant	-1.261980E+01	-1.261980E+01	-1.261980E+01	-1.261980E+01
TBM	665	WAS_AREA	PRMZ_LOG	Constant	-1.261980E+01	-1.261980E+01	-1.261980E+01	-1.261980E+01
TBM	3549	WAS_AREA	PTHRESH	Constant	8.000000E+06	8.000000E+06	8.000000E+06	8.000000E+06
TBM	3548	WAS_AREA	VOLSPALL	Uniform	2.250000E+00	2.250000E+00	5.000000E-01	4.000000E+00
PAD	2734	PAN_SEAL	SAT_IBRN	Constant	2.100000E-01	2.100000E-01	2.100000E-01	2.100000E-01
PAD	259	PAN_SEAL	PRMX_LOG	Constant	-1.804530E+01	-1.804530E+01	-1.804530E+01	-1.804530E+01
PAD	260	PAN_SEAL	PRMY_LOG	Constant	-1.271400E+01	-1.271400E+01	-1.271400E+01	-1.271400E+01
PAD	261	PAN_SEAL	PRMZ_LOG	Constant	-1.271400E+01	-1.271400E+01	-1.271400E+01	-1.271400E+01
PAD	256	PAN_SEAL	POROSITY	Constant	1.500000E-01	1.500000E-01	1.500000E-01	1.500000E-01

Table 3 Section 2

Table 3. Section 2. Technical Baseline Migration (TBM) Parameter Changes

Anal-ysis	Param. ID No.	Material ID	Property ID	Param. Record No.	Date	Replaces Param. Record	Replaced by Param. Record	PREVIOUS VALUES Mean	Median	Minimum	Maximum	Date	Prev. Anal-ysis
TBM	5	AM241	INVRHD	1542	2002-06-12		1686	9.4400E+03	9.4400E+03	9.4400E+03	9.4400E+03	1996-10-29	CCA
TBM	3504	AM241L	INVCHD	1553	2002-06-18		1760	4.9036E+05	4.9036E+05	4.9036E+05	4.9036E+05	1998-02-16	CCA
TBM	3509	AM241L	INVRHD	1554	2002-06-18		1761	1.0200E+04	1.0200E+04	1.0200E+04	1.0200E+04	1998-02-16	CCA
TBM	3184	BH_SAND	PRMX_LOG	1016	2002-02-14			-1.2500E+01	-1.2500E+01	-1.4000E+01	-1.1000E+01	1996-03-14	CCA
TBM	3190	BH_SAND	PRMY_LOG	1042	2002-03-13			-1.2500E+01	-1.2500E+01	-1.4000E+01	-1.1000E+01	1996-03-14	CCA
TBM	3191	BH_SAND	PRMZ_LOG	1043	2002-03-13			-1.2500E+01	-1.2500E+01	-1.4000E+01	-1.1000E+01	1996-03-14	CCA
TBM	3259	BLOWOUT	APORO	1050	2002-04-25			1.7000E-13	1.7000E-13	1.7000E-13	1.7000E-13	1996-04-25	CCA
TBM	3256	BLOWOUT	FGE	1051	2002-04-25			1.8100E+01	1.8100E+01	1.8100E+01	1.8100E+01	1996-04-25	CCA
TBM	2254	BOREHOLE	TAUFAIL	1017	2002-02-14			5.0300E+00	5.0300E+00	5.0000E-02	1.0000E+01	1996-04-25	CCA
TBM	3414	BOREHOLE	WUF	1018	2002-02-14		1759	3.4400E+00	3.4400E+00	3.4400E+00	3.4400E+00	1996-11-21	CCA
TBM	61	CASTILER	COMP_RCK	1019	2002-02-14			-9.8000E+00	-1.0000E+01	-1.1300E+01	-8.0000E+00	1996-04-11	CCA
TBM	109	CF252	INVRHD	1543	2002-06-12		1690	5.9600E-05	5.9600E-05	5.9600E-05	5.9600E-05	1996-10-29	CCA
TBM	3412	CM245	INVCHD	1544	2002-06-12		1695	1.1500E+02	1.1500E+02	1.1500E+02	1.1500E+02	1996-04-26	CCA
TBM	3514	CONC_PCS	CAP_MOD	981	2002-02-14				new				
TBM	3515	CONC_PCS	COMP_RCK	982	2002-02-14		1626		new				
TBM	3516	CONC_PCS	COMPRES	983	2002-02-14				new				
TBM	3517	CONC_PCS	KPT	984	2002-02-14				new				
TBM	3518	CONC_PCS	PC_MAX	985	2002-02-14				new				
TBM	3519	CONC_PCS	PCT_A	986	2002-02-14				new				
TBM	3520	CONC_PCS	PCT_EXP	987	2002-02-14				new				
TBM	3521	CONC_PCS	PO_MIN	988	2002-02-14				new				
TBM	3522	CONC_PCS	PORE_DIS	989	2002-02-14				new				
TBM	3523	CONC_PCS	POROSITY	990	2002-02-14				new				

Table 3. Section 2. Technical Baseline Migration (TBM) Parameter Changes

TBM	3524	CONC_PCS	PRESSURE	991	2002-02-14			new				
TBM	3525	CONC_PCS	PRMX_LOG	992	2002-02-14			new				
TBM	3526	CONC_PCS	PRMY_LOG	993	2002-02-14			new				
TBM	3527	CONC_PCS	PRMZ_LOG	994	2002-02-14			new				
TBM	3528	CONC_PCS	REF_PRES	995	2002-02-14			new				
TBM	3529	CONC_PCS	RELP_MOD	996	2002-02-14			new				
TBM	3530	CONC_PCS	SAT_IBRN	997	2002-02-14			new				
TBM	3531	CONC_PCS	SAT_RBRN	998	2002-02-14			new				
TBM	3532	CONC_PCS	SAT_RGAS	999	2002-02-14			new				
TBM	3185	CONC_PLG	PRMX_LOG	1020	2002-02-14		-1.6301E+01	-1.6301E+01	-1.6301E+01	-1.6301E+01	1996-03-14	CCA
TBM	3192	CONC_PLG	PRMY_LOG	1044	2002-03-13		-1.6301E+01	-1.6301E+01	-1.6301E+01	-1.6301E+01	1996-03-14	CCA
TBM	3193	CONC_PLG	PRMZ_LOG	1045	2002-03-13		-1.6301E+01	-1.6301E+01	-1.6301E+01	-1.6301E+01	1996-03-14	CCA
TBM	198	DRZ_1	PRMX_LOG	1021	2002-02-14		-1.5000E+01	-1.5000E+01	-1.5000E+01	-1.5000E+01	1995-11-01	CCA
TBM	199	DRZ_1	PRMY_LOG	1046	2002-03-13		-1.5000E+01	-1.5000E+01	-1.5000E+01	-1.5000E+01	1995-11-01	CCA
TBM	200	DRZ_1	PRMZ_LOG	1047	2002-03-13		-1.5000E+01	-1.5000E+01	-1.5000E+01	-1.5000E+01	1995-11-01	CCA
TBM	3533	DRZ_PCS	CAP_MOD	1000	2002-02-14			new				
TBM	3534	DRZ_PCS	COMP_RCK	1001	2002-02-14			new				
TBM	3535	DRZ_PCS	KPT	1002	2002-02-14			new				
TBM	3536	DRZ_PCS	PC_MAX	1003	2002-02-14			new				
TBM	3537	DRZ_PCS	PCT_A	1004	2002-02-14			new				
TBM	3538	DRZ_PCS	PCT_EXP	1005	2002-02-14			new				
TBM	3539	DRZ_PCS	PO_MIN	1006	2002-02-14			new				
TBM	3540	DRZ_PCS	PORE_DIS	1007	2002-02-14			new				
TBM	3541	DRZ_PCS	POROSITY	1008	2002-02-14			new				
TBM	3542	DRZ_PCS	PRMX_LOG	1009	2002-02-14			new				
TBM	3543	DRZ_PCS	PRMY_LOG	1010	2002-02-14			new				
TBM	3544	DRZ_PCS	PRMZ_LOG	1011	2002-02-14			new				

Table 3. Section 2. Technical Baseline Migration (TBM) Parameter Changes

TBM	3545	DRZ_PCS	RELP_MOD	1012	2002-02-25				new				
TBM	3546	DRZ_PCS	SAT_RBRN	1013	2002-02-14				new				
TBM	3547	DRZ_PCS	SAT_RGAS	1014	2002-02-14				new				
TBM	3501	GLOBAL	FPICD	1022	2002-02-14			1.0000E-02	1.0000E-02	1.0000E-02	1.0000E-02	1996-06-27	CCA
TBM	3500	GLOBAL	FPICM	1023	2002-02-14			1.0000E-02	1.0000E-02	1.0000E-02	1.0000E-02	1996-06-27	CCA
TBM	3493	GLOBAL	PBRINE	1024	2002-02-14			8.0000E-02	8.0000E-02	8.0000E-02	8.0000E-02	1996-06-26	CCA
TBM	3477	NP+4	MKD_NP	1025	2002-02-14			1.0000E+01	1.0000E+01	9.0000E-01	2.0000E+01	1996-06-12	CCA
TBM	3476	NP+5	MKD_NP	1026	2002-02-14			1.0000E-01	1.0000E-01	1.0000E-03	2.0000E-01	1996-06-12	CCA
TBM	3481	PU+4	MKD_PU	1028	2002-02-14			1.0000E+01	1.0000E+01	9.0000E-11	2.0000E+01	1996-06-12	CCA
TBM	293	PU238	INVCHD	1547	2002-06-12		1709	1.9300E+06	1.9300E+06	1.9300E+06	1.9300E+06	1996-10-29	CCA
TBM	3506	PU238L	INVCHD	1555	2002-06-18		1762	1.9300E+06	1.9300E+06	1.9300E+06	1.9300E+06	1998-02-16	CCA
TBM	3511	PU238L	INVRHD	1556	2002-06-18		1763	1.0800E+03	1.0800E+03	1.0800E+03	1.0800E+03	1998-02-16	CCA
TBM	3505	PU239L	INVCHD	1557	2002-06-18		1764	1.0128E+06	1.0128E+06	1.0128E+06	1.0128E+06	1998-02-16	CCA
TBM	3510	PU239L	INVRHD	1559	2002-06-18		1765	1.5352E+04	1.5352E+04	1.5352E+04	1.5352E+04	1998-02-16	CCA
TBM	2131	REPOSIT	PRMX_LOG	1563	2002-06-21			-1.2769E+01	-1.2769E+01	-1.2769E+01	-1.2769E+01	1996-02-08	CCA
TBM	2132	REPOSIT	PRMY_LOG	1564	2002-06-21			-1.2769E+01	-1.2769E+01	-1.2769E+01	-1.2769E+01	1996-02-08	CCA
TBM	2133	REPOSIT	PRMZ_LOG	1565	2002-06-21			-1.2769E+01	-1.2769E+01	-1.2769E+01	-1.2769E+01	1996-02-08	CCA
TBM	3402	SOLMOD3	SOLCIM	1029	2002-02-14		1566	6.5200E-08	6.5200E-08	6.5200E-08	6.5200E-08	1996-05-24	CCA
TBM	3402	SOLMOD3	SOLCIM	1566	2002-12-24	1029		1.3800E-08	1.3800E-08	1.3800E-08	1.3800E-08	2002-02-14	TBM
TBM	3406	SOLMOD3	SOLSIM	1030	2002-02-14			5.8200E-07	5.8200E-07	5.8200E-07	5.8200E-07	1996-05-24	CCA
TBM	3403	SOLMOD4	SOLCIM	1031	2002-02-14			6.0000E-09	6.0000E-09	6.0000E-09	6.0000E-09	1996-04-24	CCA
TBM	3407	SOLMOD4	SOLSIM	1032	2002-02-14			4.4000E-06	4.4000E-06	4.4000E-06	4.4000E-06	1996-04-24	CCA
TBM	3404	SOLMOD5	SOLCIM	1033	2002-02-14			2.2000E-06	2.2000E-06	2.2000E-06	2.2000E-06	1996-04-24	CCA
TBM	3408	SOLMOD5	SOLSIM	1034	2002-02-14			2.3000E-06	2.3000E-06	2.3000E-06	2.3000E-06	1996-04-24	CCA
TBM	2907	STEEL	CORRMCO2	1035	2002-02-14			7.9370E-15	7.9370E-15	0.0000E+00	1.5870E-14	1996-02-08	CCA
TBM	3478	TH+4	MKD_TH	1036	2002-02-14			1.0000E+01	1.0000E+01	9.0000E-01	2.0000E+01	1996-06-12	CCA
TBM	609	TH230	INVCHD	1546	2002-06-12		1729	2.8300E-01	2.8300E-01	2.8300E-01	2.8300E-01	1996-10-29	CCA

Table 3. Section 2. Technical Baseline Migration (TBM) Parameter Changes

TBM	3508	TH230L	INVCHD	1558	2002-06-18		1766	9.5730E+00	9.5730E+00	9.5730E+00	9.5730E+00	1998-02-16	CCA
TBM	3513	TH230L	INVRHD	1560	2002-06-18		1767	7.0520E-01	7.0520E-01	7.0520E-01	7.0520E-01	1998-02-16	CCA
TBM	3479	U+4	MKD_U	1037	2002-02-14			1.0000E+01	1.0000E+01	9.0000E-01	2.0000E+01	1996-06-12	CCA
TBM	3475	U+6	MKD_U	1038	2002-02-14			1.5000E-02	1.5000E-02	3.0000E-05	3.0000E-02	1996-06-12	CCA
TBM	638	U234	INVCHD	1545	2002-06-12		1735	7.0800E+02	7.0800E+02	7.0800E+02	7.0800E+02	1996-10-29	CCA
TBM	3507	U234L	INVCHD	1561	2002-06-18		1768	2.4980E+03	2.4980E+03	2.4980E+03	2.4980E+03	1998-02-16	CCA
TBM	3512	U234L	INVRHD	1562	2002-06-18		1769	2.0090E+02	2.0090E+02	2.0090E+02	2.0090E+02	1998-02-16	CCA
TBM	663	WAS_AREA	PRMX_LOG	1039	2002-03-13			-1.2769E+01	-1.2769E+01	-1.2769E+01	-1.2769E+01	1996-02-08	CCA
TBM	664	WAS_AREA	PRMY_LOG	1040	2002-03-13			-1.2769E+01	-1.2769E+01	-1.2769E+01	-1.2769E+01	1996-02-08	CCA
TBM	665	WAS_AREA	PRMZ_LOG	1041	2002-03-13			-1.2769E+01	-1.2769E+01	-1.2769E+01	-1.2769E+01	1996-02-08	CCA
TBM	3549	WAS_AREA	PTHRESH	1049	2002-04-25				new				
TBM	3548	WAS_AREA	VOLSPALL	1048	2002-04-24				new				
PAD	2734	PAN_SEAL	SAT_IBRN	1548	2002-06-17			1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1996-02-28	CCA
PAD	259	PAN_SEAL	PRMX_LOG	1549	2002-06-17			-1.5000E+01	-1.5000E+01	-1.5000E+01	-1.5000E+01	1996-02-20	CCA
PAD	260	PAN_SEAL	PRMY_LOG	1550	2002-06-17			-1.5000E+01	-1.5000E+01	-1.5000E+01	-1.5000E+01	1996-02-20	CCA
PAD	261	PAN_SEAL	PRMZ_LOG	1551	2002-06-17			-1.5000E+01	-1.5000E+01	-1.5000E+01	-1.5000E+01	1996-02-20	CCA
PAD	256	PAN_SEAL	POROSITY	1552	2002-06-17			7.5000E-02	7.5000E-02	7.5000E-02	7.5000E-02	1995-11-02	CCA

Table 4

Table 4. Data-Base Code Interface Test 1 Results

Analysis	Code	Filename	Material	Property	Value Returned	PAPDB Value
CRA	DRSPALL	LHS3_DRS_CRA1_A1_R001.CDB	SPALLMOD	COHESION	1.400000E+05	1.400000E+05
CRA	DRSPALL	LHS3_DRS_CRA1_A1_R001.CDB	SPALLMOD	FFSTRESS	1.490000E+07	1.490000E+07
CRA	DRSPALL	LHS3_DRS_CRA1_A1_R001.CDB	SPALLMOD	MUDSOLVE	-1.500000E+00	-1.500000E+00
CRA	DRSPALL	LHS3_DRS_CRA1_A1_R001.CDB	SPALLMOD	PIPEROUG	5.000000E-05	5.000000E-05
CRA	DRSPALL	LHS3_DRS_CRA1_A1_R001.CDB	SPALLMOD	REPIPERM	3.966000E-13	2.4E-12 TO 2.4E-14
CRA	DRSPALL	LHS3_DRS_CRA1_A1_R001.CDB	SPALLMOD	TENSLSTR	1.376000E+05	1.2E5 TO 1.7E5
CRA	DRSPALL	LHS3_DRS_CRA1_A1_R001.CDB	DRILLMUD	DNSFLUID	1.210000E+03	1.14E3 TO 1.38E3
CRA	PANEL	ALG_PANEL_CRA1_R1_V031.CDB	AM241L	INVCHD	4.590000E+05	4.590000E+05
CRA	PANEL	ALG_PANEL_CRA1_R1_V031.CDB	AM243	INVRHD	7.420000E-01	7.420000E+01
CRA	PANEL	ALG_PANEL_CRA1_R1_V031.CDB	BOREHOLE	WUF	2.480000E+00	2.480000E+00
CRA	PANEL	ALG_PANEL_CRA1_R1_V031.CDB	CM243	INVCHD	1.820000E-01	1.820000E-01
CRA	PANEL	ALG_PANEL_CRA1_R1_V031.CDB	NP237	INVCHD	9.250000E+00	9.250000E+00
CRA	PANEL	ALG_PANEL_CRA1_R1_V031.CDB	PU238L	INVRHD	2.800000E+03	2.800000E+03
CRA	PANEL	ALG_PANEL_CRA1_R1_V031.CDB	PU239	INVRHD	5.370000E+03	5.370000E+03
CRA	PANEL	ALG_PANEL_CRA1_R1_V031.CDB	RA226	INVRHD	4.990000E-05	4.990000E-05
CRA	PANEL	ALG_PANEL_CRA1_R1_V031.CDB	SOLMOD3	SOLSOH	3.070000E-07	3.070000E-07
CRA	PANEL	ALG_PANEL_CRA1_R1_V031.CDB	SOLMOD4	SOLSOC	1.240000E-08	1.240000E-08
CRA	PANEL	ALG_PANEL_CRA1_R1_V031.CDB	SOLMOD6	SOLCOC	8.800000E-06	8.800000E-06
CRA	PANEL	ALG_PANEL_CRA1_R1_V031.CDB	TH230L	INVCHD	5.420000E+00	5.420000E+00
CRA	PANEL	ALG_PANEL_CRA1_R1_V031.CDB	U238	INVCHD	2.440000E+01	2.440000E+01
CRA	PANEL	ALG_PANEL_CRA1_R1_V031.CDB	GLOBAL	OXSTAT	9.244000E-01	0.0E0 TO 1.0E0
CRA	SECO	LHS2_ST2D_CRA1_TRN_A3.OUT (VECTOR 28)	AM+3	MKD_AM	1.006000E-01	2.0E-2 TO 4.0E-1
CRA	SECO	LHS2_ST2D_CRA1_TRN_A3.OUT (VECTOR 28)	PU+3	MKD_PU	4.318000E-02	2.0E-2 TO 4.0E-1
CRA	BRAGFLO	ALG1_BF_CRA1_R1_V013.CDB	BH_OPEN	PC_MAX	1.000000E+08	1.000000E+08
CRA	BRAGFLO	MS_DBR_CRA1_DIR_REL.CDB	BLOWOUT	THCK_CAS	1.258300E+02	1.258300E+02

Table 4. Data-Base Code Interface Test 1 Results

CRA	BRAGFLO	ALG1_BF_CRA1_R1_V013.CDB	CONC_MON	COMP_RCK	6.000000E-11	6.000000E-11
CRA	BRAGFLO	ALG1_BF_CRA1_R1_V013.CDB	CONC_PCS	COMP_RCK	6.000000E-11	6.000000E-11
CRA	BRAGFLO	ALG1_BF_CRA1_R1_V013.CDB	CULEBRA	PRESSURE	9.141000E+05	9.141000E+05
CRA	BRAGFLO	ALG1_BF_CRA1_R1_V013.CDB	CULEBRA	PRYMY_LOG	-1.311200E+01	-1.311200E+01
CRA	BRAGFLO	ALG1_BF_CRA1_R1_V013.CDB	MAGENTA	PRESSURE	9.465000E+05	9.465000E+05
CRA	BRAGFLO	ALG1_BF_CRA1_R1_V013.CDB	REFCON	BIP_15	0.000000E+00	0.000000E+00
CRA	BRAGFLO	ALG1_BF_CRA1_R1_V013.CDB	REFCON	BIP_34	2.780000E-02	2.780000E-02
CRA	BRAGFLO	ALG1_BF_CRA1_R1_V013.CDB	REFCON	BIP_66	0.000000E+00	0.000000E+00
CRA	BRAGFLO	ALG1_BF_CRA1_R1_V013.CDB	REFCON	VREPOS	4.384060E+05	4.384100E+05
CRA	BRAGFLO	ALG1_BF_CRA1_R1_V013.CDB	**SHFTL-TI**	**PCT_A**	**0.000000E+00**	**5.600000E-01**
CRA	BRAGFLO	ALG1_BF_CRA1_R1_V013.CDB	SHFTL_T1	RELP_MOD	4.000000E+00	4.000000E+00
CRA	BRAGFLO	ALG1_BF_CRA1_R1_V013.CDB	SHFTL_T2	KPT	0.000000E+00	0.000000E+00
CRA	BRAGFLO	ALG1_BF_CRA1_R1_V013.CDB	SHFTU	POROSITY	2.910000E-01	2.910000E-01
CRA	BRAGFLO	ALG1_BF_CRA1_R1_V013.CDB	SHFTU	PRMX_LOG	-2.033000E+01	-2.05E1 TO -1.65E1
CRA	BRAGFLO	ALG1_BF_CRA1_R1_V013.CDB	SHFTU	SAT_RGAS	3.979000E-01	0.0 TO 4.0E-1
CRA	BRAGFLO	ALG1_BF_CRA1_R1_V013.CDB	WAS_AREA	DIRNCCHW	1.700000E+02	1.700000E+02
CRA	BRAGFLO	ALG1_BF_CRA1_R1_V013.CDB	WAS_AREA	DPLASRHW	4.900000E+00	4.900000E+00
CRA	BRAGFLO	ALG1_BF_CRA1_R1_V013.CDB	WAS_AREA	DRUBBCHW	1.400000E+01	1.400000E+01
CRA	BRAGFLO	ALG1_BF_CRA1_R1_V013.CDB	DRZ-PCS	PORE-DIS	7.000000E-01	7.000000E-01
CRA	CCDFGF	ALG1_BF_CRA1_R1_V013.CDB	GLOBAL	LAMBDAD	5.250000E-03	5.250000E-03
CRA	CCDFGF	CCGF_CRA1_MS.CDB	GLOBAL	THREEPLG	2.890000E-01	2.890000E-01
AMW	CUTTINGS	LHS3_CUSP_AMW_A1_R076.CDB	BOREHOLE	DOMEGA	7.599000E+00	4.2E0 TO 2.3E1
AMW	CUTTINGS	LHS3_CUSP_AMW_A1_R076.CDB	BOREHOLE	TAUFAIL	3.326000E+01	5.0E-2 TO 7.7E1
AMW	CUTTINGS	LHS3_CUSP_AMW_A1_R076.CDB	WAS_AREA	PTHRESH	8.000000E+06	8.000000E+06
AMW	CUTTINGS	LHS3_CUSP_AMW_A1_R076.CDB	WAS_AREA	VOLSPALL	9.492000E-01	5.0E-1 TO 4.0E0
AMW	CCDFGF	CCGF_AMW_MS.CDB	BOREHOLE	WUF	2.480000E+00	2.480000E+00
AMW	CCDFGF	CCGF_AMW_MS.CDB	GLOBAL	ONEPLG	1.500000E-02	1.500000E-02

Table 4. Data-Base Code Interface Test 1 Results

AMW	CCDFGF	CCGF_AMW_MS.CDB	REFCON	FVRW	1.000000E+00	1.000000E+00
AMW	SECO	LHS3_STSD_AMW_A1_R047.CDB	PU+3	MKD_PU	3.764000E-02	2.0E-2 TO 4.0E-1
AMW	SECO	LHS3_STSD_AMW_A1_R047.CDB	PU+4	MKD_PU	1.263000E+00	7.0E-1 TO 1.0E1

Table 5

Table 5. Data-Base Code Interface Test 2 Results

Anal-ysis	Code	Library	Filename	Material	Property	Value	PAPDB Values		
CRA1	BRAGFLO	LIBCRA1_ALG	ALG1_BF_CRA1_R1_V047.CDB	BH_CREEP	PCT_A	0.00000E+00	0.00000E+00		
CRA1	BRAGFLO	LIBCRA1_ALG	ALG1_BF_CRA1_R1_V047.CDB	BH_OPEN	PO_MIN	1.01325E+05	1.01325E+05		
CRA1	BRAGFLO	LIBCRA1_ALG	ALG1_BF_CRA1_R1_V047.CDB	BH_SAND	PC_MAX	1.00000E+08	1.00000E+08		
CRA1	BRAGFLO	LIBCRA1_MS	MS_DBR_CRA1_DIR_REL.INP	BLOWOUT	RE_CAST	1.14000E+02	1.14000E+02		
CRA1	BRAGFLO	LIBCRA1_ALG	ALG1_BF_CRA1_R1_V047.CDB	CASTILER	COMP_RCK	6.26400E-11	2.00000E-11	to	1.00000E-10
CRA1	BRAGFLO	LIBCRA1_ALG	ALG1_BF_CRA1_R1_V047.CDB	CAVITY_3	PRESSURE	1.01325E+05	1.01325E+05		
CRA1	BRAGFLO	LIBCRA1_ALG	ALG1_BF_CRA1_R1_V047.CDB	CELLULS	FBETA	8.96800E-01	0.00000E+00	to	1.00000E+00
CRA1	BRAGFLO	LIBCRA1_ALG	ALG1_BF_CRA1_R1_V047.CDB	CULEBRA	RELP_MOD	4.00000E+00	4.00000E+00		
CRA1	BRAGFLO	LIBCRA1_ALG	ALG1_BF_CRA1_R1_V047.CDB	DRZ_PCS	COMP_RCK	7.41000E-10	7.41000E-10		
CRA1	BRAGFLO	LIBCRA1_ALG	ALG1_BF_CRA1_R1_V047.CDB	IMPERM_Z	CAP_MOD	1.00000E+00	1.00000E+00		
CRA1	BRAGFLO	LIBCRA1_ALG	ALG1_BF_CRA1_R1_V047.CDB	OPS_AREA	PORE_DIS	7.00000E-01	7.00000E-01		
CRA1	BRAGFLO	LIBCRA1_ALG	ALG1_BF_CRA1_R1_V047.CDB	REFCON	ACF_N2	4.50000E-02	4.50000E-02		
CRA1	BRAGFLO	LIBCRA1_ALG	ALG1_BF_CRA1_R1_V047.CDB	REFCON	BIP_36	0.00000E+00	0.00000E+00		
CRA1	BRAGFLO	LIBCRA1_ALG	ALG1_BF_CRA1_R1_V047.CDB	REFCON	MW_FE	5.58470E-02	5.58470E-02		
CRA1	BRAGFLO	LIBCRA1_ALG	ALG1_BF_CRA1_R1_V047.CDB	REFCON	PC_H2S	9.00700E+06	9.00700E+06		
CRA1	BRAGFLO	LIBCRA1_ALG	ALG1_BF_CRA1_R1_V047.CDB	REFCON	TC_CO2	3.04150E+02	3.04150E+02		
CRA1	BRAGFLO	LIBCRA1_ALG	ALG1_BF_CRA1_R1_V047.CDB	S_MB139	EXPKLINK	-3.41000E-01	-3.41000E-01		
CRA1	BRAGFLO	LIBCRA1_ALG	ALG1_BF_CRA1_R1_V047.CDB	S_MB139	PF_DELTA	3.80000E+06	3.80000E+06		
CRA1	BRAGFLO	LIBCRA1_ALG	ALG1_BF_CRA1_R1_V047.CDB	WAS_AREA	DPLASRHW	4.90000E+00	4.90000E+00		
CRA1	BRAGFLO	LIBCRA1_ALG	ALG1_BF_CRA1_R1_V047.CDB	WAS_AREA	DPLSCRHW	1.40000E+00	1.40000E+00		
CRA1	BRAGFLO	LIBCRA1_ALG	ALG1_BF_CRA1_R1_V047.CDB	WAS_AREA	GRATMICI	4.77141E-10	0.00000E+00	to	1.26840E-09
CRA1	BRAGFLO	LIBCRA1_ALG	ALG1_BF_CRA1_R1_V047.CDB	WAS_AREA	SAT_RBRN	5.10500E-01	0.00000E+00	to	5.52000E-01
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	AM241	INVCHD	4.42000E+05	4.42000E+05		
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	AM241	INVRHD	1.58000E+04	1.58000E+04		
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	AM241L	INVCHD	4.59000E+05	4.59000E+05		
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	AM241L	INVRHD	1.66000E+04	1.66000E+04		
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	AM243	INVCHD	2.10000E+01	2.10000E+01		

Table 5. Data-Base Code Interface Test 2 Results

CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	BOREHOLE	WUF	2.48000E+00	2.48000E+00	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	CF252	INVCHD	4.64000E-05	4.64000E-05	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	CF252	INVRHD	3.95000E-06	3.95000E-06	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	CM243	INVCHD	1.82000E-01	1.82000E-01	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	CM243	INVRHD	2.25000E-01	2.25000E-01	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	CM244	INVCHD	3.39000E+03	3.39000E+03	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	CM244	INVRHD	7.94000E+01	7.94000E+01	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	CM245	INVCHD	8.59000E-03	8.59000E-03	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	CM245	INVRHD	1.06000E-02	1.06000E-02	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	CM248	INVCHD	9.14000E-02	9.14000E-02	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	CM248	INVRHD	1.83000E-03	1.83000E-03	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	CS137	INVCHD	4.61000E+03	4.61000E+03	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	CS137	INVRHD	1.74000E+05	1.74000E+05	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	NP237	INVRHD	8.22000E-01	8.22000E-01	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	PA231	INVCHD	1.21000E+00	1.21000E+00	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	PA231	INVRHD	6.55000E-04	6.55000E-04	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	PB210	INVCHD	4.94000E+00	4.94000E+00	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	PB210	INVRHD	1.42000E-05	1.42000E-05	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	PM147	INVCHD	3.86000E-04	3.86000E-04	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	PM147	INVRHD	7.47000E-02	7.47000E-02	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	PU238	INVCHD	1.25000E+06	1.25000E+06	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	PU238	INVRHD	2.80000E+03	2.80000E+03	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	PU238L	INVCHD	1.25000E+06	1.25000E+06	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	PU239	INVCHD	6.59000E+05	6.59000E+05	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	PU239L	INVCHD	7.66000E+05	7.66000E+05	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	PU239L	INVRHD	7.05000E+03	7.05000E+03	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	PU240	INVCHD	1.07000E+05	1.07000E+05	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	PU240	INVRHD	1.67000E+03	1.67000E+03	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	PU241	INVCHD	5.14000E+05	5.14000E+05	

Table 5. Data-Base Code Interface Test 2 Results

CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	PU241	INVRHD	2.39000E+04	2.39000E+04	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	PU242	INVCHD	2.66000E+01	2.66000E+01	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	PU242	INVRHD	4.74000E-01	4.74000E-01	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	PU244	INVCHD	1.32000E-06	1.32000E-06	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	PU244	INVRHD	1.10000E-03	1.10000E-03	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	RA226	INVCHD	6.28000E+00	6.28000E+00	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	RA228	INVCHD	7.63000E+00	7.63000E+00	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	RA228	INVRHD	2.51000E-01	2.51000E-01	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	SOLMOD3	SOLCOC	1.77000E-07	1.77000E-07	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	SOLMOD3	SOLSOC	3.07000E-07	3.07000E-07	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	SOLMOD3	SOLSOH	3.07000E-07	3.07000E-07	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	SOLMOD4	SOLCOC	5.84000E-09	5.84000E-09	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	SOLMOD4	SOLCOH	2.47000E-08	2.47000E-08	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	SOLMOD4	SOLSOH	1.19000E-08	1.19000E-08	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	SOLMOD5	SOLCOC	2.13000E-05	2.13000E-05	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	SOLMOD5	SOLCOH	5.08000E-06	5.08000E-06	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	SOLMOD5	SOLSOC	9.72000E-07	9.72000E-07	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	SOLMOD5	SOLSOH	1.02000E-06	1.02000E-06	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	SOLMOD6	SOLCOH	8.80000E-06	8.80000E-06	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	SOLMOD6	SOLSOC	8.70000E-06	8.70000E-06	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	SOLMOD6	SOLSOH	8.70000E-06	8.70000E-06	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	SR90	INVCHD	2.68000E+04	2.68000E+04	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	SR90	INVRHD	1.15000E+05	1.15000E+05	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	TH229	INVCHD	5.25000E+00	5.25000E+00	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	TH229	INVRHD	1.39000E-01	1.39000E-01	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	TH230	INVCHD	1.69000E-01	1.69000E-01	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	TH230	INVRHD	6.67000E-03	6.67000E-03	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	TH232	INVCHD	6.61000E+00	6.61000E+00	
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	TH232	INVRHD	2.18000E-01	2.18000E-01	

Table 5. Data-Base Code Interface Test 2 Results

CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	U233	INVCHD	1.24000E+03	1.24000E+03		
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	U233	INVRHD	3.41000E+01	1.24000E+03		
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	U234	INVCHD	2.97000E+02	2.97000E+02		
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	U234	INVRHD	2.20000E+01	2.20000E+01		
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	U234L	INVCHD	1.54000E+03	1.54000E+03		
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	U234L	INVRHD	5.61000E+01	5.61000E+01		
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	U235	INVCHD	1.34000E+00	1.34000E+00		
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	U235	INVRHD	9.42000E-01	9.42000E-01		
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	U236	INVCHD	2.31000E-01	2.31000E-01		
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	U236	INVRHD	1.42000E+00	1.42000E+00		
CRA1	PANEL	LIBCRA1_ALG	ALG_PANEL_CRA1_R1_V008.CDB	U238	INVRHD	1.30000E+02	1.30000E+02		
CRA1	CCDFGF	LIBCRA1_MS	CCGF_CRA1_MS.CDB	BRINESAL	DNSFLUID	1.22000E+03	1.22000E+03		
CRA1	CCDFGF	LIBCRA1_MS	CCGF_CRA1_MS.CDB	GLOBAL	FPICM	1.00000E+00	1.00000E+00		
CRA1	CCDFGF	LIBCRA1_MS	CCGF_CRA1_MS.CDB	GLOBAL	LAMBDAD	5.25000E-03	5.25000E-03		
CRA1	CCDFGF	LIBCRA1_MS	CCGF_CRA1_MS.CDB	GLOBAL	TWOPLG	6.96000E-01	6.96000E-01		
CRA1	SECOTP2D	LIBCRA1_LHS	LHS2_ST2D_CRA1_TRN_A2.OUT (vector 16)	AM+3	MKD_AM	1.455E-01	2.00000E-02	to	4.00000E-01
CRA1	SECOTP2D	LIBCRA1_LHS	LHS2_ST2D_CRA1_TRN_A2.OUT (vector 16)	CULEBRA	APOROS	9.075E-04	1.00000E-04	to	1.00000E-02
CRA1	SECOTP2D	LIBCRA1_REL	REL_ST2D_CRA1_R2_V016.CDB	CULEBRA	FTORT	1.00000E+00	1.00000E+00		
CRA1	SECOTP2D	LIBCRA1_LHS	LHS2_ST2D_CRA1_TRN_A2.OUT (vector 16)	PU+3	MKD_PU	8.985E-02	2.00000E-02	to	4.00000E-01
CRA1	SECOTP2D	LIBCRA1_LHS	LHS2_ST2D_CRA1_TRN_A2.OUT (vector 16)	U+6	MKD_U	3.909E-04	7.00000E-01	to	1.00000E+01
CRA1	CUTTINGS	LIBCRA1_LHS	LHS3_CRA1_CUSP_A3_R063.CDB	BOREHOLE	DIAMMOD	3.11150E-01	3.11150E-01		
CRA1	CUTTINGS	LIBCRA1_LHS	LHS3_CRA1_CUSP_A3_R063.CDB	DRILLMUD	VISCO	9.17000E-03	5.00000E-03	to	3.00000E-02
CRA1	CUTTINGS	LIBCRA1_LHS	LHS3_CRA1_CUSP_A3_R063.CDB	WAS_AREA	PTHRESH	8.00000E+06	8.00000E+06		
CRA1	LHS	LIBCRA1_LHS	LHS2_CRA1_TRN_A2.OUT (vector 72)	AM+3	MKD_AM	3.05200E-02	2.00000E-02	to	4.00000E-01
CRA1	LHS	LIBCRA1_LHS	LHS2_CRA1_TRN_A2.OUT (vector 72)	BOREHOLE	TAUFAIL	6.69300E-01	5.00000E-02	to	7.70000E+01
CRA1	LHS	LIBCRA1_LHS	LHS2_CRA1_TRN_A2.OUT (vector 72)	CONC_PLG	PRMX_LOG	-1.88000E+01	-1.90000E+01	to	-1.70000E+01
CRA1	LHS	LIBCRA1_LHS	LHS2_CRA1_TRN_A2.OUT (vector 72)	S_MB139	COMP_RCK	1.00000E-10	1.09000E-11	to	2.75000E-10

Table 5. Data-Base Code Interface Test 2 Results

CRA1	LHS	LIBCRA1_LHS	LHS2_CRA1_TRN_A2.OUT (vector 72)	SOLTH4	SOLCIM	-2.37600E-01	-2.00000E+00	to	1.40000E+00
CRA1	LHS	LIBCRA1_LHS	LHS2_CRA1_TRN_A2.OUT (vector 72)	SOLU4	SOLSIM	-5.45600E-02	-2.00000E+00	to	1.40000E+00
CRA1	LHS	LIBCRA1_LHS	LHS2_CRA1_TRN_A2.OUT (vector 72)	SOLU6	SOLSIM	-6.54600E-01	-2.00000E+00	to	1.40000E+00
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	BLOWOUT	RGAS	4.11600E+03	4.11600E+03		
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	CHARLEN	2.00000E-02			
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	COHESION	1.40000E+05	1.40000E+05		
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	DDZPERM	1.00000E-14	1.00000E-14		
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	DRZTCK	8.50000E-01	8.50000E-01		
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	EXITPDIA	2.03200E-01			
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	EXITPLEN	0.00000E+00			
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	FFSTRESS	1.49000E+07	1.49000E+07		
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	FRCHBETA	1.15000E-06	1.15000E-06		
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	INITBAR	1.50000E-01			
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	MAXPPRES	2.75000E+07			
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	MUDPRATE	2.01810E-02	2.01810E-02		
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	PIPEID	9.71800E-02	9.71800E-02		
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	POISRAT	3.80000E-01	3.80000E-01		
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	REFPRS	1.01770E+05	1.01770E+05		
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	REPIPERM	2.40000E-13	2.40000E-14	to	2.40000E-12
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	REPOSTCK	0.00000E+00	0.00000E+00		
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	REPOTRAD	1.92000E+01	1.92000E+01		
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	SALTDENS	2.18000E+03	2.18000E+03		
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	SHAPEFAC	1.00000E-01	1.00000E-01		
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	STPDTIME	1.00000E+03			
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	SURFELEV	1.03730E+03	1.03730E+03		
CRA1	DRSPALL	LIBCRA1_DRS	MS_DRS_CRA1_R1.CDB	SPALLMOD	TENSLSTR	1.45000E+05	1.20000E+05	to	1.70000E+05
AMW	LHS	LIBAMW_LHS	LHS2_AMW_TRN_A1.OUT (vector 1)	AM+3	MKD_AM	3.88600E-02	2.00000E-02	to	4.00000E-01
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	BH_SAND	POROSITY	3.20000E-01	3.20000E-01		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	CASTILER	PCT_A	5.60000E-01	5.60000E-01		

Table 5. Data-Base Code Interface Test 2 Results

AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	CAVITY_4	PRMX_LOG	-1.00000E+01	-1.00000E+01		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	CONC_PLG	COMP_RCK	3.80000E-10	3.80000E-10		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	CULEBRA	PRMX_LOG	-1.31120E+01	-1.31120E+01		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	CULEBRA	PRMZ_LOG	-1.31120E+01	-1.31120E+01		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	DEWYLAKE	CAP_MOD	2.00000E+00	2.00000E+00		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	DRZ_1	COMP_RCK	7.41000E-10	7.41000E-10		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	MAGENTA	PORE_DIS	6.43600E-01	6.43600E-01		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	OPS_AREA	PO_MIN	1.01325E+05	1.01325E+05		
AMW	LHS	LIBAMW_LHS	LHS2_AMW_TRN_A1.OUT (vector 1)	PU+3	MKD_PU	2.65600E-02	2.00000E-02	to	4.00000E-01
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_11	0.00000E+00	0.00000E+00		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_12	-3.42600E-01	-3.42600E-01		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_13	-2.22000E-02	-2.22000E-02		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_14	9.78000E-02	9.78000E-02		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_16	0.00000E+00	0.00000E+00		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_21	-3.42600E-01	-3.42600E-01		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_22	0.00000E+00	0.00000E+00		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_23	9.33000E-02	9.33000E-02		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_24	-3.15000E-02	-3.15000E-02		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_25	9.89000E-02	9.89000E-02		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_26	0.00000E+00	0.00000E+00		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_31	-2.22000E-02	-2.22000E-02		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_32	9.33000E-02	9.33000E-02		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_33	0.00000E+00	0.00000E+00		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_35	8.50000E-02	8.50000E-02		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_36	0.00000E+00	0.00000E+00		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_41	9.78000E-02	9.78000E-02		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_42	-3.15000E-02	-3.15000E-02		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_43	2.78000E-02	2.78000E-02		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_44	0.00000E+00	0.00000E+00		

Table 5. Data-Base Code Interface Test 2 Results

AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_45	1.69600E-01	1.69600E-01	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_46	-7.80000E-03	-7.80000E-03	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_51	0.00000E+00	0.00000E+00	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_52	9.89000E-02	9.89000E-02	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_53	8.50000E-02	8.50000E-02	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_54	1.69600E-01	1.69600E-01	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_55	0.00000E+00	0.00000E+00	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_56	0.00000E+00	0.00000E+00	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_61	0.00000E+00	0.00000E+00	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_62	0.00000E+00	0.00000E+00	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_63	0.00000E+00	0.00000E+00	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_64	-7.80000E-03	-7.80000E-03	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	BIP_65	0.00000E+00	0.00000E+00	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	MW_CELL	2.70230E-02	2.70230E-02	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	MW_CH4	1.60428E-02	1.60428E-02	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	MW_CO2	4.40098E-02	4.40098E-02	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	MW_FE	5.58470E-02	5.58470E-02	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	MW_H2	2.01588E-03	2.01588E-03	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	MW_H2O	1.80153E-02	1.80153E-02	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	MW_H2S	3.40819E-02	3.40819E-02	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	MW_N2	2.80135E-02	2.80135E-02	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	MW_NACL	5.84425E-02	5.84425E-02	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	REFCON	MW_O2	3.19988E-02	3.19988E-02	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	S_MB138	PC_MAX	1.00000E+08	1.00000E+08	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTL_T1	COMP_POR	4.28000E-09	4.28000E-09	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTL_T1	KPT	0.00000E+00	0.00000E+00	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTL_T1	PC_MAX	1.00000E+08	1.00000E+08	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTL_T1	PCT_EXP	-3.46000E-01	-3.46000E-01	
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTL_T1	PO_MIN	1.01000E+05	1.01000E+05	

Table 5. Data-Base Code Interface Test 2 Results

AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTL_T1	POROSITY	1.13000E-01	1.13000E-01		
AMW	LHS	LIBAMW_LHS	LHS2_AMW_TRN_A1.OUT (vector 1)	SHFTL_T1	PRMX_LOG	-1.79200E+01	-2.25000E+01	to	-1.80000E+01
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTL_T1	SAT_IBRN	5.34000E-01	5.34000E-01		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTL_T2	COMP_POR	4.28000E-09	4.28000E-09		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTL_T2	PC_MAX	1.00000E+08	1.00000E+08		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTL_T2	PCT_A	5.60000E-01	5.60000E-01		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTL_T2	PCT_EXP	-3.46000E-01	-3.46000E-01		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTL_T2	PO_MIN	1.01000E+05	1.01000E+05		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTL_T2	POROSITY	1.13000E-01	1.13000E-01		
AMW	LHS	LIBAMW_LHS	LHS2_AMW_TRN_A1.OUT (vector 1)	SHFTL_T2	PRMX_LOG	-2.08000E+01	-2.25000E+01	to	-1.80000E+01
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTL_T2	RELP_MOD	4.00000E+00	4.00000E+00		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTL_T2	SAT_IBRN	5.34000E-01	5.34000E-01		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTU	COMP_POR	2.05000E-08	2.05000E-08		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTU	KPT	0.00000E+00	0.00000E+00		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTU	PC_MAX	1.00000E+08	1.00000E+08		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTU	PCT_A	5.60000E-01	5.60000E-01		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTU	PCT_EXP	-3.46000E-01	-3.46000E-01		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTU	PO_MIN	1.01000E+05	1.01000E+05		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTU	RELP_MOD	4.00000E+00	4.00000E+00		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SHFTU	SAT_IBRN	7.96000E-01	7.96000E-01		
AMW	LHS	LIBAMW_LHS	LHS2_AMW_TRN_A1.OUT (vector 1)	SHFTU	SAT_RBRN	3.85800E-01	0.00000E+00	to	6.00000E-01
AMW	LHS	LIBAMW_LHS	LHS2_AMW_TRN_A1.OUT (vector 1)	SOLTH4	SOLCIM	5.78200E-01	-2.00000E+00	to	1.40000E+00
AMW	LHS	LIBAMW_LHS	LHS2_AMW_TRN_A1.OUT (vector 1)	SOLU4	SOLSIM	-3.65000E-01	-2.00000E+00	to	1.40000E+00
AMW	LHS	LIBAMW_LHS	LHS2_AMW_TRN_A1.OUT (vector 1)	SOLU6	SOLSIM	2.02000E-01	-2.00000E+00	to	1.40000E+00
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	SULFATE	QINIT	6.59000E+06	6.59000E+06		
AMW	LHS	LIBAMW_LHS	LHS2_AMW_TRN_A1.OUT (vector 1)	WAS_AMW	CLOSMOD1	3.00000E+00	1.00000E+00	to	4.00000E+00
AMW	LHS	LIBAMW_LHS	LHS2_AMW_TRN_A1.OUT (vector 1)	WAS_AMW	CLOSMOD2	2.00000E+00	1.00000E+00	to	2.00000E+00
AMW	LHS	LIBAMW_LHS	LHS2_AMW_TRN_A1.OUT (vector 1)	WAS_AMW	FRACAMW	3.43500E-01	2.00000E-01	to	1.00000E+00
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	WAS_AREA	DCELLCHW	5.80000E+01	5.80000E+01		

Table 5. Data-Base Code Interface Test 2 Results

AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	WAS_AREA	DCELLRHW	4.50000E+00	4.50000E+00		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	WAS_AREA	DIRNCRHW	4.80000E+02	4.80000E+02		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	WAS_AREA	DIRONCHW	1.10000E+02	1.10000E+02		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	WAS_AREA	DIRONRHW	1.10000E+02	1.10000E+02		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	WAS_AREA	DPLASCHW	4.20000E+01	4.20000E+01		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	WAS_AREA	DPLSCCHW	1.60000E+01	1.60000E+01		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	WAS_AREA	DPLSCRHW	1.40000E+00	1.40000E+00		
AMW	LHS	LIBAMWV_MS	MS_BF_AMWV_POR.CDB	WAS_AREA	DRUBBRHW	3.10000E+00	3.10000E+00		
AMW	CUTTINGS	LIBAMW_LHS	LHS3_CUSP_AMW_A1_R001.CDB	BLOWOUT	PARTDIA	2.80000E-03	4.00000E-05	to	2.00000E-01
AMW	CUTTINGS	LIBAMW_LHS	LHS3_CUSP_AMW_A1_R001.CDB	DRILLMUD	YLDSTRSS	4.40000E+00	2.40000E+00	to	1.92000E+01
AMW	CUTTINGS	LIBAMW_LHS	LHS3_CUSP_AMW_A1_R001.CDB	WAS_AREA	VOLSPALL	8.50500E-01	5.00000E-01	to	4.00000E+00
AMW	CCDFGF	LIBAMW_MS	CCGF_AMW_MS.CDB	BOREHOLE	WUF	2.48000E+00	2.48000E+00		
AMW	CCDFGF	LIBAMW_MS	CCGF_AMW_MS.CDB	GLOBAL	LAMBDAD	5.25000E-03	5.25000E-03		
AMW	CCDFGF	LIBAMW_MS	CCGF_AMW_MS.CDB	GLOBAL	ONEPLG	1.50000E-02	1.50000E-02		
AMW	CCDFGF	LIBAMW_MS	CCGF_AMW_MS.CDB	GLOBAL	TPICM	6.00000E+02	6.00000E+02		
AMW	CCDFGF	LIBAMW_MS	CCGF_AMW_MS.CDB	REFCON	FVRW	1.00000E+00	1.00000E+00		
AMW	CCDFGF	LIBAMW_MS	CCGF_AMW_MS.CDB	REFCON	GRAVACC	9.80665E+00	9.80665E+00		
AMW	CCDFGF	LIBAMW_MS	CCGF_AMW_MS.CDB	U234	HALFLIFE	7.71600E+12	7.71600E+12		
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	DRZ_PCS	KPT	0.00000E+00	0.00000E+00		
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	BH_CREEP	PRMX_LOG	-1.35000E+01	-1.50000E+01	to	-1.20000E+01
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	REFCON	VREPOS	4.36023E+05	4.38406E+05	to	4.36023E+05
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	SHFTL_T1	COMP_POR	4.28000E-09	4.28000E-09		
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	SHFTL_T1	KPT	0.00000E+00	0.00000E+00		
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	SHFTL_T1	PC_MAX	1.00000E+08	1.00000E+08		
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	SHFTL_T1	PCT_A	5.60000E-01	5.60000E-01		
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	SHFTL_T1	PCT_EXP	-3.46000E-01	-3.46000E-01		
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	SHFTL_T1	PRMX_LOG	-1.82000E+01	-2.25000E+01	to	-1.80000E+01
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	SHFTL_T2	KPT	0.00000E+00	0.00000E+00		
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	SHFTL_T2	PC_MAX	1.00000E+08	1.00000E+08		

Table 5. Data-Base Code Interface Test 2 Results

AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	SHFTL_T2	POROSITY	1.13000E-01	1.13000E-01		
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	SHFTL_T2	RELP_MOD	4.00000E+00	4.00000E+00		
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	SHFTL_T2	SAT_IBRN	5.34000E-01	5.34000E-01		
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	SHFTU	COMP_POR	2.05000E-08	2.05000E-08		
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	SHFTU	PRMX_LOG	-1.83000E+01	-2.05000E+01	to	-1.65000E+01
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	SHFTU	SAT_IBRN	7.96000E-01	7.96000E-01		
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	SHFTU	SAT_RGAS	2.00000E-01	0.00000E+00	to	4.00000E-01
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	SHFTU	PO_MIN	1.01000E+05	1.01000E+05		
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	SHFTU	PCT_A	5.60000E-01	5.60000E-01		
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	DRZ_PCS	SAT_RBRN	0.00000E+00	0.00000E+00		
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	CONC_PCS	PCT_EXP	-3.46000E-01	-3.46000E-01		
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	CONC_MON	COMP_RCK	1.20000E-09	6.00000E-11	to	1.20000E-09
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	CONC_PCS	COMP_RCK	1.20000E-09	6.00000E-11	to	1.20000E-09
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	CONC_PLG	COMP_RCK	1.20000E-09	3.80000E-10	to	1.20000E-09
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	CULEBRA	PRESSURE	8.22000E+05	9.14100E+05	to	8.22000E+05
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	CULEBRA	PRMX_LOG	-1.36780E+01	-1.31120E+01	to	-1.36780E+01
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	CULEBRA	PRMY_LOG	-1.36780E+01	-1.31120E+01	to	-1.36780E+01
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	CULEBRA	PRMZ_LOG	-1.36780E+01	-1.31120E+01	to	-1.36780E+01
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	MAGENTA	PRESSURE	9.17000E+05	9.46500E+05	to	9.17000E+05
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	WAS_AREA	DCELLCHW	5.40000E+01	5.80000E+01	to	5.40000E+01
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	WAS_AREA	DIRNCCHW	1.39000E+02	1.70000E+02	to	1.39000E+02
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	WAS_AREA	DIRONRHW	1.00000E+02	1.10000E+02	to	1.00000E+02
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	WAS_AREA	DPLASRHW	1.50000E+01	4.90000E+00	to	1.50000E+01
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	WAS_AREA	DPLSCCHW	2.60000E+01	2.10000E+01	to	2.60000E+01
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	WAS_AREA	DRUBBCHW	1.00000E+01	1.40000E+01	to	1.00000E+01
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	STEEL	CORRMCO2	1.58500E-14	0.00000E+00	to	3.17000E-14
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	CONC_PCS	PC_MAX	1.00000E+08	1.00000E+08		
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	CONC_PCS	POROSITY	5.00000E-02	5.00000E-02		
AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	CONC_PLG	PRMZ_LOG	-1.80000E+01	-1.90000E+01	to	-1.70000E+01

Table 5. Data-Base Code Interface Test 2 Results

AP106	BRAGFLO	LIB_AP106_P1_S0	AP106_P1_S0_BF_MS.CDB	DRZ_PCS	PRMY_LOG	-1.87496E+01	-2.06990E+01	to	-1.70000E+01
AP106	LHS	LIB_AP106_LHS	AP106_P1_S0_LHS_LHS2.OUT (VECTOR 8)	SHFTL_T1	PRMX_LOG	-1.80400E+01	-2.25000E+01	to	-1.80000E+01
AP106	LHS	LIB_AP106_LHS	AP106_P1_S0_LHS_LHS2.OUT (VECTOR 8)	SHFTL_T2	PRMX_LOG	-1.86000E+01	-2.25000E+01	to	-1.80000E+01
AP106	LHS	LIB_AP106_LHS	AP106_P1_S0_LHS_LHS2.OUT (VECTOR 8)	SHFTU	PRMX_LOG	-1.86600E+01	-2.05000E+01	to	-1.65000E+01
AP106	LHS	LIB_AP106_LHS	AP106_P1_S0_LHS_LHS2.OUT (VECTOR 8)	SHFTU	SAT_RBRN	1.88900E-02	0.00000E+00	to	6.00000E-01
AP106	LHS	LIB_AP106_LHS	AP106_P1_S0_LHS_LHS2.OUT (VECTOR 8)	SHFTU	SAT_RGAS	9.05400E-02	0.00000E+00	to	4.00000E-01
AP106	LHS	LIB_AP106_LHS	AP106_P1_S0_LHS_LHS2.OUT (VECTOR 8)	DRZ_PCS	PRMX_LOG	-1.92700E+01	-2.06990E+01	to	-1.70000E+01
AP106	LHS	LIB_AP106_LHS	AP106_P1_S0_LHS_LHS2.OUT (VECTOR 8)	AM+3	MKD_AM	5.06500E-02	2.00000E-02	to	4.00000E-01
AP106	LHS	LIB_AP106_LHS	AP106_P1_S0_LHS_LHS2.OUT (VECTOR 8)	PU+3	MKD_PU	2.20000E-01	2.00000E-02	to	4.00000E-01
AP106	LHS	LIB_AP106_LHS	AP106_P1_S0_LHS_LHS2.OUT (VECTOR 8)	CASTILER	COMP_RCK	5.67000E-11	2.00000E-11	to	1.00000E-10
AP106	LHS	LIB_AP106_LHS	AP106_P1_S0_LHS_LHS2.OUT (VECTOR 8)	BOREHOLE	TAUFAIL	4.29000E+01	5.00000E-02	to	7.70000E+01
AP106	LHS	LIB_AP106_LHS	AP106_P1_S0_LHS_LHS2.OUT (VECTOR 8)	CONC_PCS	PORE_DIS	6.93400E+00	1.10000E-01	to	8.10000E+00
AP106	LHS	LIB_AP106_LHS	AP106_P1_S0_LHS_LHS2.OUT (VECTOR 8)	CONC_PCS	SAT_RGAS	3.30400E-01	0.00000E+00	to	4.00000E-01

* Value not retrieved from PAPDB
** 1st value used in CRA1, 2nd value used in AP 106.

Table 6

Table 6. Parameters Used in BRAGFLO That Differ from the PAPDB

Material	Property	BRAG-FLO Value	PAPDB Value	Reference/ Comment
DRZ_PCS	RELP_MOD	4.00E+00	0.00E+00	Assigned value for DRZ_1: RELP_MOD, (SNL, 2004t)
REPOSIT	DCELLCHW	5.80E+01	5.40E+01	Reassigned in Algebra to equal values for WAS_AREA
REPOSIT	DCELLRHW	4.50E+00	1.70E+01	Reassigned in Algebra to equal values for WAS_AREA
REPOSIT	DIRNCCHW	1.70E+02	1.39E+02	Reassigned in Algebra to equal values for WAS_AREA
REPOSIT	DIRNCRHW	4.8E+02	2.59E+03	Reassigned in Algebra to equal values for WAS_AREA
REPOSIT	DIRONCHW	1.10E+02	1.70E+02	Reassigned in Algebra to equal values for WAS_AREA
REPOSIT	DIRONRHW	1.10E+02	1.70E+02	Reassigned in Algebra to equal values for WAS_AREA
REPOSIT	DPLASCHW	4.20E+02	3.4E+01	Reassigned in Algebra to equal values for WAS_AREA
REPOSIT	DPLASCCHW	1.60E+01	2.6E+01	Reassigned in Algebra to equal values for WAS_AREA
REPOSIT	DRUBBCHW	1.40E+01	1.00+01	Reassigned in Algebra to equal values for WAS_AREA
REPOSIT	DRUBBRHW	3.10E+00	3.30E+00	Reassigned in Algebra to equal values for WAS_AREA
SHFTL_T1	PCT_A	0.00+00	5.60E-01	Reassigned in Algebra per SNL 2003u
SHFTL_T1	PCT_EXP	0.00E+00	-3.46E-01	Reassigned in Algebra per SNL 2003u
SHFTL_T1	SAT_IBRN	9.99E-01	5.34E-01	Reassigned in Algebra per SNL 2003u
SHFTL_T2	PCT_A	0.00E+00	5.60E-01	Reassigned in Algebra per SNL 2003u
SHFTL_T2	PCT_EXP	0.00E+00	-3.46E-01	Reassigned in Algebra per SNL 2003u

SHFTL_T2	SAT_IBRN	9.99E-01	5.34E-01	Reassigned in Algebra per SNL 2003u
SHFTU	PCT_A	0.00E+00	5.60E-01	Reassigned in Algebra per SNL 2003u
SHFTU	PCT_EXP	0.00E+00	-3.46E-01	Reassigned in Algebra per SNL 2003u
SHFTU	SAT_IBRN	9.99E-01	7.90E-01	Reassigned in Algebra per SNL 2003u

Table 7

Table 7. Parameters in CRA PA Input Files that are not in the PAPDB

Code	Material/Parameter Name	Property	Doc OK?	Add to PAPDB	Comments
MODFLOW/PEST	WELL ID	Coordinates	YES	if feasible	OR develop alternative database system to provide parameter identification and documenation traceability; defined in analysis plans (Leigh et al., 2003 and Beauheim, 2002b) and the associated task reports
		Elevation	YES	if feasible	same as above
		Transmissivity	YES	if feasible	same as above
		Salado Dissolution	YES	if feasible	same as above
		Culebra Depth	YES	if feasible	same as above
		Depth to Middle of Culebra	YES	if feasible	same as above
		Water Level	YES	if feasible	same as above
		Fluid Density	YES	if feasible	same as above
		Freshwater Head	YES	if feasible	same as above
	GRID	Coordinates	YES	NO	Defined in analysis plans (Leigh et al, 2003; Beauheim, 2002b) and the associated task reports
DRSPALL	SPALLMOD	CHARLEN	YES	YES	
		INITBAR	YES	YES	
		EXITPLEN	YES	YES	
		EXITDIAM	YES	YES	
		MAXPRESS	YES	YES	
		STPDTIME	YES	YES	
BRAGFLO	GRID	Coordinates	YES	NO	Defined in Stein (2003c); Stein and Zelinkski (2003a, 2003b); Caporuscio et al. (2003)
	DRF_PCS	PRMX_LOG	YES	YES	set = WAS_AREA in PAPDB; Hadgu, (2002); Hadgu et al. (2003); Stein and Zelinksi (2003b). Material should be added to database for future PAs

Table 7. Parameters in CRA PA Input Files that are not in the PAPDB

		PRMY_LOG	YES	YES	Same as above
		PRMZ_LOG	YES	YES	Same as above
		POROSITY	YES	YES	Same as above
		PORE_DIS	YES	YES	Same as above
		SAT_RGAS	YES	YES	Same as above
		SAT_RBRN	YES	YES	Same as above
		COMP_RCK	YES	YES	Same as above
		CAP_MOD	YES	YES	Same as above
		RELP_MOD	YES	YES	Same as above
		PC_MAX	YES	YES	Same as above
		PO_MIN	YES	YES	Same as above
		PCT_A	YES	YES	Same as above
		PCT_EXP	YES	YES	Same as above
		KPT	YES	YES	Same as above
	SHFTU	CAP_MOD	YES	YES	Flag is set in Algebra to 1; to be consistent with other parameters, should be added to database for future performance assessments
	SHFTL_T1	CAP_MOD	YES	YES	Same as above
	SHFTL_T2	CAP_MOD	YES	YES	Same as above
	SALADO	DIP1	YES	YES	In Caporuscio et al (2003)
		DIP2	YES	YES	In Caporuscio et al (2003)
	GRID DBR	Coordinates	YES	NO	In DBR Analysis Plan (Stein, 2003d) and Analysis Package (Stein, 2003e)
	WAS-AREA	HEIGHT	YES	NO	DBR analysis, derived from 10,000 year BRAGFLO and CUTTINGS-S output (Stein, 2003e; Hadgu et al, 2003; Stein, 2003d)
		PRESPAN1	YES	NO	Same as above

Table 7. Parameters in CRA PA Input Files that are not in the PAPDB

		GPRSPAN1	YES	NO	Same as above
		BSATPAN1	YES	NO	Same as above
		GSATPAN1	YES	NO	Same as above
		PRESPAN2	YES	NO	Same as above
		GPRESPAN2	YES	NO	Same as above
		GSATPAN2	YES	NO	Same as above
		PRESPAN3	YES	NO	same as above
		GPRESPAN3	YES	NO	same as above
		BSATPAN3	YES	NO	same as above
		GSATPAN3	YES	NO	same as above
	DRZ_CONC	PERM_X	YES	NO	DBR Analysis, Set = to combination of DRZ_1 and CONC_PCS (DBR Analysis) (Stein 2003e; Hedgu, 2002; Hedgu et al, 2003) Material should be added to database for future performance assessments, this parameter is calculated value from input from CUTTINGS_S/10,000 year BRAGFLO analyses..
		PERM_Y	YES	NO	Same as above
		PERM_Z	YES	NO	Same as above
		POROSITY	YES	NO	Same as above
		PORE_DIS	YES	YES	DBR Analysis, Set = to combination of DRZ_1 and CONC_PCS (DBR Analysis) (Stein 2003e; Hedgu, 2002; Hedgu et al, 2003) Material should be added to database for future performance assessments
		SAT_RGAS	YES	YES	Same as above
		SAT_RBRN	YES	YES	Same as above
		COMP_RCK	YES	YES	Same as above
		CAP_MOD	YES	YES	Same as above
		RELP_MOD	YES	YES	Same as above

Table 7. Parameters in CRA PA Input Files that are not in the PAPDB

		PC_MAX	YES	YES	Same as above
		PO_MIN	YES	YES	Same as above
		PCT_A	YES	YES	Same as above
		PCT_EXP	YES	YES	Same as above
		KPT	YES	YES	Same as above
		HEIGHT	YES	NO	DBR Analysis, Set = to combination of DRZ_1 and CONC_PCS (DBR Analysis) (Stein 2003e; Hedgu, 2002; Hedgu et al, 2003) Material should be added to database for future performance assessments, this parameter is calculated value from input from CUTTINGS_S/10,000 year BRAGFLO analyses..
		PERMBRX	YES	NO	Same as above
		PRO_INTR	YES	NO	Same as above
	PAN_SL2	PRMX_LOG	YES	NO	DBR Analysis; Set = to CONC_PCS (in PAPDB); Material should be added to database for future performance assessments, this parameter is calculated value from input from CUTTINGS_S/10,000 year BRAGFLO analyses..
		PRMY_LOG	YES	NO	Same as above
		PRMZ_LOG	YES	NO	Same as above
		POROSITY	YES	NO	Same as above
		PORE_DIS	YES	YES	DBR Analysis; Set = to CONC_PCS (in PAPDB); Material should be added to database for future performance assessments Same as above
		SAT_RGAS	YES	YES	Same as above
		SAT_RBRN	YES	YES	Same as above
		COMP_RCK	YES	YES	Same as above
		CAP_MOD	YES	YES	Same as above
		RELP_MOD	YES	YES	Same as above

Table 7. Parameters in CRA PA Input Files that are not in the PAPDB

		PC_MAX	YES	YES	Same as above
		PO_MIN	YES	YES	Same as above
		PCT_A	YES	YES	Same as above
		PCT_EXP	YES	YES	Same as above
		KPT	YES	YES	Same as above
		HEIGHT	YES	NO	DBR Analysis; Set = to CONC_PCS (in PAPDB); Material should be added to database for future performance assessments, this parameter is calculated value from input from CUTTINGS_S/10,000 year BRAGFLO analyses.
		SAT_IBRN	YES	YES	DBR Analysis; Set = to CONC_PCS (in PAPDB); Material should be added to database for future performance assessments Same as above
		PERMBRX	YES	NO	DBR Analysis; Set = to CONC_PCS (in PAPDB); Material should be added to database for future performance assessments, this parameter is calculated value from input from CUTTINGS_S/10,000 year BRAGFLO analyses.
		POR_INTR	YES	NO	Same as above
	WELLBORE	INTR_TIME	YES	NO	DBR analysis, Stein (2003d; 2003e); values either from CUTTINGS_S output or derived in analysis package. Material and properties should be explicitly defined in future DBR analysis plans.
		BITSIZE	YES	NO	Assigned values in ALGEBRA files from CUTTINGS_S output files.
		SKIN	YES	NO	Defined in DBR analysis package (Stein, 2003e) and calculated in ALGEBRA files.
		WELLPI	YES	NO	Same as above.
		DRAINRAD	YES	NO	Same as above.
		PRM_OPEN	YES	NO	Assigned values in ALGEBRA files = BH_OPEN which is in PAPDB.

Table 7. Parameters in CRA PA Input Files that are not in the PAPDB

		PRM_SAND	YES	NO	Assigned values in ALGEBRA files = BH_SAND which is in PAPDB.
		PRM_CREP	YES	NO	Assigned values in ALGEBRA files = BH_CREEP which is in PAPDB
		AREA_TOT	YES	NO	Defined in analysis package, Stein (2003e); calculated from other parameters
		VOLU_TOT	YES	NO	Defined in analysis package, Stein (2003e); value set by output from CUTTINGS_S or output from DRSPALL; Analysis package sets value max at 4 m^3
		CAST_RE	YES	NO	DBR analysis, derived from 10,000 year BRAGFLO and CUTTINGS-S output in ALGEBRA files.
		CAST_WB	YES	NO	Same as above
		WELL_PAN	YES	NO	Same as above
	DRZ_1	PERMBRX	YES	NO	Same as above
		POR_INTR	YES	NO	Same as above
		HEIGHT	YES	NO	Same as above
	S_HALITE	HEIGHT	YES	NO	Same as above
	REFCON	DIP_DEG	YES	YES	DBR Analysis, defined in ALGEBRA file; same as that used in CCA. Should be added to PAPDB for future performance assessments.
	MATL NAME	FBHP	YES	NO	DBR Analysis, defined/calculated in Algebra file; SNL, (1999); Hadgu et al. (2003)
	MATL NAME	D1	YES	YES	DBR Analysis, defined in Hadgu et al (2003) and used in calculating permeabilities; should be added to PAPDB for future performance assessments.
	MATL NAME	D2	YES	YES	Same as above
	MATL NAME	DE	YES	YES	Same as above
	HYDROGEN	H2_MOLE	YES	YES	Values/parameter defined in PREBRAG User's Manual (Stein, 2003b), should be included in PAPDB for future performance assessments.

Table 7. Parameters in CRA PA Input Files that are not in the PAPDB

	CARBON DIOXIDE	CO2_MOLE	YES	YES	Same as above
	NITROGEN	N2_MOLE	YES	YES	Same as above
	HYDROGEN SULFIDE	H2S_MOLE	YES	YES	Same as above
	OXYGEN	O2_MOLE	YES	YES	Same as above
	METHANE	CH4_MOLE	YES	YES	Same as above
SECOTP2D	REFCON	ACTCONST	YES	YES	Documented in SNL (1992; 1996e), should be added to PAPDB for future performance assessments.
CCDFGF	AM241	WS-aCH_INV	YES	YES	Documented in SNL (2003l; 2003o), should be added to PAPDB for future performance assessments.
		WS-bCH_INV	YES	YES	Same as above
		etc for all Waste Streams	YES	YES	Same as above
	AM241	WSRH_INV	YES	YES	Same as above
	CM244	WS-aCH_INV	YES	YES	Same as above
		WS-bCH_INV	YES	YES	Same as above
		etc for all Waste Streams	YES	YES	Same as above
	CM244	WSRH_INV	YES	YES	Same as above
	PU238	WS-aCH_INV	YES	YES	Same as above
		WS-bCH_INV	YES	YES	Same as above
		etc for all Waste Streams	YES	YES	Same as above
	PU238	WSRH_INV	YES	YES	Same as above
	PU239	WS-aCH_INV	YES	YES	Same as above
		WS-bCH_INV	YES	YES	Same as above
		etc for all Waste Streams	YES	YES	Same as above
	PU239	WSRH_INV	YES	YES	Same as above
	PU240	WS-aCH_INV	YES	YES	Same as above

Table 7. Parameters in CRA PA Input Files that are not in the PAPDB

		WS-bCH_INV	YES	YES	Same as above
		etc for all Waste Streams	YES	YES	Same as above
	PU240	WSRH_INV	YES	YES	Same as above
	PU241	WS-aCH_INV	YES	YES	Same as above
		WS-bCH_INV	YES	YES	Same as above
		etc for all Waste Streams	YES	YES	Same as above
	PU241	WSRH_INV	YES	YES	Same as above
	U234	WS-aCH_INV	YES	YES	Same as above
		WS-bCH_INV	YES	YES	Same as above
		etc for all Waste Streams	YES	YES	Same as above
	U234	WSRH_INV	YES	YES	Same as above
	CS137	WSRH_INV	YES	YES	Same as above
	SR90	WSRH_INV	YES	YES	Same as above
	U233	WSRH_INV	YES	YES	Same as above
	CH	VOL	YES	YES	Same as above
	RH	VOL	YES	YES	Same as above
FMT	Thermodynamic Data		YES	NO	Documented in SNL (2003b).

7.0 REFERENCES

Beauheim, R., 2002a: *Routine Calculations Report in Support of Task 3 of AP-088, Calculation of Culebra Freshwater Heads in 1980, 1990, and 2000 for Use in T-Field Calibration*. ERMS# 522580, Sandia National Lab, Carlsbad, NM.

Beauheim, R., 2002b: *SNL WIPP Analysis Plan for the Evaluation of the Effects of Head Changes on Calibration of Culebra Transmissivity Fields, AP-088, Rev. 1*. ERMS# 524785, Sandia National Lab, Carlsbad, NM..

Beauheim, R., 2003: *Records Package for AP-088 Task 4, Conditioning of Base T Fields to Transient Heads: Compilation and Reduction of Transient Head Data*. ERMS# 527572, Sandia National Lab, Carlsbad, NM..

Brush, L., 2003: *Calculation of Actinide Solubilities for the WIPP Compliance Recertification Application, Analysis Plan AP-098, Rev. 1*. ERMS# 527714, Sandia National Lab, Carlsbad, NM..

Brush, L., and Y Xiong, 2003: *Calculation of Actinide Solubilities for the WIPP CRA, BOE 1.3.5.1.2*. ERMS# 529131, Sandia National Lab, Carlsbad, NM..

Caporuscio, F., Gibbons, J., and E. Oswald, 2003: *SNL WIPP Salado Flow Conceptual Models Final Peer Review Report.* ERMS# 526879, Sandia National Lab, Carlsbad, NM..

CRA Monitoring Data, Vol 1. ERMS# 527192, Sandia National Lab, Carlsbad, NM..

Downs, P.S., and C. D. Leigh, 2003: *Analysis Plan (AP-097) for Deriving Radionuclide Inventory Information for PA Calculations: CRA, Task 1.3.5.1.2.1, Rev. 0*, http://www.nwmp.sandia.gov/onlinedocuments/wipp/ap/apo97.pdf , Sandia National Lab, Carlsbad, NM.

EPA, 2003: *Review of WIPP Performance Assessment Parameter Database Migration, Final Report, April, 2003.* EPA Docket II-B3-51. USA EPA, Washington, DC.

Downs, P.S., and D. Guerin, 2003: *Analysis Plan (AP-092) for Transuranic Waste Inventory Update Report, Rev. 2, 2003, Task No. 1.3.5.1.3.1*, http://www.nwmp.sandia.gov/onlinedocuments/wipp/ap/apo92.pdf

Fox, B., 2003: *Calculation of Decayed Radionuclide Inventories for the CRA, Supercedes ERMS# 528748*. ERMS# 530992, Sandia

National Lab, Carlsbad, NM..

Garner, J., 2003a: *WIPP PA User's Manual for PANEL, Version 4.02*. ERMS# 526652, Sandia National Lab, Carlsbad, NM.

Garner, J., 2003b: *SNL WIPP Analysis Package for PANEL: Compliance Recertification Application*. ERMS# 530165, Sandia National Lab, Carlsbad, NM.

Hadgu, T. 2002: *Analysis Plan for the Analysis of Direct Releases Part of TBM, AP-085*, ERMS # 522634, Sandia National Lab., Carlsbad, NM.

Hadgu, T., B.Y. Park and P. Vaughn. 2003. *Analysis of DBR Calculations for the TBM*. ERMS # 528770, Sandia National Lab., Carlsbad, NM.

Hansen, C., 2002: *A Reconciliation of the CCA and PAVT Parameter Baselines, Rev. 2*. ERMS# 524694, Sandia National Lab, Carlsbad, NM.

Hansen, C., 2003: *WIPP PA User's Manual for CUTTINGS_S, Version 5.10*. ERMS# 532340, Sandia National Lab, Carlsbad, NM.

Hansen, C., and C. Leigh, 2002: *A Reconciliation of the CCA and PAVT Parameter Baselines, Rev. 1*. ERMS# 522337, Sandia National Lab, Carlsbad, NM.

Hansen, F., T. Pfeifle, and D. Lord, 2003: *Parameter Justification Report for DRSPALL, SAND2003-2930*. ERMS# 531057, Sandia National Lab, Carlsbad, NM.

Hobart, D. E. And R.C. Moore. 1996. *Analysis of Uranium (VI) Solubility Data for WIPP Performance Assessment* (unpub. rpt), ERMS # 239856. Sandia National Lab., Carlsbad, NM.

Holt, R., and L. Yarbrough, 2002: *Analysis Report Task 2 of AP-088, Estimating Base Transmissivity Fields*. ERMS# 523889, Sandia National Lab, Carlsbad, NM..

Holt, R., and L. Yarbrough, 2003: *Addendum 2 to Analysis Report Task 2 of AP-088, Estimating Base Transmissivity Fields*. ERMS# 529416, Sandia National Lab, Carlsbad, NM.

James, S., and J. Stein, 2003: *Analysis Report for Development of a Simplified Shaft Seal Model for WIPP PA*. ERMS# 525203, Sandia National Lab, Carlsbad, NM.

Kessel, D.S. 2004. *Response to 031604 ParamRevActions Needed by DOE*, email dtd 3/16/04, Memo to Tom Peak and Chuck Byrum (EPA), ERMS# 534575. Sandia National Lab., Carlsbad, NM.

Leigh, C., 2003a: *SNL WIPP Analysis Plan for Compliance Assessment Recertification Application Performance Assessment Calculations, AP-105, Rev. 0*. ERMS# 525252, Sandia National Lab, Carlsbad, NM..

Leigh, C., 2003b: *Calculation of Decayed Radionuclide Inventories for the CRA*. ERMS# 528748, Sandia National Lab, Carlsbad, NM.

Leigh, C., 2003c: *Calculation of Radionuclide Inventories for Use in PANEL in the CRA*. ERMS# 529130, Sandia National Lab, Carlsbad, NM.

Leigh, C., 2003d: *Calculation of the Waste Unit Factor in the CRA*. ERMS# 529148, Sandia National Lab, Carlsbad, NM.

Leigh, C., 2003e: *Calculation of Radionuclide Inventories for Use in NUTS in the CRA*. ERMS# 529289, Sandia National Lab, Carlsbad, NM.

Leigh, C., 2003f: *Calculation of Waste Stream Volumes, Waste and Container Material Densities, and Radionuclide Concentrations for Non-Debris AMWTF Waste Streams at INEEL for the CRA Rev. 0*. ERMS# 530688, Sandia National Lab, Carlsbad, NM.

Leigh, C., 2003g: *Calculation of the Waste Unit Factor in the CRA, Supercedes ERMS# 529148*. ERMS# 531099, Sandia National Lab, Carlsbad, NM.

Leigh, C., 2003h: *Calculation of Radionuclide Inventories for Use in PANEL in the CRA, Supercedes ERMS #529130*. ERMS# 531103, Sandia National Lab, Carlsbad, NM.

Leigh, C., 2003i: *Calculation of Radionuclide Inventories for use in NUTS in the CRA, Supercedes ERMS 529289.* ERMS# 531090, Sandia National Lab, Carlsbad, NM.

Leigh, C., Beauheim, R., and J. Kanney, 2003: *SNL WIPP Analysis Plan for Calculations of Culebra Flow and Transport: Compliance Recertification Application, AP-100, Rev. 0*. ERMS# 530172, Sandia National Lab, Carlsbad, NM.

Li, D., R. Svec, T. Engler, and R. Grigg, March 2001: *Modeling and Simulation of the Wafer Non-Darcy Flow Experiments,* ERMS # 535944, SPE Paper 68822, presented at the Society of Petroleum Engineers Western Regional Meeting in Bakersfield, CA.

Long, J., 2004: *WIPP Execution of Performance Assessment for the Compliance Recertification Application, Rev. 0*. ERMS# 530170, Sandia National Lab, Carlsbad, NM.

Lord, D., 2003a: *WIPP PA User's Manual for DRSPALL Version 1.00.* ERMS# 524780, Sandia National Lab, Carlsbad, NM.

Lord, D., 2002b: *SNL WIPP Analysis Plan for Completion of the Spallings Model for WIPP Recertification, AP-096, Rev. 0*. ERMS# 524993, Sandia National Lab, Carlsbad, NM..

Lord, D.L. 2004. *Description of DRSPALL Parameters Called Out in the CRA, Table PAR-2*. Memo to Record, 25 Feb 2004. ERMS # 533995. Sandia National Lab., Carlsbad, NM.

Lord, D., and D. Rudeen, 2003: *Sensitivity Analysis Report, Part II, DRSPALL V. 1.00, Report for Conceptual Model Peer Review Convening July 7-11, 2003.* ERMS# 531914, Sandia National Lab, Carlsbad, NM.

Lord, D., Rudeen, D., and C. Hansen, 2003: *SNL WIPP Analysis Package for DRSPALL: Compliance Recertification Application, Part I–Calculations of Spall Volumes*. ERMS# 532766, Sandia National Lab, Carlsbad, NM.

Lowry, T. S., 2003a: *Analysis Package for Salado Transport Calculations: Compliance Recertification Application*, ERMS # 530164, Sandia National Lab., Carlsbad, NM.

Lowry, T. S., 2003b: *Analysis Report: Task 5 of AP-088, Evaluation of Mining Scenarios*, ERMS # 531138, Sandia National Lab., Carlsbad, NM..

Lowry, T. S. 2003c: *Analysis Report for Tasks 2 & 3 of AP-100, Grid Size Conversion and Generation of SECOTP2D Input, Analysis Package for the Calculation of Culebra Flow and Transport*, ERMS # 531137, Sandia National Lab., Carlsbad, NM.

McKenna, S., and D. Hart, 2003a: *Analysis Report Task 3 of AP-088, Conditioning of Base T Fields to Steady-State Heads*. ERMS# 529645, Sandia National Lab, Carlsbad, NM..

McKenna, S., and D. Hart, 2003b: *Analysis Report Task 4 of AP-088, Conditioning of Base T Fields to Transient Heads*. ERMS# 531124, Sandia National Lab, Carlsbad, NM.

McKenna, S., D. Hart and T. Lowry, 2004: *PA Run Control Summary for Culebra Transmissivity Field Calibration and Mining Scenarios.* ERMS# 537200, Sandia National Lab., Carlsbad, NM.

Powers, D., 2002: *Analysis Report for Task 1 of AP-088, Construction of Geologic Contour Maps*. ERMS# 522086, Sandia National Lab, Carlsbad, NM..

Ramsey, J., 1997a: *WIPP PA User's Manual for PRESECOTP2D, Version 1.22.* ERMS# 245963, Sandia National Lab, Carlsbad, NM..

Ramsey, J., 1997b: *WIPP PA User's Manual for SECOTP2D 1.41A, Version 1.02.* ERMS# 245734, Sandia National Lab, Carlsbad, NM..

Rudeen, D., Lord, D., Goss, M., and B. Thompson, 2003: *Zone Size Sensitivity DRSPALL Version 1.00, Report in Response to Conceptual Model Peer Review, July 2003*. ERMS# 531397, Sandia National Lab, Carlsbad, NM.

Scott, J., and J. Stein, 2002, *Analysis Plan for the Development of a Simplified Shaft Seal Model for the WIPP Performance Assessment, AP-094, Rev. 0*. ERMS# 524968, Sandia National Lab, Carlsbad, NM.

Snider, A., 2003: *Verification of the Definition of Generic Weep Brine and the Development of a Recipe for this Brine*. ERMS# 527505, Sandia National Lab, Carlsbad, NM..

SNL, 1996a. *Memo to Distribution from M. Tierney, dated 21 March 1996: Distributions*. ERMS# 235268, Sandia National Lab, Carlsbad, NM.

SNL, 1996b. *Memo, R. Bynum to M. Tierney and C. Stockman, dated 23 May 1996: Revised Update of Uncertainty Range and Distribution for Actinide Solubility to be used in CCA NUTS calculations*. ERMS# 237791, Sandia National Lab, Carlsbad, NM.

SNL, 1996c. *Memo, Brush, L. to M. Tierney, dated 10 June 1996: Ranges and Probability Distributions of Kds for Dissolved Pu, Am, U, Th and Np in the Culebra for the PA Calculations to Support the WIPP CCA*. ERMS# 238801, Sandia National Lab, Carlsbad, NM.

SNL, 1996d. *Memo, L. H. Brush and L. J. Storz, to M. S. Tierney, dated 24 July 1996 ; Revised Ranges and Probability Distributions of Kds for Dissolved Pu, Am, U, Th, and Np in the Culebra for the PA Calculations to Support the WIPP CCA*. ERMS#

241561, Sandia National Lab, Carlsbad, NM.

SNL, 1999. *Memo, T. Hadgu, P. Vaughn, J. Bean, D. Johnson, J. Johnson, K. Aragon and J. Helton to M. Marietta, dated 2 Nov 1999. Modifications to the 96 CCA Direct Brine Release Calculations.* ERMS# 511276. Sandia National Lab, Carlsbad, NM.

SNL, 2000. *Memo to File, S. Tisinger, dated 3 November 2000: Documentation for and Classification of PAVT Parameter Changes Effected by the EPA*. ERMS# 514688, Sandia National Lab, Carlsbad, NM.

SNL, 2002a. *Letter, dated 4 June 2002, L Sanchez to E. Giambalvo: Updated (2033 yr) WIPP-Scale Radionuclides for use in WIPP PA Calculations (Memo 4044 Rev. C)*. ERMS# 522348. Sandia National Lab, Carlsbad, NM.

SNL, 2003b. *Memo, C. Hansen to R. Beauheim, dated 26 June 2003: Mining Modification Factors for CRA-1 T-Fields*. ERMS# 530177, Sandia National Lab, Carlsbad, NM..

SNL, 2002c. *Memo, E. Giambalvo to L. Brush, dated 25 July 2002: Recommended Parameter Values for Modeling Organic Ligands in WIPP Brines*. ERMS# 522981, Sandia National Lab, Carlsbad, NM.

SNL, 2002d. *Memo, E. Giambalvo to L Brush, dated 25 July 2002: Recommended Parameter Values for Modeling An(III) Solubility in WIPP Brines*. ERMS# 522982, Sandia National Lab, Carlsbad, NM.

SNL, 2002e. *Memo, E. Giambalvo to L. Brush, dated 26 July 2002: Recommended Parameter Values for Modeling An(IV) Solubility in WIPP Brines*. ERMS# 522986, Sandia National Lab, Carlsbad, NM.

SNL, 2002f. *Memo, E. Giambalvo to L. Brush, dated 26 July 2002: Recommended Parameter Values for Modeling An(V) Solubility in WIPP Brines*. ERMS# 522990, Sandia National Lab, Carlsbad, NM.

SNL, 2002g. *Memo, E. Giambalvo to L. Brush, dated 31 July 2002: Recommended □□°/RT Values for Modeling the Solubility of Oxalate Solids in WIPP Brines*. ERMS# 523057, Sandia National Lab, Carlsbad, NM.

SNL, 2002h. *Memo, J. Stein to K. Knowles, dated 17 Sep 2002: Errors Identified in Waste Storage Volume Parameters Used to Construct BRAGFLO Grid*. ERMS# 523760, Sandia National Lab, Carlsbad, NM.

SNL, 2002i. *Memo to Records from S. Dunagan, dated 20 Dec 2002: Correction to A Reconciliation of the CCA and PAVT Parameter Baselines, Rev. 2 (ERMS # 524694)*. ERMS# 524971, Sandia National Lab, Carlsbad, NM.

SNL, 2002j: Letter, dated 22 April 2002, Giambalvo to J. Harvill: *Sandia's WIPP Inventory Data Needs for Performance Assessment.* ERMS # 521948, Sandia National Lab, Carlsbad, NM.

SNL, 2003a. *Memo to Record from S. Tisinger, dated 6 Jan 2003: Creation of a Placeholder Parameter for LHS*. ERMS# 525047, Sandia National Lab, Carlsbad, NM.

SNL, 2003b. *Memo, E. Giambalvo to L. Brush, dated 10 March 2003: Release of FMT Database FMT_021120.CHEMDAT*. ERMS# 526372, Sandia National Lab, Carlsbad, NM.

SNL, 2003c. *Memo, J. Stein to D Kessel, dated 19 Mar 2003: Pore Compressibility Parameters Mistakenly Named as Rock Compressibility (COMP_RCK) Parameters*. ERMS# 526661, Sandia National Lab, Carlsbad, NM.

SNL, 2003d. *Letter, dated 24 March 2003, J. Stein to J. Long: BRAGFLO Version 5.00 Parameters to be Added to the Parameter Database*. ERMS# 526858, Sandia National Lab, Carlsbad, NM.

SNL, 2003e. *Letter, dated 2 April 2003, B. Crawford to C Leigh: Waste Material Parameters Deliverable in Support of WIPP CRA*. ERMS# 527270, Sandia National Lab, Carlsbad, NM.

SNL, 2003f. *Letter, dated 1 May 2003, B. Crawford to C. Leigh: Rev. 2 Updated Estimate of Radionuclide Activities in TRU Waste Streams*. ERMS# 528679, Sandia National Lab, Carlsbad, NM.

SNL, 2003g. *Memo dated 17 June 2003: C. Hansen to D. Kessel: Request for New Parameter REFCON FVRW*. ERMS# 529865, Sandia National Lab, Carlsbad, NM.

SNL, 2003h. *Memo, J. Stein to M Chavez, dated 12 August 2003 Page Changes for ERMS# 525203*. ERMS# 530631, Sandia National Lab, Carlsbad, NM.

SNL, 2003i. *Letter dated 15 August 2003, S. Lott to C. Leigh: Response to the Request for Waste Material and Container Material Densities from TWBID Rev. 2.1 Ver. 3.12, Data Ver. D.4.08*. ERMS# 530767, Sandia National Lab, Carlsbad, NM.

SNL, 2003j. *Memo, T. Lowry to J.Stein, dated 19 August 2003: Culebra Permeability Value to be Used by BRAGFLO for the 2003 CRA PA.* ERMS# 530899, Sandia National Lab, Carlsbad, NM.

SNL, 2003k. *Memo, R. Beauheim to D. Kessel, dated 19 August 2003: Culebra and Magenta Pressures to Use in CRA BRAGFLO*

Runs. ERMS# 530903, Sandia National Lab, Carlsbad, NM.

SNL, 2003l. *Letter, dated 20 August 2003, S. Lott to C. Leigh: Response to the Request for Radionuclide Activities in TRU Waste Streams from TWBID Rev. 2.1, Ver. 3.12, Data Ver. D.4.08*. ERMS# 530918, Sandia National Lab, Carlsbad, NM.

SNL, 2003m. *Memo to Record from C. Hansen, dated 27 Aug 2003: Waste Parameters for AP-107 Analysis*. ERMS# 531073, Sandia National Lab, Carlsbad, NM.

SNL, 2003n. *Memo to Record from C. Hansen, dated 27 Aug 2003: Porosity Surfaces for AP-107 Analysis*. ERMS# 531077, Sandia National Lab, Carlsbad, NM.

SNL, 2003o. *Memo to Records, dated 3 Sept 2003, from C. Leigh: Radionuclides for LANL Waste Streams: LA-TA-21-40, LA-TA-21-41, La-TA-21-42, LA-TA-21-43, LA-TA-21-44, LA-TA-48-01, LA-TA-49-01, LA-TA-50-11*. ERMS# 531187, Sandia National Lab, Carlsbad, NM.

SNL, 2003p. *Memo, R. Kirkes to C. Hansen, dated 5 Sep 2003: Borehole Plugging Probabilities to be Used in CRA Calculations*. ERMS# 531352, Sandia National Lab, Carlsbad, NM.

SNL, 2003q. *Memo, D. Lord to D. Kessel, dated 10 September 2003: Justification for Waste Permeability Range Used in DRSPALL*. ERMS# 531473. Sandia National Lab, Carlsbad, NM.

SNL, 2003r. *Memo, D. Lord to D. Kessel, dated 10 September 2003: Justification for Particle Diameter and Shape Factor Used in DRSPALL*. ERMS# 531477, Sandia National Lab, Carlsbad, NM.

SNL, 2003s. *Memo, D, Lord to D. Kessel, dated 11 Sep 2003: Justification for DRZ Permeability Value used in DRSPALL*. ERMS# 531481, Sandia National Lab, Carlsbad, NM..

SNL, 2003t. *Memo, D. Lord to D. Kessel, dated 30 September 2003: Justification for Drilling Damaged Zone Constant Permeability Used in DRSPALL*. ERMS# 532259, Sandia National Lab, Carlsbad, NM.

SNL, 2003u. *Memo, J. Stein to D. Kessel, dated 17 Dec 2003: Parameter Values Used for the Simplified Shaft Model in the CRA1 and AMWTP BRAGFLO Analysis*. ERMS# 533428, Sandia National Lab, Carlsbad, NM.

SNL, 2003v. *Parameter Data Entry Form (PDE) for SPALLMOD:TENSLSTR, Sep 2003.* ERMS# 532364, Sandia National Lab, Carlsbad, NM.

SNL, 2003w. *Parameter Data Entry Form (PDE) for SPALLMOD: REPIPERM, Sep, 2003*. ERMS# 531931, Sandia National Lab, Carlsbad, NM.

SNL, 2003x. *Parameter Problem Report, PPR-2003-4, CM244-INVCHD*. ERMS# 531232, Sandia National Lab, Carlsbad, NM.

SNL, 2003y. *Parameter Problem Report, PPR 2003-1, for MKD_AM and MKD_PU*. ERMS# 527703, Sandia National Lab, Carlsbad, NM.

SNL, 2003z. *Parameter Problem Report, PPR-2003-02, REFCON-VREPOS*. ERMS# 527694, Sandia National Lab, Carlsbad, NM.

SNL, 2003aa. *Parameter Problem Report, for BLOWOUT THCK_CAS*. ERMS# 530503, Sandia National Lab, Carlsbad, NM.

SNL, 2004a. *Memo to Record from Cliff Hansen, dated 22 March 2004: Porosity Surfaces for AP 107 Analysis (Revision 1)*. ERMS# 534212, Sandia National Lab, Carlsbad, NM.

SNL, 2004b. *Memo to Record from Cliff Hansen, dated 22 March 2004: Waste Parameters for AP-107 Analysis (Revision 3)*. ERMS# 534214, Sandia National Lab, Carlsbad, NM.

SNL, 2004c. *Memo to Record: D. Lord, dated 25 March 2004: Description of DRSPALL Parameters Called out in CRA Table PAR-2, Rev. 1*. ERMS# 534287, Sandia National Lab, Carlsbad, NM.

SNL 2004d. *Memo, M. Chavez to Records, 31 March 2004: Record Correction to ERMS 531057, Parameter Justification Report for DRSPALL*. ERMS# 534342, Sandia National Lab, Carlsbad, NM.

SNL 2004e. *Memo to Record, D. Lord and D Rudeen, dated 22 July 2004: SNL/DOE Response to EPA's 2004 WIPP CRA Review Item G-6*. ERMS# 536134, Sandia National Lab, Carlsbad, NM.

SNL, 2004f. *Parameter Problem Report, dtd 2 Feb 2004, RELP_MOD, for TBM, CRA1, AMW* ERMS#unknown, Sandia National Lab, Carlsbad, NM.

SNL, 2004g. *Parameter Data Entry Form (PDE) for MKD_AM, 5 Feb 2004*. ERMS# 527706, Sandia National Lab, Carlsbad, NM.

SNL, 2004h. *Parameter Data Entry Form (PDE) for MKD_PU, 5 Feb 2004*. ERMS# 527707, Sandia National Lab, Carlsbad, NM.

SNL, 2004i. *Parameter Data Entry Form (PDE) for SPALLMOD: DRZTCK*, ERMS# 534364, Sandia National Lab, Carlsbad, NM.

SNL, 2004j. *Parameter Data Entry Form (PDE) for SPALLMOD: FRCHBETA*, ERMS# 534365, Sandia National Lab, Carlsbad, NM.

SNL, 2004k. *Parameter Data Entry Form (PDE) for SPALLMOD: REPOSTCK*, ERMS# 534363, Sandia National Lab, Carlsbad, NM.

SNL, 2004l. *Parameter Data Entry Form (PDE) for SPALLMOD: REPOTRAD*, ERMS# 534362, Sandia National Lab, Carlsbad, NM.

SNL, 2004m: Letter, dated 13 July 2004, DOE/SNL to EPA, : *DOE Response to EPA's Second Completeness Letter.* Sandia National Lab, Carlsbad, NM.

SNL, 2004n. *Memo dated 13 Oct 2004, B Buell to Records: Correction to ERMS# 526858.* Sandia National Lab, Carlsbad, NM.

Stein, J. 2002: *Parameter Values for the New Materials, CONC_PCS and DRZ_PCS*. ERMS # 520524, Sandia National Lab., Carlsbad, NM.

Stein, J., 2003a: *WIPP PA User's Manual for BRAGFLO, Version 5.0.* ERMS# 525702, Sandia National Lab, Carlsbad, NM..

Stein, J., 2003b: *WIPP PA User's Manual for PREBRAG, Version 7.0.* ERMS# 526643, Sandia National Lab, Carlsbad, NM..

Stein, J., 2003c: *SNL WIPP Analysis Plan for Calculations of Salado Flow and Transport: Compliance Recertification Application, AP-099, Rev. 0*. ERMS# 526891, Sandia National Lab, Carlsbad, NM..

Stein, J., 2003d: *Analysis Plan for Calculations of Direct Brine Releases: Compliance Recertification Application, AP-104, Rev. 0*. ERMS# 528743, Sandia National Lab, Carlsbad, NM..

Stein, J, 2003e: *Analysis Package for Direct Brine Releases: Compliance Recertification Application,* ERMS # 532344, Sandia National Lab, Carlsbad, NM.

Stein, J., and W. Zelinski, 2003a: *Analysis Plan for the Testing of a Proposed BRAGFLO Grid to be used for the Compliance Recertification Application Performance Assessment Calculations, AP-106, Rev. 0*. ERMS# 525236, Sandia National Lab, Carlsbad, NM..

Stein, J., and W. Zelinski, 2003b: *Analysis Package for BRAGFLO: Compliance Recertification Application*, ERMS # 530163, Sandia National Lab, Carlsbad, NM.

U.S. Department of Energy (DOE). 1996. *Title 40 CFR 191, Compliance Certification Application for the Waste Isolation Pilot Plant*. DOE/CAO-1996-2184, US DOE WIPP, Carlsbad, NM.

WIPP PA, 1997: *User's Manual for NUTS, Version 2.05A.* ERMS# 246002. Sandia National Lab, Carlsbad, NM.

WIPP PA, 2003: *Design Document and User's Manual for CCDFGF Version 5.00*, ERMS# 530471, Sandia National Lab, Carlsbad, NM.

NOTE: ERMS References to all PDE Forms reviewed are listed in Table 1 of this report and are not reproduced here.

APPENDIX A: PAPDB Parameter Names and Properties

Table A-1. PAPDB Parameter Names and Properties

Name	***Property Description***	***New?*** *(since CCA)*	***Comments***
ABERM	Area of Berm Placed Over Waste Panel		
ABSROUGH	Absolute roughness of material		
ACF_CH4	Acentric Factors - CH4		
ACF_CO2	Acentric Factors - CO2		
ACF_H2	Acentric Factors - H2		
ACF_H2S	Acentric Factors - H2S		
ACF_N2	Acentric Factors - N2		
ACF_O2	Acentric Factors - O2		
AL2	Log2		
ANNUROUG	Absolute wall roughness of wellbore annulus	Y	MAT ID: SPALLMOD
APORO	Waste permeability in CUTTINGS model		
APOROS	Culebra Advective Porosity		
AREA_CH	Area For CH Waste Disposal in CCDFGF Model		
AREA_RH	Area for RH waste disposal in CCDFGF model		
AREA_ZRO	Area in Waste Panels Not Used For Disposal (CCDFGF Model)		
ASDRUM	Surface area of corrodible metal per drum		
ATMPA	Conversion from std. atmosphere to Pa		
ATWEIGHT	Atomic Weight in kg/mole		

Table A-1. PAPDB Parameter Names and Properties

AVOGADRO	Avogadro's number		
BBLG	Conversion from barrel to gallon		
BIOTBETA	Biot's beta for waste	Y	MAT ID: SPALLMOD
BIP_11	H2:H2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_12	H2:CO2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_13	H2:CH4 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_14	H2:N2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_15	H2:H2S - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_16	H2:O2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_21	CO2:H2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_22	CO2:CO2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_23	CO2:CH4 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_24	CO2:N2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_25	CO2:H2S - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_26	CO2:O2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_31	CH4:H2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_32	CH4:CO2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_33	CH4:CH4 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_34	CH4:N2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_35	CH4:H2S - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_36	CH4:O2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_41	N2:H2 - Binary Interaction Parameter	Y	MAT ID: REFCON

Table A-1. PAPDB Parameter Names and Properties

BIP_42	N2:CO2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_43	N2:CH4 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_44	N2:N2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_45	N2:H2S - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_46	N2:O2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_51	H2S:H2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_52	H2S:CO2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_53	H2S:CH4 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_54	H2S:N2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_55	H2S:H2S - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_56	H2S:O2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_61	O2:H2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_62	O2:CO2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_63	O2:CH4 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_64	O2:N2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_65	O2:H2S - Binary Interaction Parameter	Y	MAT ID: REFCON
BIP_66	O2:O2 - Binary Interaction Parameter	Y	MAT ID: REFCON
BITNZDIA	Diameter of nozzles in a tricone drill bit	Y	MAT ID: SPALLMOD
BITNZNO	Number of nozzles in a tricone drill bit	Y	MAT ID: SPALLMOD
BKLINK	Klinkenberg B Correction Parameters for H2 gas		
CAP_MOD	Model number, capillary pressure model		

Table A-1. PAPDB Parameter Names and Properties

CAPHUM	Maximum Concentration of Actinide with Mobile Humic Colloids		
CAPMIC	Maximum Concentration of Actinide on Microbe Colloids		
CEMENT	Waste Cementation Strength		
CITOBQ	Curie to Becquerel Conversion		
CLIMTIDX	Climate Index		
CLOSMOD	Closure Surface Model		
CLOSMOD1	Closure model for representative panel	Y	MAT ID: WAS AMW
CLOSMOD2	Closure model for rest of repository	Y	MAT ID: WAS AMW
COHESION	Cohesion of waste	Y	MAT ID: SPALLMOD
COLDIA	Drill collar diameter in CUTTINGS model		
COMP_POR	Pore volume compressibility	Y	MAT ID: SHFTU, SHFTL T1, SHFTL T2
COMP_RCK	Bulk Compressibility		
COMPRES	Brine Compressibility		
CONCINT	Actinide Concentration with Mobile Actinide Intrinsic Colloids		
CONCMIN	Actinide Concentration with Mobile Mineral Fragment Colloids		
CORRMCO2	Inundated corrosion rate for steel without CO2 present		
CORRWCO2	Inundated corrosion rate for steel with CO2 present		
CUMPROB	Cumulative Probability		

Table A-1. PAPDB Parameter Names and Properties

DARM2	Conversion from darcy to m^2		
DAYSEC	Conversion from days to seconds		
DCELLCHW	Average density of cellulosics in CH waste		
DCELLRHW	Average density of cellulosics in RH waste		
DDZPERM	Permeability of drilling-damaged zone (DDZ)	Y	MAT ID: SPALLMOD
DDZTHICK	Thickness of drilling-damaged zone (DDZ)	Y	MAT ID: SPALLMOD
DIAMMOD	Modern or current diameter		
DIRNCCHW	Bulk density of iron containers, CH waste		
DIRNCRHW	Bulk density of iron containers, RH waste		
DIRONCHW	Average density of iron-based material in CH waste		
DIRONRHW	Average density of iron-based material in RH waste		
DISP_L	Longitudinal dispersivity		
DISPT_L	Transverse dispersivity		
DNSFLUID	Brine Density		
DNSGRAIN	Material Grain Density		
DOMEGA	Drill string angular velocity (0)		
DPHIMAX	Incremental increase in porosity relative to intact conditions		
DPLASCHW	Average density of plastics in CH waste		
DPLASRHW	Average density of plastics in RH waste		
DPLSCCHW	Bulk density of plastic liners, CH waste		
DPLSCRHW	Bulk density of plastic liners, RH waste		

Table A-1. PAPDB Parameter Names and Properties

DPOROS	Diffusive Porosity for Culebra Dolomite		
DRILRATE	Drill penetration rate through Salado	Y	MAT ID: SPALLMOD
DRROOM	Number of drums, per room, in ideal packing		
DRUBBCHW	Average density of rubber in CH waste		
DRUBBRHW	Average density of rubber in RH waste		
DRZPERM	DRZ Permeability for DRSPALL	Y	MAT ID: SPALLMOD
DTORT	Diffusive Tortuosity		
EPAREL	EPA Release Limit		
ETHICK	Effective Thickness		
EXPKLINK	Klinkenberg b correction parameters for H2 gas		
F3M3	Conversion from ft^3 to m^3		
FBETA	Factor beta for microbial reaction rates		
FCE	Cementation Scaling Factor		
FFSTRESS	Isotropic in-situ stress in waste area	Y	MAT ID: SPALLMOD
FGE	Gravity effectiveness factor in CUTTINGS model		
FPICD	PIC multiplicative factor for human intrusion by drilling		
FPICM	PIC multiplicative factor for human intrusion by mining		
FRACAMW	Fraction of panel volume filled with AMWTF waste	Y	MAT ID: WAS AMW
FRICTANG	Friction angle of waste	Y	MAT ID: SPALLMOD
FSE	Stress effectiveness factor in CUTTINGS model		
FTM	Conversion from feet to meter		
FTORT	Fracture Tortuosity		

Table A-1. PAPDB Parameter Names and Properties

FVRW	Fraction of Emplaced RH Volume Occupied by RH Waste in CCDFGF Model	Y	MAT ID: REFCON
FVW	Fraction of Repository Volume Occupied By Waste In CCDFGF Model		
GAS_MIN	Gas rate cut-off		
GRATMICH	Humid biodegradation rate for cellulose		
GRATMICI	Inundated biodegradation rate for cellulose		
GRAVACC	Standard gravitational acceleration		
GRIDFLO	Index for Selecting a Brine Pocket		
GTI3	Conversion from gallon to in^3		
HALFLIFE	Half life		
HMBLKLT	Culebra Half Matrix-Block Length		
HREPO	Height of repository at burial time in CUTTINGS model		
HRH	Emplaced Height of Remote Handled Waste in CCDFGF Model		
HUMCORR	Humid corrosion rate for steel		
IFRX	Index for fracture perm. enhancement in X-direction		
IFRY	Index for fracture perm. enhancement in Y-direction		
IFRZ	Index for fracture perm. enhancement in Z-direction		
INPORO	Default value for initial repository porosity in CUTTINGS model		
INV_AR	The area of the repository in the CUTTINGS model		

Table A-1. PAPDB Parameter Names and Properties

INVCHD	Inventory of Contact Handled Design		
INVRHD	Inventory of Remote Handled Design		
KGAS	Ratio of specific heats for Hydrogen in CUTTINGS model		
KGLB	Conversion from kg to lb		
KMAXLOG	Log of Maximum Permeability in Altered Anhydrite Flow Model Anhydrites		
KPT	Flag for Permeability Determined Threshold	Y	MAT ID: SHFTU, SHFTL T1, SHFTL T2
L1	Drill collar length in CUTTINGS model		
L2	Drill pipe length when repository penetrated, CUTTINGS model		
LAMBDAD	Drilling Rate Per Unit Area		
LBKG	Conversion from lb to kg		
LHSBLANK	Blank placeholder parameter for LHS	Y	
LOGSOLM	Log of the Radionuclide Solubility		
MAXFLOW	Maximum blowout flow		
MD0	Molecular diffusion in pure fluid		
MEA_STOR	Measured Storativity		
MINERT	Mining rate from 40 CFR 194		
MINFLOW	Minimum blowout flow		
MINP_FAC	Mining Transmissivity Multiplier		
MKD_AM	Matrix Partition Coefficient for Americium		

Table A-1. PAPDB Parameter Names and Properties

MKD_NP	Matrix Partition Coefficient for Neptunium		
MKD_PU	Matrix Partition Coefficient for Plutonium		
MKD_TH	Matrix Partition Coefficient for Thorium		
MKD_U	Matrix Partition Coefficient for Uranium		
MUDPRATE	Typical volumetric mud pumping rate for drilling in Salado	Y	MAT ID: SPALLMOD
MUDSOLMX	Solids volume fraction in drill mud that causes choking of flow	Y	MAT ID: SPALLMOD
MUDSOLVE	Exponent on mud slurry viscosity power law	Y	MAT ID: SPALLMOD
MW_CELL	Carbon Normalized Molecular Weight of Cellulose	Y	
MW_CH2O	Molecular Weight - CH2O		
MW_CH4	Molecular Weight of CH4	Y	
MW_CO2	Molecular Weight of CO2	Y	
MW_FE	Molecular Weight - FE		
MW_H2	Molecular Weight - H2		
MW_H2O	Molecular Weight - H2O		
MW_H2S	Molecular Weight of H2S	Y	
MW_N2	Molecular Weight of N2	Y	
MW_NACL	Molecular Weight of NaCl	Y	
MW_O2	Molecular Weight of O2	Y	
OMEGAA	Constants for RKS EOS		
OMEGAB	Constants for RDS EOS		
ONEPLG	Probability of having Plug Pattern 1	Y	MAT ID: GLOBAL

Table A-1. PAPDB Parameter Names and Properties

OXSTAT	Index for the Oxidation State		
PARTDIA	Waste Particle Diameter in CUTTINGS Model		
PARTDIAM	Particle diameter of disaggregated waste	Y	MAT ID: SPALLMOD
PASCP	Conversion from Pa*s to cP		
PBRINE	Prob. that Drilling Intrusion In Excavated Area Encounters Pressurized Brine		
PC_CH4	Critical Pressure of CH4		
PC_CO2	Critical Pressure of CO2		
PC_H2	Critical Pressure of H2		
PC_H2S	Critical Pressure of H2S		
PC_MAX	Maximum allowable capillary pressure	Y	MAT ID: SHFTU, SHFTL T1, SHFTL T2
PC_N2	Critical Pressure of N2		
PC_O2	Critical Pressure of O2		
PCT_A	Threshold Pressure Linear Parameter	Y	MAT ID: SHFTU, SHFTL T1, SHFTL T2
PCT_EXP	Threshold pressure exponential parameter	Y	MAT ID: SHFTU, SHFTL T1, SHFTL T2
PF_DELTA	Incremental pressure for full fracture development		
PHUMCIM	Proportionality Const.,Humic Colloids, Castile Brine, MgO controls pH		
PHUMSIM	Proportionality Const. of Actinides in Salado Brine w/Humic Colloids, Inorganic		
PI	Mathematical constant: PI		

Table A-1. PAPDB Parameter Names and Properties

PI_DELTA	Fracture initiation pressure increment		
PIPED	Drill pipe diameter in CUTTINGS model		
PIPEID	Inner diameter of drill pipe (where OD = 0.1143 m)	Y	MAT ID: SPALLMOD
PIPEROUG	Absolute wall roughness of drill pipe	Y	MAT ID: SPALLMOD
PLGPAT	Index for Plugging Pattern After Drilling Intrusion		
PMLT_HI	Log triangular distribution high value for permeability		
PMLT_LO	Log triangular distribution low value for permeability		
PMLT_MD	Log triangular distribution mode for permeability		
PO_MIN	Minimum brine pressure for capillary model KPC=3		
POISRAT	Poisson's ratio for waste	Y	MAT ID: SPALLMOD
PORE_DIS	Brooks-Corey pore distribution parameter		
POROSITY	Effective porosity	Y	MAT ID: SHFTU, SHFTL T1, SHFTL T2
PRESSURE	Brine far-field pore pressure		
PRMX_LOG	Log of intrinsic permeability, X-direction	Y	MAT ID: SHFTU, SHFTL T1, SHFTL T2
PRMY_LOG	Log of intrinsic permeability, Y-direction		
PRMZ_LOG	Log of intrinsic permeability, Z-direction		
PROBDEG	Probability of plastics and rubber biodegradation in event of microbial gas generation		
PROPMIC	Moles of Actinide Mobilized on Microbe Colloids per Moles Dissolved		
PSIPA	Conversion from psi to pascal		

Table A-1. PAPDB Parameter Names and Properties

PSUF	Surface atmospheric pressure at elevation 1039m in CUTTINS model		
PTHRESH	Capillary threshold displacement pressure		
QINIT	Initial quantity of material in waste		
R	Gas constant R		
RADN_DRZ	DRZ outer radius at each shaft		
RE_CAST	External drainage radius for the Castile formation		
REF_PRES	Reference pressure for porosity		
REF_TEMP	Reference Temperature		
REFPRS	Atmospheric pressure at sea level	Y	MAT ID: SPALLMOD
RELP_MOD	Model number, relative permeability model	Y	MAT ID: SHFTU, SHFTL T1, SHFTL T2
REPIPERM	Waste permeability to gas local to intrusion borehole	Y	MAT ID: SPALLMOD
REPOSTOP	Elevation of roof in excavated area	Y	MAT ID: SPALLMOD
RGAS	Gas Constant for Hydrogen		
RHOS	Waste Particle Density in CUTTINGS_S Model		
RHW_AR	The total area of the remote-handled waste in the CUTTINGS model		
ROOM	Equivalent radius of one room in CUTTINGS model		
ROUGHP	Friction factor for very rough pipe in CUTTINGS model		
RPANEL	Equivalent radius of one panel in CUTTINGS model		
RSH_AIR	Air-supply shaft radius (3.09 m)		

Table A-1. PAPDB Parameter Names and Properties

RSH_EXH	Air-exhaust shaft radius (2.3 m)		
RSH_SAL	Salt-handling shaft radius (1.8 m)		
RSH_WAS	Waste-handling shaft radius (3.5 m)		
RTK	Conversion from Rankine to K		
SAL_USAT	Average saturation, unsaturated zones		
SALTDENS	Density of solid cuttings from the Salado	Y	MAT ID: SPALLMOD
SAT_IBRN	Initial Brine Saturation	Y	MAT ID: SHFTU, SHFTL T1, SHFTL T2
SAT_RBRN	Residual Brine Saturation	Y	MAT ID: SHAFTU
SAT_RGAS	Residual Gas Saturation	Y	MAT ID: SHAFTU
SAT_WICK	Index for computing wicking		
SECYR	Seconds to years Conversion		
SHAPEFAC	Shape factor for disaggregated waste particles	Y	MAT ID: SPALLMOD
SKIN_RES	Skin Resistance		
SOLCIM	Solubility Mult. in Castile Brine, Inorganic Chem Controlled by Mg(OH)2-MgCO3	Y	MAT ID: SOLTH4, SOLU4
SOLCOC	Solubility in Castile Brine with Organics included Controlled by Mg(OH)2/CaCO3	Y	MAT ID: SOLMOD3,SOLMOD4, SOLMOD5, SOLMOD6
SOLCOH	Solubility in Castile Brine with Organics included Controlled by Mg(OH)2/Hydromagnisite buffer(5424)	Y	MAT ID: SOLMOD3,SOLMOD4, SOLMOD5, SOLMOD6
SOLSIM	Solubility Mult. in Salado Brine, Inorganic Chem Controlled by Mg(OH)2-MgCO3		

Table A-1. PAPDB Parameter Names and Properties

SOLSOC	Solubiltiy in Salado Brine with Organics included Controlled by Mg(OH)2/CaCO3	Y	MAT ID: SOLMOD3,SOLMOD4, SOLMOD5, SOLMOD6
SOLSOH	Solubiltiy in Salado Brine with Organics included Controlled by Mg(OH)2/Hydromagnisite buffer(5424)	Y	MAT ID: SOLMOD3,SOLMOD4, SOLMOD5, SOLMOD6
STOIFX	Stoichiometric factor - X		
STPDVOLR	Mud ejection rate that turns off drilling	Y	MAT ID: SPALLMOD
STPPVOLR	Mud ejection rate that turns off mud pump	Y	MAT ID: SPALLMOD
SUFTEN	Surface tension of brine in CUTTINGS model		
SURFELEV	Elevation of land surface at WIPP site	Y	MAT ID: SPALLMOD
TA	Time Active Institutional Controls at WIPP Site Are Effective		
TAUFAIL	Effective shear strength for erosion (rfail)		
TC_CH4	Critical temperature: Methane (CH4)		
TC_CO2	Critical temperature: Carbon Dioxide (CO2)		
TC_H2	Critical temperature: Hydrogen (H2)		
TC_H2S	Critical temperature: Hydrogen Sulfide (H2S)		
TC_N2	Critical temperature: Nitrogen (N2)		
TC_O2	Critical temperature: Oxygen (O2)		
TENSLSTR	Tensile strength of waste	Y	MAT ID: SPALLMOD
THCK_CAS	Thickness of the Castile Brine Reservoir		
THICK	Thickness of feature or layer		
THREEPLG	Probability of having Plug Pattern 3	Y	MAT ID: GLOBAL

Table A-1. PAPDB Parameter Names and Properties

TPICD	Time over which passive institutional controls reduce rate of drilling		
TPICM	Time over which passive institutional controls reduce rate of mining		
TRANSIDX	Index for selecting realizations of the Transmissivity Field		
TREPO	Temperature of repository in CUTTINGS model		
TWOPLG	Probability of having Plug Pattern 2	Y	MAT ID: GLOBAL
VISC	Hydrogen Viscosity in CUTTINGS Model		
VISCO	Viscosity		
VOLCHW	BIR total volume of CH waste		
VOLRHW	BIR total volume of RH waste		
VOLSPALL	Volume of material released by spallings		
VOLUME	Total Reservoir Volume		
VOLWP	Uncompacted Volume of Waste Panels In CCDFGF Model		
VPANLEX	Excavated volume of one panel		
VREPOS	Excavated storage volume of repository		
VROOM	Volume of one room in repository		
WTF	Mass fraction of salt in brine		
WUF	Unit of Waste		
YLDSTRSS	Yield Stress Point		
YRSEC	Conversion from mean solar or tropical year to seconds		

Table A-1. PAPDB Parameter Names and Properties

ZCINK	Zero Celsius in Kelvin		

Appendix B: BRAGFLO Input Files–See WP File ParamRevAppB-I.wpd

Appendix C: DRSPALL Input Files–See WP File ParamRevAppB-I.wpd

Appendix D: CUTTINGS_S Input Files–See WP File ParamRevAppB-I.wpd

Appendix E: PANEL Input Files–See WP File ParamRevAppB-I.wpd

Appendix F: NUTS Input Files–See WP File ParamRevAppB-I.wpd

Appendix G: SECOTP2D Input Files–See WP File ParamRevAppB-I.wpd

Appendix H: Parameters Used in MODFLOW/PEST --See WP File ParamRevAppB-I.wpd

Appendix I: FMT Database File–See WP File ParamRevAppB-I.wpd

APPENDIX B: INPUT FILES FOR BRAGFLO

B.1: BRAGFLO CRA

B.1.1. GENMESH INPUT: Sets up grid for Bragflo

```
$ type GM_BF_CRA1.INP
TITLE:    BRAGFLO 2003 CRA1 (GENMESH)
SCENARIO: S1, S2, S3, S4, S5, and S6
ANALYSTS: Joshua Stein and Bill Zelinski
CREATED:  April  2003
MODIFIED: BRAGFLO GRID FOR 2003 CRA
*SETUP
DIM = 3
ORIGIN = 0., 0., 0.
IJKMAX= 69, 34,2
*GRID
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DEL, COORD=Y, DEL=     0.69, INRANGE  8,  9 , FACTOR=1.0
DEL, COORD=Y, DEL=     0.69, INRANGE  9, 10 , FACTOR=1.0
DEL, COORD=Y, DEL=     1.32, INRANGE 10, 11 , FACTOR=1.0
DEL, COORD=Y, DEL=     1.32, INRANGE 11, 12 , FACTOR=1.0
DEL, COORD=Y, DEL=     1.32, INRANGE 12, 13 , FACTOR=1.0
DEL, COORD=Y, DEL=     2.62, INRANGE 13, 14 , FACTOR=1.0
DEL, COORD=Y, DEL=     0.27, INRANGE 14, 15 , FACTOR=1.0
DEL, COORD=Y, DEL=     4.53, INRANGE 15, 16 , FACTOR=1.0
DEL, COORD=Y, DEL=     4.53, INRANGE 16, 17 , FACTOR=1.0
DEL, COORD=Y, DEL=     0.18, INRANGE 17, 18 , FACTOR=1.0
DEL, COORD=Y, DEL=    54.73, INRANGE 18, 19 , FACTOR=1.0
DEL, COORD=Y, DEL=    54.73, INRANGE 19, 20 , FACTOR=1.0
DEL, COORD=Y, DEL=    54.73, INRANGE 20, 21 , FACTOR=1.0
DEL, COORD=Y, DEL=    54.73, INRANGE 21, 22 , FACTOR=1.0
DEL, COORD=Y, DEL=    54.73, INRANGE 22, 23 , FACTOR=1.0
DEL, COORD=Y, DEL=    54.73, INRANGE 23, 24 , FACTOR=1.0
DEL, COORD=Y, DEL=    54.73, INRANGE 24, 25 , FACTOR=1.0
DEL, COORD=Y, DEL=    36.00, INRANGE 25, 26 , FACTOR=1.0
DEL, COORD=Y, DEL=     7.70, INRANGE 26, 27 , FACTOR=1.0
```

```
DEL, COORD=Y, DEL=    24.80, INRANGE 27, 28 , FACTOR=1.0
DEL, COORD=Y, DEL=     8.50, INRANGE 28, 29 , FACTOR=1.0
DEL, COORD=Y, DEL=    17.30, INRANGE 29, 30 , FACTOR=1.0
DEL, COORD=Y, DEL=   106.00, INRANGE 30, 31 , FACTOR=1.0
DEL, COORD=Y, DEL=    43.30, INRANGE 31, 32 , FACTOR=1.0
DEL, COORD=Y, DEL=    15.66, INRANGE 32, 33 , FACTOR=1.0
DEL, COORD=Y, DEL=     0.10, INRANGE 33, 34 , FACTOR=1.0

*ELEVATION_ELEMENT, ADJUST_Z_COORD
LOCATION, THICK= 66177.07, ELEVATION=0.0, IRANGE=  1,  2, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK= 35515.71, ELEVATION=0.0, IRANGE=  2,  3, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK= 24949.10, ELEVATION=0.0, IRANGE=  3,  4, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK= 17661.78, ELEVATION=0.0, IRANGE=  4,  5, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK= 12636.05, ELEVATION=0.0, IRANGE=  5,  6, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  9170.02, ELEVATION=0.0, IRANGE=  6,  7, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  6701.95, ELEVATION=0.0, IRANGE=  7,  8, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  4922.12, ELEVATION=0.0, IRANGE=  8,  9, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  3694.66, ELEVATION=0.0, IRANGE=  9, 10, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  2848.13, ELEVATION=0.0, IRANGE= 10, 11, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  2264.31, ELEVATION=0.0, IRANGE= 11, 12, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  1861.68, ELEVATION=0.0, IRANGE= 12, 13, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  1584.01, ELEVATION=0.0, IRANGE= 13, 14, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  1392.51, ELEVATION=0.0, IRANGE= 14, 15, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  1260.44, ELEVATION=0.0, IRANGE= 15, 16, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  1169.36, ELEVATION=0.0, IRANGE= 16, 17, JRANGE=1, 33,
KRANGE=1
,2
```

```
LOCATION, THICK=  1106.54, ELEVATION=0.0, IRANGE= 17, 18, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  1063.22, ELEVATION=0.0, IRANGE= 18, 19, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  1033.34, ELEVATION=0.0, IRANGE= 19, 20, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  1012.74, ELEVATION=0.0, IRANGE= 20, 21, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=   998.53, ELEVATION=0.0, IRANGE= 21, 22, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=   988.73, ELEVATION=0.0, IRANGE= 22, 23, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=   126.20, ELEVATION=0.0, IRANGE= 23, 24, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=    28.80, ELEVATION=0.0, IRANGE= 24, 25, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=     4.80, ELEVATION=0.0, IRANGE= 25, 26, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  0.27575, ELEVATION=0.0, IRANGE= 26, 27, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=     4.80, ELEVATION=0.0, IRANGE= 27, 28, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=    28.80, ELEVATION=0.0, IRANGE= 28, 29, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=   126.20, ELEVATION=0.0, IRANGE= 29, 30, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=    20.00, ELEVATION=0.0, IRANGE= 30, 31, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=    20.00, ELEVATION=0.0, IRANGE= 31, 32, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  156.904, ELEVATION=0.0, IRANGE= 32, 33, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  156.904, ELEVATION=0.0, IRANGE= 33, 34, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=    40.00, ELEVATION=0.0, IRANGE= 34, 35, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=    40.00, ELEVATION=0.0, IRANGE= 35, 36, JRANGE=1, 33,
KRANGE=1
,2
```

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LOCATION, THICK=   196.13, ELEVATION=0.0, IRANGE= 36, 37, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=   196.13, ELEVATION=0.0, IRANGE= 37, 38, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=    40.00, ELEVATION=0.0, IRANGE= 38, 39, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=    40.00, ELEVATION=0.0, IRANGE= 39, 40, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=    32.18, ELEVATION=0.0, IRANGE= 40, 41, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=    32.18, ELEVATION=0.0, IRANGE= 41, 42, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=    32.18, ELEVATION=0.0, IRANGE= 42, 43, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=     9.50, ELEVATION=0.0, IRANGE= 43, 44, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=    30.61, ELEVATION=0.0, IRANGE= 44, 45, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=    30.61, ELEVATION=0.0, IRANGE= 45, 46, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  2839.58, ELEVATION=0.0, IRANGE= 46, 47, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  2849.38, ELEVATION=0.0, IRANGE= 47, 48, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  2863.59, ELEVATION=0.0, IRANGE= 48, 49, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  2884.19, ELEVATION=0.0, IRANGE= 49, 50, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  2914.07, ELEVATION=0.0, IRANGE= 50, 51, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  2957.39, ELEVATION=0.0, IRANGE= 51, 52, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  3020.20, ELEVATION=0.0, IRANGE= 52, 53, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  3111.29, ELEVATION=0.0, IRANGE= 53, 54, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  3243.36, ELEVATION=0.0, IRANGE= 54, 55, JRANGE=1, 33,
KRANGE=1
,2
```

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LOCATION, THICK=  3434.86, ELEVATION=0.0, IRANGE= 55, 56, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  3712.53, ELEVATION=0.0, IRANGE= 56, 57, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  4115.16, ELEVATION=0.0, IRANGE= 57, 58, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  4698.98, ELEVATION=0.0, IRANGE= 58, 59, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  5545.50, ELEVATION=0.0, IRANGE= 59, 60, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  6772.97, ELEVATION=0.0, IRANGE= 60, 61, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK=  8552.80, ELEVATION=0.0, IRANGE= 61, 62, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK= 11020.87, ELEVATION=0.0, IRANGE= 62, 63, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK= 14486.90, ELEVATION=0.0, IRANGE= 63, 64, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK= 19512.63, ELEVATION=0.0, IRANGE= 64, 65, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK= 26799.95, ELEVATION=0.0, IRANGE= 65, 66, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK= 37366.56, ELEVATION=0.0, IRANGE= 66, 67, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK= 52688.14, ELEVATION=0.0, IRANGE= 67, 68, JRANGE=1, 33,
KRANGE=1
,2
LOCATION, THICK= 77095.80, ELEVATION=0.0, IRANGE= 68, 69, JRANGE=1, 33,
KRANGE=1
,2
*REGIONS
REGION= 1, IRANGE=  1,69, JRANGE= 3, 7, KRANGE=1,2 ! S_Halite
REGION= 1, IRANGE=  1,23, JRANGE= 8,14, KRANGE=1,2 ! S_Halite
REGION= 1, IRANGE= 46,69, JRANGE= 8,14, KRANGE=1,2 ! S_Halite
REGION= 1, IRANGE=  1,23, JRANGE=15,17, KRANGE=1,2 ! S_Halite
REGION= 1, IRANGE= 46,69, JRANGE=15,17, KRANGE=1,2 ! S_Halite
REGION= 1, IRANGE=  1,43, JRANGE=18,25, KRANGE=1,2 ! S_Halite
REGION= 1, IRANGE= 44,69, JRANGE=18,25, KRANGE=1,2 ! S_Halite
REGION= 2, IRANGE= 31,32, JRANGE=15,17, KRANGE=1,2 ! DR_PCS
REGION= 2, IRANGE= 35,36, JRANGE=15,17, KRANGE=1,2 ! DRZ_PCS
REGION= 2, IRANGE= 39,40, JRANGE=15,17, KRANGE=1,2 ! DRZ_PCS
REGION= 2, IRANGE= 23,31, JRANGE= 7,10, KRANGE=1,2 ! LDRZ
REGION= 2, IRANGE= 32,35, JRANGE= 7,10, KRANGE=1,2 ! LDRZ
REGION= 2, IRANGE= 36,39, JRANGE= 7,10, KRANGE=1,2 ! LDRZ
REGION= 2, IRANGE= 40,43, JRANGE= 7,10, KRANGE=1,2 ! LDRZ
```

```
REGION= 2, IRANGE= 44,46, JRANGE= 7,10, KRANGE=1,2 ! LDRZ
REGION= 2, IRANGE= 23,31, JRANGE=13,17, KRANGE=1,2 ! UDRZ
REGION= 2, IRANGE= 32,35, JRANGE=13,17, KRANGE=1,2 ! UDRZ
REGION= 2, IRANGE= 36,39, JRANGE=13,17, KRANGE=1,2 ! UDRZ
REGION= 2, IRANGE= 40,43, JRANGE=13,17, KRANGE=1,2 ! UDRZ
REGION= 2, IRANGE= 44,46, JRANGE=13,17, KRANGE=1,2 ! UDRZ
REGION= 3, IRANGE=  1,23, JRANGE= 7, 8, KRANGE=1,2 ! MB_139
REGION= 3, IRANGE= 31,32, JRANGE= 7, 8, KRANGE=1,2 ! MB_139
REGION= 3, IRANGE= 35,36, JRANGE= 7, 8, KRANGE=1,2 ! MB_139
REGION= 3, IRANGE= 39,40, JRANGE= 7, 8, KRANGE=1,2 ! MB_139
REGION= 3, IRANGE= 43,44, JRANGE= 7, 8, KRANGE=1,2 ! MB_139
REGION= 3, IRANGE= 46,69, JRANGE= 7, 8, KRANGE=1,2 ! MB_139
REGION= 4, IRANGE=  1,23, JRANGE=14,15, KRANGE=1,2 ! ANH_AB
REGION= 4, IRANGE= 31,32, JRANGE=14,15, KRANGE=1,2 ! ANH_AB
REGION= 4, IRANGE= 35,36, JRANGE=14,15, KRANGE=1,2 ! ANH_AB
REGION= 4, IRANGE= 39,40, JRANGE=14,15, KRANGE=1,2 ! ANH_AB
REGION= 4, IRANGE= 43,44, JRANGE=14,15, KRANGE=1,2 ! ANH_AB
REGION= 4, IRANGE= 46,69, JRANGE=14,15, KRANGE=1,2 ! ANH_AB
REGION= 5, IRANGE=  1,69, JRANGE=17,18, KRANGE=1,2 ! MB_138
REGION= 6, IRANGE= 23,30, JRANGE=10,13, KRANGE=1,2 ! IP
REGION= 7, IRANGE= 32,34, JRANGE=10,13, KRANGE=1,2 ! SRoR
REGION= 7, IRANGE= 36,38, JRANGE=10,13, KRANGE=1,2 ! NRoR
REGION= 8, IRANGE= 40,43, JRANGE=10,13, KRANGE=1,2 ! OPS
REGION= 8, IRANGE= 44,46, JRANGE=10,13, KRANGE=1,2 ! EXP
REGION= 9, IRANGE= 30,31, JRANGE=10,13, KRANGE=1,2 ! DRF_PCS
REGION= 9, IRANGE= 34,35, JRANGE=10,13, KRANGE=1,2 ! DRF_PCS
REGION= 9, IRANGE= 38,39, JRANGE=10,13, KRANGE=1,2 ! DRF_PCS
REGION= 9, IRANGE= 31,32, JRANGE= 8,14, KRANGE=1,2 ! CONC_PCS
REGION= 9, IRANGE= 35,36, JRANGE= 8,14, KRANGE=1,2 ! CONC_PCS
REGION= 9, IRANGE= 39,40, JRANGE= 8,14, KRANGE=1,2 ! CONC_PCS
REGION= 9, IRANGE= 43,44, JRANGE= 8,14, KRANGE=1,2 ! CONC_MON
REGION= 9, IRANGE= 43,44, JRANGE=25,34, KRANGE=1,2 ! Shft_non
REGION= 9, IRANGE= 43,44, JRANGE=18,25, KRANGE=1,2 ! Shft_sal
REGION= 9, IRANGE= 43,44, JRANGE=15,17, KRANGE=1,2 ! Shft_sal
REGION=10, IRANGE=  1,23, JRANGE= 1, 2, KRANGE=1,2 ! Castile
REGION=10, IRANGE= 46,69, JRANGE= 1, 2, KRANGE=1,2 ! Castile
REGION=10, IRANGE=  1,69, JRANGE= 2, 3, KRANGE=1,2 ! Castile
REGION=10, IRANGE=  1,43, JRANGE=25,26, KRANGE=1,2 ! unnamed
REGION=10, IRANGE= 44,69, JRANGE=25,26, KRANGE=1,2 ! unnamed
REGION=10, IRANGE=  1,43, JRANGE=27,28, KRANGE=1,2 ! tamarisk
REGION=10, IRANGE= 44,69, JRANGE=27,28, KRANGE=1,2 ! tamarisk
REGION=10, IRANGE=  1,43, JRANGE=29,30, KRANGE=1,2 ! 49er
REGION=10, IRANGE= 44,69, JRANGE=29,30, KRANGE=1,2 ! 49er
REGION=10, IRANGE=  1,43, JRANGE=26,27, KRANGE=1,2 ! culebra
REGION=10, IRANGE= 44,69, JRANGE=26,27, KRANGE=1,2 ! culebra
REGION=10, IRANGE=  1,43, JRANGE=28,29, KRANGE=1,2 ! magenta
REGION=10, IRANGE= 44,69, JRANGE=28,29, KRANGE=1,2 ! magenta
REGION=10, IRANGE=  1,43, JRANGE=30,32, KRANGE=1,2 ! Dewey
REGION=10, IRANGE= 44,69, JRANGE=30,32, KRANGE=1,2 ! Dewey
REGION=10, IRANGE=  1,43, JRANGE=32,34, KRANGE=1,2 ! Santrosa
REGION=10, IRANGE= 44,69, JRANGE=32,34, KRANGE=1,2 ! Santrosa
REGION=11, IRANGE= 23,46, JRANGE= 1, 2, KRANGE=1,2 ! castiler
```

B.1.2 MATSET INPUT: Parameter call out/block assignment

```
! TITLE:    BRAGFLO 2003 CRA1 (MATSET)
! SCENARIO: S1, S2, S3, S4, S5, and S6
! ANALYSTS: Joshua Stein and Bill Zelinski
! MODIFIED: 03/28/03 to include infomration formerly included in
!                the BRAGFLO executable
!===========================================================================
*PRINT_ASSIGNED_VALUES
!
*HEADING
 TITLE, BRAGFLO 2003: CRA1
 SCALE, LOCAL
 SCENARIO, DISTURBED
!
*UNITS=SI
!
*CREATE_BLOCKS
!...Create additional blocks for FLUID, WELL, and other properties
!   for modeling corrosion and biodegradation reactions
 BLOCK_IDS=12
 BLOCK_IDS=13
 BLOCK_IDS=14
 BLOCK_IDS=15
 BLOCK_IDS=16
 BLOCK_IDS=17
 BLOCK_IDS=18
 BLOCK_IDS=19
 BLOCK_IDS=20
 BLOCK_IDS=21
 BLOCK_IDS=22
 BLOCK_IDS=23
 BLOCK_IDS=24
 BLOCK_IDS=25
 BLOCK_IDS=26
 BLOCK_IDS=27
 BLOCK_IDS=28
 BLOCK_IDS=29
 BLOCK_IDS=30
 BLOCK_IDS=31
 BLOCK_IDS=32
 BLOCK_IDS=33
 BLOCK_IDS=34
 BLOCK_IDS=35
 BLOCK_IDS=36
 BLOCK_IDS=37
 BLOCK_IDS=38
 BLOCK_IDS=39
 BLOCK_IDS=40
 BLOCK_IDS=41
 BLOCK_IDS=42
!
*RETRIEVE
 COORD, DIM=3, NAMES= X,Y,Z
!
! ...Define region names
 MATERIAL, 1=S_HALITE,&
           2=DRZ_0,&
           3=S_MB139,&
```

```
           4=S_ANH_AB,&
           5=S_MB138,&
           6=CAVITY_1,&
           7=CAVITY_2,&
           8=CAVITY_3,&
           9=CAVITY_4,&
          10=IMPERM_Z,&
          11=CASTILER,&
          12=OPS_AREA,&
          13=EXP_AREA,&
          14=CULEBRA,&
          15=MAGENTA,&
          16=DEWYLAKE,&
          17=SANTAROS,&
          18=WAS_AREA,&
          19=DRZ_1,&
          20=DRZ_PCS,&  !Healed DRZ above CONC_PCS
          21=CONC_PCS,& !Concrete part of PCS
          22=CONC_PLG,&
          23=BH_OPEN,&
          24=BH_SAND,&
          25=BH_CREEP,&
          26=BRINESAL,&
          27=H2,&
          28=SULFATE,&
          29=NITRATE,&
          30=STEEL,&
          31=CELLULS,&
          32=REFCON,&
          33=UNNAMED,&
          34=TAMARISK,&
          35=FORTYNIN,&
          36=BOREHOLE,&
          37=DRF_PCS:WAS_AREA,&
          38=REPOSIT:WAS_AREA,&
          39=CONC_MON,&
          40=SHFTU,&
          41=SHFTL_T1,&
          42=SHFTL_T2
!1...Define LOWER SALADO (below MB139) property names
 PROPERTY, MAT=S_HALITE, NAMES=      PRMX_LOG,     PRMY_LOG,    PRMZ_LOG,&
                                     POROSITY,     PORE_DIS,    SAT_RGAS,&
                                     SAT_RBRN,     COMP_RCK,    CAP_MOD,&
                                     RELP_MOD,     PC_MAX,      PO_MIN,&
                                     PCT_A,        PCT_EXP,     KPT,&
                                     PRESSURE
!2a...Define INITIAL DRZ property names
 PROPERTY, MAT=DRZ_0, NAMES=         PRMX_LOG,     PRMY_LOG,    PRMZ_LOG,&
                                     POROSITY,     PORE_DIS,    SAT_RGAS,&
                                     SAT_RBRN,     COMP_RCK,    CAP_MOD,&
                                     RELP_MOD,     PC_MAX,      PO_MIN,&
                                     PCT_A,        PCT_EXP,     KPT
!2b...Define DRZ_0 fracture model parameters
 PROPERTY, MAT=DRZ_0,    NAMES=      DPHIMAX,      PI_DELTA,    PF_DELTA,&
                                     IFRX,         IFRY,        IFRZ,&
                                     KMAXLOG
!3a...Define MARKER BED 139  property names
```

```
 PROPERTY, MAT=S_MB139, NAMES=       PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                     POROSITY,     PORE_DIS,   SAT_RGAS,&
                                     SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                     RELP_MOD,     PC_MAX,     PO_MIN,&
                                     PCT_A,        PCT_EXP,    KPT,&
                                     BKLINK,       EXPKLINK
!3b...Define MARKER BED 139 fracture model parameters
 PROPERTY, MAT=S_MB139, NAMES=       DPHIMAX,      PI_DELTA,   PF_DELTA,&
                                     IFRX,         IFRY,       IFRZ,&
                                     KMAXLOG
!4a...Define ANHYDRITE A and B  property names
 PROPERTY, MAT=S_ANH_AB, NAME=       PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                     POROSITY,     PORE_DIS,   SAT_RGAS,&
                                     SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                     RELP_MOD,     PC_MAX,     PO_MIN,&
                                     PCT_A,        PCT_EXP,    KPT
!4b...Define ANHYDRITE A and B fracture model parameters
 PROPERTY, MAT=S_ANH_AB, NAMES=      DPHIMAX,      PI_DELTA,   PF_DELTA,&
                                     IFRX,         IFRY,       IFRZ,&
                                     KMAXLOG
!5a...Define Marker Bed 138 property names
 PROPERTY, MAT=S_MB138, NAME=        PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                     POROSITY,     PORE_DIS,   SAT_RGAS,&
                                     SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                     RELP_MOD,     PC_MAX,     PO_MIN,&
                                     PCT_A,        PCT_EXP,    KPT
!5b...Define Marker Bed 138 fracture model parameters
 PROPERTY, MAT=S_MB138, NAMES=       DPHIMAX,      PI_DELTA,   PF_DELTA,&
                                     IFRX,         IFRY,       IFRZ,&
                                     KMAXLOG
!6...Define  empty CAVITY property names (Time Period -5 to 0 years)(IP)
 PROPERTY, MAT=CAVITY_1,  NAMES=     PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                     POROSITY,     PORE_DIS,   SAT_RGAS,&
                                     SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                     RELP_MOD,     PC_MAX,     PO_MIN,&
                                     PCT_A,        PCT_EXP,    KPT,&
                                     PRESSURE,     SAT_IBRN
!7...Define  empty CAVITY property names (Time Period -5 to 0 years)(RoR)
 PROPERTY, MAT=CAVITY_2,  NAMES=     PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                     POROSITY,     PORE_DIS,   SAT_RGAS,&
                                     SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                     RELP_MOD,     PC_MAX,     PO_MIN,&
                                     PCT_A,        PCT_EXP,    KPT,&
                                     PRESSURE,     SAT_IBRN

!8...Define  empty CAVITY property names (Time Period -5 to 0 years)(OPS+EXP)
 PROPERTY, MAT=CAVITY_3,  NAMES=     PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                     POROSITY,     PORE_DIS,   SAT_RGAS,&
                                     SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                     RELP_MOD,     PC_MAX,     PO_MIN,&
                                     PCT_A,        PCT_EXP,    KPT,&
                                     PRESSURE,     SAT_IBRN
!9...Define  empty CAVITY property names (Time Period -5 to 0 years)(PCS)
 PROPERTY, MAT=CAVITY_4,  NAMES=     PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                     POROSITY,     PORE_DIS,   SAT_RGAS,&
                                     SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                     RELP_MOD,     PC_MAX,     PO_MIN,&
```

```
                                   PCT_A,        PCT_EXP,    KPT,&
                                   PRESSURE,     SAT_IBRN
!10...Define IMPERM_Z  property names
 PROPERTY, MAT=IMPERM_Z, NAMES=    PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                   POROSITY,     PORE_DIS,   SAT_RGAS,&
                                   SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                   RELP_MOD,     PC_MAX,     PO_MIN,&
                                   PCT_A,        PCT_EXP,    KPT
!11...Define CASTILER  property names
 PROPERTY, MAT=CASTILER,    NAMES= PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                   POROSITY,     PORE_DIS,   SAT_RGAS,&
                                   SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                   RELP_MOD,     PC_MAX,     PO_MIN,&
                                   PCT_A,        PCT_EXP,    KPT,&
                                   PRESSURE,     SAT_IBRN
!12...Define OPS_AREA property names
 PROPERTY, MAT=OPS_AREA,    NAMES= PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                   POROSITY,     PORE_DIS,   SAT_RGAS,&
                                   SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                   RELP_MOD,     PC_MAX,     PO_MIN,&
                                   PCT_A,        PCT_EXP,    KPT,&
                                   PRESSURE,     SAT_IBRN
!13...Define Experimental Area  property names
 PROPERTY, MAT=EXP_AREA, NAMES=    PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                   POROSITY,     PORE_DIS,   SAT_RGAS,&
                                   SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                   RELP_MOD,     PC_MAX,     PO_MIN,&
                                   PCT_A,        PCT_EXP,    KPT,&
                                   PRESSURE,     SAT_IBRN
!14...Define CULEBRA property names
 PROPERTY, MAT=CULEBRA, NAMES=     PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                   POROSITY,     PORE_DIS,   SAT_RGAS,&
                                   SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                   RELP_MOD,     PC_MAX,     PO_MIN,&
                                   PCT_A,        PCT_EXP,    KPT,&
                                   PRESSURE,     SAT_IBRN
!15...Define MAGENTA property names
 PROPERTY, MAT=MAGENTA, NAMES=     PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                   POROSITY,     PORE_DIS,   SAT_RGAS,&
                                   SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                   RELP_MOD,     PC_MAX,     PO_MIN,&
                                   PCT_A,        PCT_EXP,    KPT,&
                                   PRESSURE
!16...Define Dewey Lake Red Beds property names
 PROPERTY, MAT=DEWYLAKE, NAMES=    PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                   POROSITY,     PORE_DIS,   SAT_RGAS,&
                                   SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                   RELP_MOD,     PC_MAX,     PO_MIN,&
                                   PCT_A,        PCT_EXP,    KPT,&
                                   SAT_IBRN,     SAL_USAT
!17...Define Santa Rosa property names
 PROPERTY, MAT=SANTAROS, NAMES=    PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                   POROSITY,     PORE_DIS,   SAT_RGAS,&
                                   SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                   RELP_MOD,     PC_MAX,     PO_MIN,&
                                   PCT_A,        PCT_EXP,    KPT,&
                                   SAT_IBRN,     PRESSURE
```

```
!18a...Define WASTE property names
 PROPERTY, MAT=WAS_AREA, NAMES=      PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                     POROSITY,     PORE_DIS,   SAT_RGAS,&
                                     SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                     RELP_MOD,     PC_MAX,     PO_MIN,&
                                     PCT_A,        PCT_EXP,    KPT,&
                                     SAT_IBRN
!
!18b..Define the waste properties that will control gas generation by
!     corrosion reaction and biodegradation
 PROPERTY, MAT=WAS_AREA, NAMES=      GRATMICI,     GRATMICH,&
                                     DCELLCHW,     DCELLRHW,   DIRONCHW,&
                                     DIRONRHW,     DPLASCHW,   DPLASRHW,&
                                     DRUBBCHW,     DRUBBRHW,   DIRNCCHW,&
                                     DIRNCRHW,     DPLSCCHW,   DPLSCRHW,&
                                     VOLCHW,       VOLRHW,     SAT_WICK,&
                                     PROBDEG
!19...Define DRZ (Time period 2 : 0-10000 yrs)
 PROPERTY, MAT=DRZ_1,    NAMES=      PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                     POROSITY,     PORE_DIS,   SAT_RGAS,&
                                     SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                     RELP_MOD,     PC_MAX,     PO_MIN,&
                                     PCT_A,        PCT_EXP,    KPT
 PROPERTY, MAT=DRZ_1,    NAMES=      DPHIMAX,      PI_DELTA,   PF_DELTA,&
                                     IFRX,         IFRY,       IFRZ,&
                                     KMAXLOG
!20...Define DRZ above concrete monolith
 PROPERTY, MAT=DRZ_PCS,  NAMES=      PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                     POROSITY,     PORE_DIS,   SAT_RGAS,&
                                     SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                     RELP_MOD,     PC_MAX,     PO_MIN,&
                                     PCT_A,        PCT_EXP,    KPT
!21...Define PANEL CLOSURE CONCRETE SECTION
 PROPERTY, MAT=CONC_PCS,    NAMES=   PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                     POROSITY,     PORE_DIS,   SAT_RGAS,&
                                     SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                     RELP_MOD,     PC_MAX,     PO_MIN,&
                                     PCT_A,        PCT_EXP,    KPT
!22...Define INTRUSION BOREHOLE: CONCRETE PLUG SECTION
! property names
 PROPERTY, MAT=CONC_PLG, NAMES=      PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                     POROSITY,     PORE_DIS,   SAT_RGAS,&
                                     SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                     RELP_MOD,     PC_MAX,     PO_MIN,&
                                     PCT_A,        PCT_EXP,    KPT
!23...Define INTRUSION BOREHOLE: OPEN BOREHOLE SECTION
! property names
 PROPERTY, MAT=BH_OPEN, NAMES=       PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                     POROSITY,     PORE_DIS,   SAT_RGAS,&
                                     SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                     RELP_MOD,     PC_MAX,     PO_MIN,&
                                     PCT_A,        PCT_EXP,    KPT
!24...Define INTRUSION BOREHOLE: SILTY-SAND BOREHOLE SECTION
! property names
 PROPERTY, MAT=BH_SAND, NAMES=       PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                     POROSITY,     PORE_DIS,   SAT_RGAS,&
                                     SAT_RBRN,     COMP_RCK,   CAP_MOD,&
```

```
                                    RELP_MOD,     PC_MAX,     PO_MIN,&
                                    PCT_A,        PCT_EXP,    KPT
!25...Define INTRUSION BOREHOLE: CREEP CLOSURE SILTY SAND SECTION
! property names
 PROPERTY, MAT=BH_CREEP, NAMES=     PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                    POROSITY,     PORE_DIS,   SAT_RGAS,&
                                    SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                    RELP_MOD,     PC_MAX,     PO_MIN,&
                                    PCT_A,        PCT_EXP,    KPT
!26..Define BRINE property names
 PROPERTY, MAT=BRINESAL, NAMES=     DNSFLUID,     WTF,        COMPRES,&
                                    VISCO,        REF_TEMP,   REF_PRES
!27..Define GAS (H2) property names
 PROPERTY, MAT=H2,       NAMES=     VISCO
!28..Define SULFATE property names
 PROPERTY, MAT=SULFATE,  NAMES=     QINIT
!29..Define NITRATE property names
 PROPERTY, MAT=NITRATE,  NAMES=     QINIT
!30..Define STEEL property names
 PROPERTY, MAT=STEEL,    NAMES=     CORRMCO2,     HUMCORR,    STOIFX
!31..Define CELLULS property names
 PROPERTY, MAT=CELLULS,  NAMES=     FBETA
!32..Define REFCON property names
 PROPERTY, MAT=REFCON,   NAMES=     GRAVACC,      PI,         VPANLEX,&
                                    VROOM,        VREPOS,     DRROOM,&
                                    YRSEC,        SECYR,      ASDRUM,&
                                    ATMPA,        MW_FE,      MW_CELL,&
                                    MW_NACL,      MW_CO2,     MW_CH4,&
                                    MW_N2,        MW_H2S,     MW_O2,&
                                    MW_H2O,       MW_H2,      R,&
                                    TC_H2,        TC_CO2,     TC_CH4,&
                                    TC_N2,        TC_H2S,     TC_O2,&
                                    PC_H2,        PC_CO2,     PC_CH4,&
                                    PC_N2,        PC_H2S,     PC_O2,&
                                    ACF_H2,       ACF_CO2,    ACF_CH4,&
                                    ACF_N2,       ACF_H2S,    ACF_O2,&
                                    OMEGAA,       OMEGAB,&
                                    BIP_11,       BIP_12,     BIP_13,&
                                    BIP_14,       BIP_15,     BIP_16,&
                                    BIP_21,       BIP_22,     BIP_23,&
                                    BIP_24,       BIP_25,     BIP_26,&
                                    BIP_31,       BIP_32,     BIP_33,&
                                    BIP_34,       BIP_35,     BIP_36,&
                                    BIP_41,       BIP_42,     BIP_43,&
                                    BIP_44,       BIP_45,     BIP_46,&
                                    BIP_51,       BIP_52,     BIP_53,&
                                    BIP_54,       BIP_55,     BIP_56,&
                                    BIP_61,       BIP_62,     BIP_63,&
                                    BIP_64,       BIP_65,     BIP_66
!33...Define UNNAMED property names
 PROPERTY, MAT=UNNAMED, NAMES=      PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                    POROSITY,     PORE_DIS,   SAT_RGAS,&
                                    SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                    RELP_MOD,     PC_MAX,     PO_MIN,&
                                    PCT_A,        PCT_EXP,    KPT
!34...Define TAMARISK property names
 PROPERTY, MAT=TAMARISK, NAMES=     PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
```

```
                                    POROSITY,     PORE_DIS,   SAT_RGAS,&
                                    SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                    RELP_MOD,     PC_MAX,     PO_MIN,&
                                    PCT_A,        PCT_EXP,    KPT
!35...Define FORTYNIN property names
 PROPERTY, MAT=FORTYNIN, NAMES=     PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                    POROSITY,     PORE_DIS,   SAT_RGAS,&
                                    SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                    RELP_MOD,     PC_MAX,     PO_MIN,&
                                    PCT_A,        PCT_EXP,    KPT
!36...Define BOREHOLE property names
 PROPERTY, MAT=BOREHOLE, NAMES=     PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                    POROSITY,     PORE_DIS,   SAT_RGAS,&
                                    SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                    RELP_MOD,     PC_MAX,     PO_MIN,&
                                    PCT_A,        PCT_EXP,    KPT


!37...Define PANEL CLOSURE CONCRETE SECTION THAT FRACTURES
 PROPERTY, MAT=DRF_PCS,     NAMES=  PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                    POROSITY,     PORE_DIS,   SAT_RGAS,&
                                    SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                    RELP_MOD,     PC_MAX,     PO_MIN,&
                                    PCT_A,        PCT_EXP,    KPT,&
                                    SAT_IBRN
!38...Define REPOSIT property names
 PROPERTY, MAT=REPOSIT, NAMES=      PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                    POROSITY,     PORE_DIS,   SAT_RGAS,&
                                    SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                    RELP_MOD,     PC_MAX,     PO_MIN,&
                                    PCT_A,        PCT_EXP,    KPT,&
                                    SAT_IBRN
 PROPERTY, MAT=REPOSIT, NAMES=      GRATMICI,     GRATMICH,&
                                    DCELLCHW,     DCELLRHW,   DIRONCHW,&
                                    DIRONRHW,     DPLASCHW,   DPLASRHW,&
                                    DRUBBCHW,     DRUBBRHW,   DIRNCCHW,&
                                    DIRNCRHW,     DPLSCCHW,   DPLSCRHW,&
                                    VOLCHW,       VOLRHW,     SAT_WICK,&
                                    PROBDEG
!39...Define Concrete Monolith property names
  PROPERTY, MAT= CONC_MON, NAMES=   PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                    POROSITY,     PORE_DIS,   SAT_RGAS,&
                                    SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                    RELP_MOD,     PC_MAX,     PO_MIN,&
                                    PCT_A,        PCT_EXP,    KPT,&
                                    SAT_IBRN
!40...Define Shaft Upper non Salado property names
   PROPERTY, MAT=SHFTU, NAMES=      COMP_POR,     KPT,&
                                    PC_MAX,       PCT_A,      PCT_EXP,&
                                    PO_MIN,       POROSITY,&
                                    RELP_MOD,     SAT_IBRN,   SAT_RBRN,&
                                    SAT_RGAS,     PRMX_LOG
!41...Define Shaft Lower Salado t1 property names
   PROPERTY, MAT=SHFTl_T1, NAMES=   COMP_POR,     KPT,&
                                    PC_MAX,       PCT_A,      PCT_EXP,&
                                    PO_MIN,       POROSITY,&
                                    RELP_MOD,     SAT_IBRN,   PRMX_LOG
```

```
!42...Define Shaft Lower Salado t2 property names
   PROPERTY, MAT=SHFTl_T2, NAMES=    COMP_POR,     KPT,&
                                     PC_MAX,       PCT_A,      PCT_EXP,&
                                     PO_MIN,       POROSITY,&
                                     RELP_MOD,     SAT_IBRN,   PRMX_LOG

!=============================================================================
*SET
PROPERTY_VALUES, MAT= DRZ_0, NAME*VALUE: DPHIMAX  = 0.0,      PI_DELTA= 0.0,&
                                        PF_DELTA = 0.0,      IFRX    = 0,&
                                        IFRY     = 0.0,      IFRZ    = 0,&
                                        KMAXLOG  = 0.0
PROPERTY_VALUES, MAT= DRZ_1, NAME*VALUE: DPHIMAX  = 0.0,      PI_DELTA= 0.0,&
                                        PF_DELTA = 0.0,      IFRX    = 0,&
                                        IFRY     = 0.0,      IFRZ    = 0,&
                                        KMAXLOG  = 0.0
PROPERTY_VALUES, MAT= DRZ_PCS, NAME*VALUE: RELP_MOD = 4.0
*END
$
```

B.1.3 LHS INPUT Callout of sampled parameters

```
$ type lhs1_cra1_a1.inp
! TITLE:    BRAGFLO 2003 CRA1 (LHS1)
! SCENARIO: S1, S2, S3, S4, S5, and S6
! ANALYSTS: Joshua Stein and Bill Zelinski
! CREATED:  April  2003
! MODIFIED: April 7
!
!  LHSCALC = CRA1 REALIZATION 1
!==========================================================================
!
!  DESCRIPTION:
!
!  WIPP 2003 Compliance Recertification Analyses (CRA)
!
!  This input file to PRELHS is used to generate, as an output file, an LHS
!  input file containing all distribution information and execution options
!  required to create a sample for Replicate R1 for the WIPP 2003 CRA
!
!  Modifed for CRA analyses:  LHSBLANK dummy changed to LHSBLANK and
!           REFCON MATERIAL (LHSBLANK) changed to REFCON
!           #59 dummy replaced with VOLSPALL
!========= No Comments Allowed between *ECHO and *ENDECHO ================
!
*ECHOLHS
TITLE 2002 TBM PA Calculation, Replicate R1 Input File for the LHS Code
NOBS           100
RANDOM SEED    921196800
CORRELATION MATRIX
   3
   18  19 -0.99
   20  21 -0.99
   28  29 -0.75
OUTPUT CORR HIST DATA
*ENDECHO
```

```
!
!== PROPERTIES TO BE RETRIEVED FROM WIPP 1997 PA CALCULATION DATABASE ==
!
*RETRIEVE
!1
  MATERIALS,  STEEL
  PROPERTIES, CORRMCO2
!2
  MATERIALS,  WAS_AREA
  PROPERTIES, PROBDEG
!3
  MATERIALS,  WAS_AREA
  PROPERTIES, GRATMICI
!4
  MATERIALS,  WAS_AREA
  PROPERTIES, GRATMICH
!5
  MATERIALS,  CELLULS
  PROPERTIES, FBETA
!6
  MATERIALS,  WAS_AREA
  PROPERTIES, SAT_RGAS
!7
  MATERIALS,  WAS_AREA
  PROPERTIES, SAT_RBRN
!8
  MATERIALS,  WAS_AREA
  PROPERTIES, SAT_WICK
!9
  MATERIALS,  DRZ_PCS
  PROPERTIES, PRMX_LOG
!10
  MATERIALS,  CONC_PCS
  PROPERTIES, PRMX_LOG
!11
  MATERIALS,  SOLU4
  PROPERTIES, SOLCIM
!12
  MATERIALS,  SOLTH4
  PROPERTIES, SOLCIM
!13 dummy placeholder
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!14
  MATERIALS,  CONC_PCS
  PROPERTIES, SAT_RGAS
!15
  MATERIALS,  CONC_PCS
  PROPERTIES, SAT_RBRN
!16
  MATERIALS,  CONC_PCS
  PROPERTIES, PORE_DIS
!17
  MATERIALS,  S_HALITE
  PROPERTIES, POROSITY
!18
  MATERIALS,  S_HALITE
```

```
  PROPERTIES, PRMX_LOG
!19
  MATERIALS,  S_HALITE
  PROPERTIES, COMP_RCK
!20
  MATERIALS,  S_MB139
  PROPERTIES, PRMX_LOG
!21
  MATERIALS,  S_MB139
  PROPERTIES, COMP_RCK
!22
  MATERIALS,  S_MB139
  PROPERTIES, RELP_MOD
!23
  MATERIALS,  S_MB139
  PROPERTIES, SAT_RBRN
!24
  MATERIALS,  S_MB139
  PROPERTIES, SAT_RGAS
!25
  MATERIALS,  S_MB139
  PROPERTIES, PORE_DIS
!26
  MATERIALS,  S_HALITE
  PROPERTIES, PRESSURE
!27
  MATERIALS,  CASTILER
  PROPERTIES, PRESSURE
!28
  MATERIALS,  CASTILER
  PROPERTIES, PRMX_LOG
!29
  MATERIALS,  CASTILER
  PROPERTIES, COMP_RCK
!30
  MATERIALS,  BH_SAND
  PROPERTIES, PRMX_LOG
!31
  MATERIALS,  DRZ_1
  PROPERTIES, PRMX_LOG
!32
  MATERIALS,  CONC_PLG
  PROPERTIES, PRMX_LOG
!33 dummy placeholder
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!34
  MATERIALS,  SOLAM3
  PROPERTIES, SOLSIM
!35
  MATERIALS,  SOLAM3
  PROPERTIES, SOLCIM
!36
  MATERIALS,  SOLPU3
  PROPERTIES, SOLSIM
!37
  MATERIALS,  SOLPU3
```

```
  PROPERTIES, SOLCIM
!38
  MATERIALS,  SOLPU4
  PROPERTIES, SOLSIM
!39
  MATERIALS,  SOLPU4
  PROPERTIES, SOLCIM
!40
  MATERIALS,  SOLU4
  PROPERTIES, SOLSIM
!41
  MATERIALS,  SOLU6
  PROPERTIES, SOLSIM
!42
  MATERIALS,  SOLU6
  PROPERTIES, SOLCIM
!43
  MATERIALS,  SOLTH4
  PROPERTIES, SOLSIM
!44
  MATERIALS,  PHUMOX3
  PROPERTIES, PHUMCIM
!45
  MATERIALS,  GLOBAL
  PROPERTIES, OXSTAT
!46
  MATERIALS,  CULEBRA
  PROPERTIES, MINP_FAC
!47
  MATERIALS,  GLOBAL
  PROPERTIES, TRANSIDX
!48
  MATERIALS,  GLOBAL
  PROPERTIES, CLIMTIDX
!49
  MATERIALS,  CULEBRA
  PROPERTIES, HMBLKLT
!50
  MATERIALS,  CULEBRA
  PROPERTIES, APOROS
!51
  MATERIALS,  CULEBRA
  PROPERTIES, DPOROS
!52
  MATERIALS,  U+6
  PROPERTIES, MKD_U
!53
  MATERIALS,  U+4
  PROPERTIES, MKD_U
!54
  MATERIALS,  PU+3
  PROPERTIES, MKD_PU
!55
  MATERIALS,  PU+4
  PROPERTIES, MKD_PU
!56
  MATERIALS,  TH+4
```

```
  PROPERTIES, MKD_TH
!57
  MATERIALS,  AM+3
  PROPERTIES, MKD_AM
!58
  MATERIALS,  BOREHOLE
  PROPERTIES, TAUFAIL
!59 dummy placeholder for VOLSPALL
  MATERIALS,  WAS_AREA
  PROPERTIES, VOLSPALL
!60
  MATERIALS,  GLOBAL
  PROPERTIES, PBRINE
!61
  MATERIALS,  BOREHOLE
  PROPERTIES, DOMEGA
!62
  MATERIALS,  SHFTU
  PROPERTIES, SAT_RBRN
!63
  MATERIALS,  SHFTU
  PROPERTIES, SAT_RGAS
!64
  MATERIALS,  SHFTU
  PROPERTIES, PRMX_LOG
!65
  MATERIALS,  SHFTL_T1
  PROPERTIES, PRMX_LOG
!66
  MATERIALS,  SHFTL_T2
  PROPERTIES, PRMX_LOG
!67
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!68
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!69
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!70
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!71
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!72
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!73
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!74
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!75
  MATERIALS,  REFCON
```

```
  PROPERTIES, LHSBLANK
!
!==========================================================================
!
*END
```

B.1.4 IC INPUT: Sets initial conditions

```
$ type IC_BF_CRA1.INP
! TITLE:    BRAGFLO 2003 CRA1 (ICSET)
! SCENARIO: S1, S2, S3, S4, S5, and S6
! ANALYSTS: Joshua Stein and Bill Zelinski
! MODIFIED: no modifications for CRA since AP106
!===========================================================================
!
*SET_NAMES
 INITIAL_NAMES TYPE=ELEMENT, NUM=4, NAMES=SATBREL, PRESEL, FECONC,&
                                         CH2OCONC
!
*SET_VALUES
!Define start time = -5 years
 INITIAL_VALUE, TYPE=TIME, VALUE=-1.57785e8
!
!Define initial brine saturations: some regions will be changed below
 INITIAL_VALUE, TYPE=ELEMENT, NAME=SATBREL,  IRANGE=1,69, JRANGE=1,34,&
               KRANGE=1,2,   VALUE=1.0
!
!Define initial Fe concentrations
 INITIAL_VALUE, TYPE=ELEMENT, NAME=FECONC,   IRANGE=1,69, JRANGE=1,34,&
               KRANGE=1,2,   VALUE=0.0
!
!Define initial CH2O concentrations
 INITIAL_VALUE, TYPE=ELEMENT, NAME=CH2OCONC, IRANGE=1,69, JRANGE=1,34,&
               KRANGE=1,2,   VALUE=0.0
!
!========================================================================
!Set initial brine saturations
!========================================================================
!
!Define initial waste brine saturation
 INITIAL_VALUE, TYPE=ELEMENT, NAME=SATBREL, MATERIAL=CAVITY_1,&
               VALUE=CAVITY_1:SAT_IBRN
 INITIAL_VALUE, TYPE=ELEMENT, NAME=SATBREL, MATERIAL=CAVITY_2,&
               VALUE=CAVITY_2:SAT_IBRN
 INITIAL_VALUE, TYPE=ELEMENT, NAME=SATBREL, MATERIAL=CAVITY_3,&
               VALUE=CAVITY_3:SAT_IBRN
!Define initial saturation in panel seal concrete <Value=PAN_SEAL:SAT_IBRN>
!  CAVITY_4 was used for shaft originally defined for the shaft and(?)
!  panel closures for -5 to 0 years. For consistency, we copy this practice
!  here assigning initial brine saturation in CONC_PCS to 0.999999 as was
!  done for the CCA and PAVT.
 INITIAL_VALUE, TYPE=ELEMENT, NAME=SATBREL, IRANGE=31,32, JRANGE=7,14,&
               KRANGE=1,2,   VALUE=9.999999E-01
 INITIAL_VALUE, TYPE=ELEMENT, NAME=SATBREL, IRANGE=35,36, JRANGE=7,14,&
               KRANGE=1,2,   VALUE=9.999999E-01
```

```
 INITIAL_VALUE, TYPE=ELEMENT, NAME=SATBREL, IRANGE=39,40, JRANGE=7,14,&
                KRANGE=1,2,   VALUE=9.999999E-01
 INITIAL_VALUE, TYPE=ELEMENT, NAME=SATBREL, IRANGE=43,44, JRANGE=7,34,&
                KRANGE=1,2,   VALUE=9.999999E-01
!Define initial saturation in panel seal drifts (set to value of
!WAS_AREA:SAT_IBRN= 1.5e-2)
 INITIAL_VALUE, TYPE=ELEMENT, NAME=SATBREL, IRANGE=30,31, JRANGE=10,13,&
                KRANGE=1,2,   VALUE=1.500000E-02
 INITIAL_VALUE, TYPE=ELEMENT, NAME=SATBREL, IRANGE=34,35, JRANGE=10,13,&
                KRANGE=1,2,   VALUE=1.500000E-02
 INITIAL_VALUE, TYPE=ELEMENT, NAME=SATBREL, IRANGE=38,39, JRANGE=10,13,&
                KRANGE=1,2,   VALUE=1.500000E-02
!Define initial saturation in upper Dewey Lake formations
 INITIAL_VALUE, TYPE=ELEMENT, NAME=SATBREL, IRANGE=1,69,  JRANGE=31,32,&
                KRANGE=1,2,   VALUE=DEWYLAKE:SAL_USAT
!Define initial saturation in Santa Rosa formations
 INITIAL_VALUE, TYPE=ELEMENT, NAME=SATBREL, IRANGE=1,69,  JRANGE=32,34,&
                KRANGE=1,2,   VALUE=SANTAROS:SAT_IBRN
!
*END
$
```

B.1.5 ALGEBRA INPUT: Further definition of parameters/manipulation of parameters

```
$ type ALG1_BF_CRA1.INP
!=======================================================================
!
!TITLE:   ALGEBRACDB INPUT FILE FOR....
!         BRAGFLO CRA1 calculations
!         This ALGEBRACDB INPUT FILE is a modified version of the
!         ALGEBRACDB INPUT FILE USED FOR THE
!         BRAGFLO INIT CRA calculations
!
!ANAYLST: Joshua S. Stein, SNL and William Zelinski, RESPEC
!
!PRESENT VERSION CREATED: April 2003
!MODIFICATION HISTORY:
!          March 13,1996: added sections for new borehole plugs and fills
!          March 20,1996: modified brine pocket conceptual model. Now
!                         brine pocket only underlies excavated area.
!          April 10,1996: further modifications to brine pocket. No
!                         longer sampling the log of the product of the
!                         brine pocket perm and bulk compressibility.
!                         Now sampling log of perm and log of bulk
!                         compressibility with some correlation.
!          May 2, 1997:   Modifications for the C97. These include:
!                         1)new treatment for the brine pocket
!                         porosity and compressibility.
!                         These two are inversely related so that
!                         the maximum porosity is combined with min compr.
and
!                         vice-versa. 2) new DRZ treatment - intrinsic
!                         permeability is sampled, intact porosity is same
!                         as Halite and DRZ is allowed to fracture with
!                         fracture properties corresponding to those of
MB139.
```

```
!           Feb 26, 2002   Added line to assign DRZ_PCS/RELP_MOD equal to
!                          DRZ_1/RELP_MOD
!           12 Mar 02 CWH  Change in equation for POR_COMP to assign pore
!                          compressibility vice bulk compressibility for
!                          borehole materials.
!                          Added lines to assign values for PORE_DIS,
SAT_RGAS,
!                          and SAT_RBRN for materials CPCS_F, LDRZ_F, DRF_PCS
!           13 Mar 02 CWH  Changed all PERM_Y and PERM_Z assignments to be
!                          equal to PERM_X, done for consistency
!            13 Mar 02 TH  Changed assignment of initial pressures for CPCS_F
!                          to be determined by the Salado pressure calculation
!           28 Mar 02 JSS  rev4 Added block 40 REPOSIT:WAS_AREA to fix a
problem
!                          with having CAVITY_1 and CAVITY_2 both assigned
!                          as WASTE regions in BF.
!           14 Jan 03 WPZ  Add fracturing to upper DRZ
!
!           01 APR 03 JSS  CRA1 Setup:
!                                1. Changed COMP_RCK values to bulk
!                                   compressibility for materials: CONC_MON,
!                                   CONC_PLG, and CONC_PCS [ERMS# 526661].
!                                2. Changed the correlation between COMP_RCK
!                                   and POROSITY for the Castile brine pocket
!                                   [ERMS#       ]
!                                3. Changed gravity constant to database
!                                   value (9.80665) to be consistent with
!                                   other PA codes.
!
!            20 AUG 03 JSS CRA Setup:  Updated the constant to calculate
!                                      the brine pocket porosity from the
!                                      sampled bulk compressibility.
!
!PURPOSE: ALGEBRA file computes properties that can not be obtained
!         from CAMDAT and/or assigns properties to element blocks.
!
!NOTE:    This input file is for the waste panel located down-dip or
!         south of the rest of the repository. Only the Salado formation
!         is dipping.
!
!========================================================================
!************************************************************************
!CHAPTER 0:  DEFINE NEW VARIABLE NAMES AND SOME NEEDED CONSTANTS
!************************************************************************
!========================================================================
!
! ***VARIABLE DEFINITION
!     DIP1 ( IN DEGREES) =  ANGLE OF DIP FOR SALADO FORMATION
!     DIP2 ( IN DEGREES) =  ANGLE OF DIP FOR NON-SALADO FORMATIONS =
!     THETA1 AND THETA2 ARE IN RADIANS
!=============================================================================
==
DIP1     = 1.0
DIP2     = 0.0
THETA1   = DIP1*2.0*PI[B:32]/360.0
THETA2   = DIP2*2.0*PI[B:32]/360.0
! JSS: Removed reassignment of GRAVACC for CRA1
```

```
!  LIMIT BLOCK 32
!  GRAVACC  = 9.79
! JSS
!=======================================================================
!***********************************************************************
!CHAPTER 1:   DEFINE AND COMPUTE HYDROLOGIC MATERIAL PROPERTIES
!***********************************************************************
!=======================================================================
!
!**********************************************************************
!BLOCK 1 = S_HALITE = SALADO HALITE
!**********************************************************************
!***COMMENTS: SAMPLED PARAMETERS ARE:
! PRMX_LOG,  POROSITY,  COMP_RCK, PRESSURE
!**********************************************************************
LIMIT BLOCK 1
!SINCE PRMX_LOG IS SAMPLED ASSIGN PERM_Y AND PERM_Z
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_RCK/POROSITY
!
!**********************************************************************
!BLOCK 2 = DRZ_0 = DRZ FROM -5 YRS TO 0 YRS
!**********************************************************************
!***COMMENTS: SAMPLED PARAMETERS: NONE
!1)CORRELATE DRZ_0 POROSITY TO SAMPLED S_HALITE
! Fracturing Treatment For EPA PAV Included
!**********************************************************************
LIMIT BLOCK 2
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
POROSITY = POROSITY[B:1] + 0.0029
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_RCK/POROSITY
!#####################################################################
!WPZ fracturing extended to entire DRZ (lower & upper)
!LIMIT ELEMENTS 1121 TO 1177
PI_DELTA = PI_DELTA[B:3]
PF_DELTA = PF_DELTA[B:3]
KMAXLOG = KMAXLOG[B:3]
PHIMAX   = MAKEPROP(0.05)
TEMP     = POROSITY*(EXP(POR_COMP*(PI_DELTA)))
PERM_EXP = LOG((10**KMAXLOG)/PERM_X)/(LOG(PHIMAX/TEMP))
IFRX = IFRX[B:3]
IFRY = IFRY[B:3]
IFRZ = IFRZ[B:3]
!
!**********************************************************************
!BLOCK 3 = S_MB139  = SALADO MARKER BED 139
!**********************************************************************
!***COMMENTS: SAMPLED PARAMETERS: SAT_RBRN, SAT_RGAS, PORE_DIS, RELP_MOD
!                                 COMP_RCK, PRMX_LOG
!**********************************************************************
LIMIT BLOCK 3
```

```
! THE FOLLOWING 5 LINES ARE USED TO LIMIT THE LOWER END OF THE STUDENT-T
! DISTRIBUTIONS FOR THE SAMPLED PARAMETERS TO THE MINIMUM MEASURED VALUE.
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN
KMAXLOG = KMAXLOG[B:3]
POR_COMP = COMP_RCK/POROSITY
PHIMAX   = POROSITY + DPHIMAX
!TEMP    = POROSITY AT FRACTURE INITIATION PRESSURE
!PI_DELTA = FRACTURE INITIATION PRESSURE - REFERENCE PRESSURE
TEMP     = POROSITY*(EXP(POR_COMP*(PI_DELTA)))
PERM_EXP = LOG((10**KMAXLOG)/PERM_X)/(LOG(PHIMAX/TEMP))
!
!**********************************************************************
!BLOCK 4 = S_ANH_AB = SALADO ANHYDRITE LAYERS A + B
!BLOCK 5 = S_MB138  = SALADO MARKER BED 138
!**********************************************************************
!***COMMENTS: SAMPLED PARAMETERS: NONE
!1) USE S_MB139 SAMPLED VALUES FOR:SAT_RBRN, SAT_RGAS, PORE_DIS, RELP_MOD
!   and PRMX_LOG
!**********************************************************************
!
LIMIT BLOCK 4 5
PERM_X   = PERM_X[B:3]
PERM_Y   = PERM_Y[B:3]
PERM_Z   = PERM_Z[B:3]
KMAXLOG  = KMAXLOG[B:3]
RELP_MOD = RELP_MOD[B:3]
PORE_DIS = PORE_DIS[B:3]
SAT_RBRN = SAT_RBRN[B:3]
SAT_RGAS = SAT_RGAS[B:3]
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_RCK[B:3]/POROSITY
PHIMAX   = POROSITY + DPHIMAX
!TEMP    = POROSITY AT FRACTURE INITIATION PRESSURE
!PI_DELTA = FRACTURE INITIATION PRESSURE - REFERENCE PRESSURE
TEMP     = POROSITY*(EXP(POR_COMP*(PI_DELTA)))
PERM_EXP = LOG((10**KMAXLOG)/PERM_X)/(LOG(PHIMAX/TEMP))
!
!**********************************************************************
!BLOCK 6  = CAVITY_1 = PANEL EXCAVATION WHERE WASTE WILL BE PLACED AT T = 0
YRS
!BLOCK 7  = CAVITY_2 = REST OF REPOSITORY WHERE WASTE WILL BE PLACED AT T= 0
YEA
RS
!BLOCK 8  = CAVITY_3 = EXPERIMENTAL REGION AND BACKFILLED REGION
!BLOCK 9  = CAVITY_4 = SHAFT AND PANEL SEALS
!**********************************************************************
!***COMMENTS:
!*****************
LIMIT BLOCK 6 7 8 9
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_RCK/POROSITY
```

```
!
!*********************************************************************
!BLOCK 10 = IMPERM_Z
!*********************************************************************
!***COMMENTS:
!   INCLUDES THE RUSTLER, SANTA ROSA, DEWEY LAKE, AND CASTILE.
!   USED TO CONTROL DRAINAGE OF FORMATIONS ABOVE THE SALADO INTO THE
!   SHAFT PRIOR TO T=0 YEARS.  IT IS ALSO USED TO PREVENT BRINE POCKET
!   FROM BECOMING DE-PRESSURIZED PRIOR TO DRILLING INTRUSION.
!*********************************************************************
LIMIT BLOCK 10
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_RCK/POROSITY
!
!*********************************************************************
!BLOCK 11 = CASTILER = BRINE POCKET
!*********************************************************************
!***COMMENTS:SAMPLED PARAMETERS COMP_RCK, PRMX_LOG
! THIS SECTION IS MODIFIED TO ACCOUNT FOR A BRINE POCKET POROSITY
! TREATMENT USED IN THE 1997 C97 CALCULATIONS
!*********************************************************************
LIMIT BLOCK 11
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN
!USE DATABASE VALUE OF "POROSITY" FOR CALCULATING PORE COMPRESSIBILITY
POR_COMP = COMP_RCK/POROSITY
! JSS: BRINE POCKET POROSITY USED BY BRAGFLO IS COMPUTED FROM...
! MIN(COMP_RCK)/MIN(POR_BKPT) = MAX(COMP_RCK)*MAX(POR_BKPT) = 1.0860E-10
POROSITY = COMP_RCK/1.0860E-10
!
!*********************************************************************
!BLOCK 12  OPERATIONS REGION
!BLOCK 13  EXPERIMENTAL REGION
!*********************************************************************
!***COMMENTS:
!   Operations and experimental region have same properties
!*********************************************************************
LIMIT BLOCK 12 13
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_RCK/POROSITY
!
!********************************************************************
!*********************************************************************
!BLOCK 14  CULEBRA MEMBER OF RUSTLER
!*********************************************************************
!***COMMENTS:
!*********************************************************************
LIMIT BLOCK 14
PERM_X   = 10**PRMX_LOG
```

```
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_RCK/POROSITY
!
!***********************************************************************
!BLOCK 15  MAGENTA MEMBER OF RUSTLER
!***********************************************************************
!***COMMENTS:
!***********************************************************************
LIMIT BLOCK 15
PERM_X   = 10**PRMX_LOG
PERM_Y   = 10**PRMY_LOG
PERM_Z   = 10**PRMZ_LOG
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_RCK/POROSITY
!
!***********************************************************************
!BLOCK 16 DEWEY LAKE RED BEDS
!***********************************************************************
!***COMMENTS:
!***********************************************************************
LIMIT BLOCK 16
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
! OVERIDE DATABASE VALUES OF PCT_A, PCT_EXP, AND PCT_FLAG
! SO THAT NO CAPILLARY EFFECTS ARE SIMULATED IN DEWEY LAKE FORMATION.
! THESE WILL THEN BE CONSISTENT WITH THE SANTA ROSA PARAMETERS ALSO.
PCT_A    = 0
PCT_EXP  = 0
CAP_MOD  = 1
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_RCK/POROSITY
!
!***********************************************************************
!BLOCK 17  SANTA ROSA
!***********************************************************************
!***COMMENTS:
!***********************************************************************
LIMIT BLOCK 17
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_RCK/POROSITY
!
!***********************************************************************
!BLOCK 18 = WAS_AREA = WASTE MATERIAL
!***********************************************************************
!***COMMENTS: HYDROLOGIC SAMPLED PARAMETERS ARE: SAT_RBRN, SAT_RGAS, SAT_WICK
!
!1) THE FOLLOWING GAS GENERATION PARAMETERS ARE PRESENTED IN TABLE 1.
!   IN THE MEMO DATED 01/02/1996, FROM Y.WANG AND L BRUSH TO M. TIERNEY,
!   SUBJECT: ESTIMATES OF GAS GENERATION PARAMETERS FOR THE LONG-TERM
!   WIPP PERFORMANCE ASSESSMENT
!
```

```
!2) MODIFICATIONS INCORPORATED (FROM NMVP) BASED ON MEMO DATED
!   FEBRUARY 29,1996 FROM YIFENG WANG AND LARRY BRUSH TO PALMER VAUGHN.
!   SUBJECT: AN ADJUSTMENT FOR USING STEEL CORROSION RATES IN BRAGFLO TO
!   REFLECT REPOSITORY CHEMICAL CONDITION CHANGES DUE TO ADDING MgO AS A
!   BACKFILL
!
!3) SEVERAL MODIFICATIONS WERE MADE IN THIS VERSION TO CORRECT LOGIC ERRORS
!   IN THE NMVP VERSION.  THE NMVP VERSION COULD NOT PROPERLY HANDLE ALL
!   COMBINATIONS OF PROBDEG.  FORTUNATELY THESE ERRORS IN THE NMVP VERSION
!   HAD NO EFFECT ON THE GENERATION OF THE NMVP INPUT FILE.
!***********************************************************************
LIMIT BLOCK 18
!HYDROLOGIC PARAMETERS
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_RCK/POROSITY
!*****************************************************************
! GAS GENERATION DEFINITIONS
! SAMPLED PARAMETERS:            GRATMICI, GRATMICH, PROBDEG,
! ASSOCIATED SAMPLED PARAMETERS: CORRMCO2[B:30], FBETA[B:31]
! STOIFX[B:30]     =  STOICHIOMETRIC FACTOR FOR IRON CORROSION
! CORRMCO2[B:30]   =  INUNDATED STEEL CORROSION RATE [M/SEC] WITHOUT
!                     MICROBIAL GAS GENERATION
! GRATMICH         =  RATE OF HUMID CELLULOSICS BIODEGRADATION [MOLE
C/KG/SEC]

! GRATMICI         =  RATE OF INUNDATED CELLULOSICS BIODEGRADATION
!                     [MOLE C/KG/SEC]
! FBETA[B:31]      =  SCALING FACTOR FOR THE AVERAGE STOICIOMETRIC FACTOR Y
IN
!                     THE MICROBIAL REACTION
! PROBDEG          =  FLAG TO INDICATE IF BIODEGRADATION IS ACTIVATED
!                     (0=NO,1=YES)
!                     PROBDEG = 0 => NO BIODEGRADATION
!                     PROBDEG = 1 => BIODEGRADATION BUT NO PLASTICS AND
RUBBERS
!                     PROBDEG = 2 => BIODEGRADATION WITH PLASTICS AND RUBBERS
!                                    INCLUDED
!                     PROBDEG IS A SAMPLED PARAMETER DEFINED SUCH THAT
!                     IT'S VALUE IS  0  50% OF THE TIME,
!                                    1  25% OF THE TIME,
!                                    2  25% OF THE TIME.
!***************************************************************************
!***************************************************************************
! STOICOR = IRON-CORROSION STOCHIOMETRIC FACTOR (Y.WANG MEMO)
 STOICOR = MAKEPROP(STOIFX[B:30])
!
! CORROSION STOCHIOMETRIC FACTOR FOR H2 PRODUCTION=SCOR_H2=S(1,1)
! SELL LINE 9.8 IN THE BRAGFLO INPUT MANUAL
 SCOR_H2 =  MAKEPROP((4 - STOICOR)/3)
!
! CORROSION STOCHIOMETRIC FACTOR FOR H2O CONSUMPTION=SCOR_H2O=S(1,2)
 SCOR_H2O = MAKEPROP((4 + 2*STOICOR)/3)
!
! CORROSION STOCHIOMETRIC FACTOR FOR FE CONSUMPTION=SCOR_FE=S(1,3)
```

```
 SCOR_FE = MAKEPROP(1.0)
!
! HUMID STEEL CORROSION RATES (KCGSH) ARE ZERO
! HUMCORR = HUMID STEEL CORROSION RATE
!
!***************************************************************************
*
! THE FOLLOWING INVENTORY PARAMETERS ARE OBTAINED FROM THE DATA BASE
! **REMOTE HANDLED WASTE
! DIRONRHW =     100  KG/M**3
! DIRNCRHW =     2591 KG/M**3
! DCELLRHW =     17   KG/M**3
! DRUBBRHW =     3.3  KG/M**3
! DPLASRHW =     15   KG/M**3
! DPLSCRHW =     3.1  KG/M**3
! VOLRHW   =     7080 M**3
!
! **CONTACT HANDLED WASTE
! DIRONCHW =     170  KG/M**3
! DIRNCCHW =     139  KG/M**3
! DCELLCHW =     54   KG/M**3
! DRUBBCHW =     10   KG/M**3
! DPLASCHW =     34   KG/M**3
! DPLSCCHW =     26   KG/M**3
! VOLCHW   =     1.69E5 M**3
!
!******************************************************************
! COMPUTE AVERAGE DENSITIES
!
! DRH_METL =     AVERAGE DENSITY OF RH METALS
! DRH_BIO  =     AVERAGE DENSITY OF RH BIO
! DCELLRHW =     AVERAGE DENSITY OF RH CELL
! DCH_METL =     AVERAGE DENSITY OF CH METALS
! DCH_BIO  =     AVERAGE DENSITY OF CH BIO
! DCELLCHW =     AVERAGE DENSITY OF CH CELLULOSE
! DRH_RUPL =     AVERAGE DENSITY OF RH RUBBERS AND PLASTICS
! DCH_RUPL =     AVERAGE DENSITY OF CH RUBBERS AND PLASTICS
!************************************************************************
!
!  BIOIDX  =  1 ===> MICROBIAL GAS GENERATION = YES
!          =  0 ===> MICROBIAL GAS GENERATION = NO
!  IF BIOIDX = 1, THEN
!     PLASIDX = 1 ====> DEGRADATION OF RUBBERS, PLASTICS, AND CELLULOSICS
!             = 0 ====> DEGRADATION OF CELLULOSE ONLY
!************************************************************************
! IF PROBDEG = 0,  NO BIODEGRADATION GAS GENERATION   (BIOIDX = 0, PLASIDX =
0)
! IF PROBDEG = 1,  DO NOT ADD IN PLASTICS AND RUBBERS (BIOIDX = 1, PLASIDX =
0)
! IF PROBDEG = 2,  ADD IN PLASTICS AND RUBBERS        (BIOIDX = 1, PLASIDX =
1)
!************************************************************************
 PLASIDX  = IFEQ0(PROBDEG-2,1.0,0.0)
 BIOIDX   = IFGT0(PROBDEG,1.0,0.0)
!
 DRH_METL =     DIRONRHW + DIRNCRHW
 DRH_RUPL =     DRUBBRHW + 1.7*(DPLASRHW+DPLSCRHW)
```

```
 DRH_BIO  =     DCELLRHW + PLASIDX*DRH_RUPL
 DCH_METL =     DIRONCHW + DIRNCCHW
 DCH_RUPL =     DRUBBCHW + 1.7*(DPLASCHW+DPLSCCHW)
 DCH_BIO  =     DCELLCHW + PLASIDX*DCH_RUPL
!
!************************************************************************
!
! VPANLEX  =     VOLUME OF EXCAVATED PANEL     = 46097.65 M**3
! VROOM    =     VOLUME OF EXCAVATED ROOM      = 3644.4 M**3
! VREPOS   =     VOLUME OF WASTE STORAGE AREA  = 436023 M**3
! DRROOM   =     NUMBER OF DRUMS PER ROOM      = 6804
!
! TOTAL MASS OF CORRODIBLE METAL
 WTFETOT = DRH_METL*VOLRHW + DCH_METL*VOLCHW
!
! TOTAL MASS OF CELLULOSICS ONLY
 WTCELTOT = DCELLRHW*VOLRHW + DCELLCHW*VOLCHW
!
! TOTAL MASS OF RUBBER AND PLASTICS
 WTRPLTOT = DRH_RUPL*VOLRHW + DCH_RUPL*VOLCHW
!
! TOTAL MASS OF BIODEGRADABLE MATERIAL
 WTBIOTOT = WTCELTOT + WTRPLTOT*PLASIDX
!
! INITIAL FE CONCENTRATION = CONCFE
! (APPEARS IN THE BRAGFLO INPUT INITIAL CONDITIONS (SEE LINE 5.6
! IN THE BRAGFLO INPUT MANUAL))
!
 CONCFE  =  WTFETOT/VREPOS[B:32]
!
! INITIAL BIODEGRADABLE MATERIAL CONCENTRATION = CONCBIO
! (APPEARS IN THE BRAGFLO INPUT INITIAL CONDITIONS (SEE LINE 5.8
! IN THE BRAGFLO INPUT MANUAL))
!
 CONCBIO  =  WTBIOTOT/VREPOS[B:32]
!
! INITIAL CELLULOSICS CONCENTRATION = CONCCEL
!
 CH20CONC   =  WTCELTOT/VREPOS[B:32]
!
!*************************************************************************
!*************************************************************************
! THE FOLLOWING CALCULATIONS DETERMINE THE AVERAGE STOCHIOMETRIC
! COEFFICIENT IN THE BIODEGRADATION REACTION
!
! DRUMVOL  =  NO OF DRUMS PER UNIT VOL OF WASTE STORAGE
! DRPANEL  =  NO OF DRUMS PER PANEL
! DRUMTOT  =  NUMBER OF DRUMS IN REPOSITORY

 DRUMVOL  =  MAKEPROP(DRROOM[B:32]/VROOM[B:32])
 DRUMTOT  =  MAKEPROP(VREPOS[B:32]*DRUMVOL)
 DRPANEL  =  MAKEPROP(DRROOM[B:32]*VPANLEX[B:32]/VROOM[B:32])
!
! CALCULATE THE MAXIMUM QUANTITIES (IN MOLES) OF CELLULOSICS AND STEEL
! THAT WILL BE POTENTIALLY CONSUMED IN 10000 YEARS
! (SEE EQUATIONS 12 AND 13 IN THE Y. WANG MEMO)
! CONVERT FROM DATABASE UNITS OF MOLES C/(KG-SEC) TO MOLES C/(KG-YR)
```

```
!********************************************************************
! 6         = 6 MOLES OF C/MOLE OF CELLULOSE C6-H10-O5
! 1000      = 1000 GRAMS/KG
! WTBIOTOT  = KG
! 162       = MW OF CELLULOSE C6-H10-O5
 A1        =  6*1000*WTBIOTOT/162
! 10000     = YEARS
! GRATMICI  = MOLES C/KG-SEC
! YRSEC     = 3.15569E7 SEC/YR
 A2        =  10000*GRATMICI*YRSEC[B:32]*WTBIOTOT
 MAX_CELL  =  MIN(A1,A2)
!********************************************************************
! 10000    =  GRAMS/KG
! WTFETOT  =  KG
! 56       =  MW OF FE
 B1       =  1000*WTFETOT/56
!********************************************************************
! 1410     =  10000 YRS* 0.141MOLES/MICROMETER/M**2
! CORRWCO2 =  M/SEC
! 1000000  =  MICROMETERS/M
! YRSEC    =  3.15569E7 YEARS/SEC
! ASDRUM   =  M**2 STEEL/DRUM
! DRUMTOT  =  DRUMS/REPOSITORY
! B2       =  MOLES
 B2       =  1410*CORRMCO2[B:30]*1000000*YRSEC[B:32]*ASDRUM[B:32]*DRUMTOT
 MAX_FE   =  MIN(B1,B2)
!********************************************************************
!
!  CALCULATE THE MAXIMUM VALUE OF THE AVERAGE STOCHIOMETRIC COEFFICIENT
!  Y IN THE BIODEGRADATION REACTION (SEE EQUATION 15 IN THE y. WANG MEMO)
 MOL_NO3  = QINIT[B:29]
 MOL_SO4  = QINIT[B:28]
! EQUATION 15 IS NEXT
 NUM1 = MAKEPROP(2.4*MOL_NO3/4.8)
 NUM2 = MAKEPROP(3*MOL_SO4/3)
 NUM3 = MAX_CELL - 6*MOL_NO3/4.8 - 6*MOL_SO4/3
 YMAX = (NUM1+NUM2+0.5*NUM3)/MAX_CELL
!
!  CALCULATE THE MINIMUM VALUE OF Y (SEE EQUATIONS 16 AND 17)
 C1    =  NUM2
 C2    =  MAX_FE
 G     =  MIN(C1,C2)
 YMIN  =  YMAX - G/MAX_CELL
!
! THE VALUE OF Y (STOIMIC) IS (EQUATION 18)
 STOIMIC  =  YMIN + FBETA[B:31]*(YMAX - YMIN)
!
! SBIO_H2 = S(2,1), SEE LINE 9.10 IN BRAGFLO INPUT MANUAL
! SBIO_H2 = STOIMIC
!
! BIODEGRADATION STOICHIOMETRIC FACTOR FOR H20 CONSUMPTION
! SBIO_H2O = S(2,2) = 0
!
! BIODEGRADATION STOICHIOMETRIC FACTOR FOR CELLULOSIC CONSUMPTION
! SBIO_CH2O = S(2,3) = 1
!
! DETERMINE THE INUNDATED STEEL CORROSION RATE
```

```
! FOR CCA CALCULATIONS THIS IS RATE WITHOUT CO2 BEING PRESENT
 KCGSI =  MAKEPROP(CORRMCO2[B:30])
!
! CONVERT REACTION RATES TO GAS GENERATION RATES REQUIRED BY PREBRAG
!
! CONVERT THE UNITS OF KCGSI FROM M/SEC TO MOLE-FE/M3-S
! KCGSI  =  KCGSI(M/SEC)*0.141 (MOLE-FE/MICRON-M2)*6(M2/DRUM)
!           *100000 MICRONS/M* (6804 DRUMS/3644.4 M3)
 KCGSI  =  MAKEPROP(KCGSI*0.141*1000000*ASDRUM[B:32]* &
           DRROOM[B:32]/VROOM[B:32])
!
! CONVERT THE UNITS OF HUMCORR (= KCGSH) FROM M/SEC TO MOLE-FE/M3-S
 KCGSH  =  MAKEPROP(HUMCORR[B:30]*0.141*1000000*ASDRUM[B:32]* &
           DRROOM[B:32]/VROOM[B:32])
!
! COMPUTE THE INUNDATED GAS (H2) PRODUCTION RATE FROM THE REACTION RATE
 GRATCORI  = MAKEPROP(KCGSI*VPANLEX[B:32]*SCOR_H2/ASDRUM[B:32]/DRPANEL)
!
! COMPUTE THE HUMID GAS (H2) PRODUCTION RATE FROM THE REACTION RATE
 GRATCORH  =  MAKEPROP(KCGSH*VPANLEX[B:32]*SCOR_H2/ASDRUM[B:32]/DRPANEL)
!
! CONVERT THE UNITS OF THE INUNDATED BIODEGRADATION RATE GRATMICI
! GRATMICI  =  GRATMICI(MOLE-C/KG/SEC)*(KG-CELL/M3)
 KBGSI     =  GRATMICI*CONCBIO
!
! COMPUTE THE INUNDATED GAS (CO2) PRODUCTION RATE FROM THE REACTION RATE
 GRATMICI  = KBGSI*STOIMIC/CONCBIO
!
! CONVERT THE UNITS OF THE HUMID BIODEGRADATION RATE GRATMICH
! GRATMICH  =  GRATMICH(MOLE-C/KG/SEC)
 KBGSH     =  GRATMICH*CONCBIO
!
! NOW CONVERT KBGSH TO THE GAS GENERATION RATE REQUIRED BY PREBRAG
 GRATMICH  = KBGSH*STOIMIC/CONCBIO
!
! COMPUTE RATIO OF HUMID TO INUNDATED (STORE IN HUMID) FOR INPUT TO PREBRAG
 GRATMICH  = GRATMICH/GRATMICI
!APPLY BIOIDX FLAG TO BIO (MICROBIAL)
 GRATMICH  = BIOIDX*GRATMICH
 GRATMICI  = BIOIDX*GRATMICI
 KBGSH     = BIOIDX*KBGSH
 KBGSI     = BIOIDX*KBGSI
 GRATCORH  = GRATCORH/GRATCORI
!*******************************************************************
!BLOCK 19  DRZ_1 Upper DRZ
!*******************************************************************
!***COMMENTS:
!   Time period 2 (0 - 10000 years)
!*******************************************************************
LIMIT BLOCK 19
!
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
PI_DELTA = PI_DELTA[B:3]
PF_DELTA = PF_DELTA[B:3]
IFRX = IFRX[B:3]
```

```
IFRY = IFRY[B:3]
IFRZ = IFRZ[B:3]
KMAXLOG = KMAXLOG[B:3]
POROSITY = POROSITY[B:1] + 0.0029
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_RCK/POROSITY
PHIMAX   = MAKEPROP(0.05)
TEMP     = POROSITY*(EXP(POR_COMP*(PI_DELTA)))
PERM_EXP = LOG((10**KMAXLOG)/PERM_X)/(LOG(PHIMAX/TEMP))
!######################################################################
!BLOCK 20  DRZ_PCS  =  DRZ above CONC_PCS
!
LIMIT BLOCK 20
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
POROSITY = POROSITY[B:1] + 0.0029
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_RCK / POROSITY
RELP_MOD = RELP_MOD[B:19]
!
!BLOCK 21  CONC_PCS  =Concrete monolith of panel closure
LIMIT BLOCK 21
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
PCT_A    = 0
PCT_EXP  = 0
CAP_MOD  = 1
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_RCK / POROSITY
!
!**********************************************************************
!BLOCK 26 = BRINESAL
LIMIT BLOCK 26
COMP    = COMPRES
!
!**********************************************************************
!BLOCK 22  CONC_PLG  = Intrusion borehole concrete plugs
!**********************************************************************
!***COMMENTS: SAMPLED PARAMETER PRMX
!**********************************************************************
LIMIT BLOCK 22
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_RCK/POROSITY
!
!**********************************************************************
!BLOCK 23  BH_OPEN  = Intrusion borehole open section
!**********************************************************************
LIMIT BLOCK 23
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN
```

```
POR_COMP = COMP_RCK/POROSITY
!
!*********************************************************************
!BLOCK 24  BH_SAND  = Intrusion borehole silty sand section
!*********************************************************************
LIMIT BLOCK 24
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_RCK/POROSITY
!
!*********************************************************************
!BLOCK 25  BH_CREEP  = Intrusion borehole silty sand creep closure section
!*********************************************************************
LIMIT BLOCK 25
PERM_X   = 0.1*PERM_X[B:24]
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_RCK/POROSITY
!
!*********************************************************************
!BLOCK 33  UNNAMED MEMBER OF RUSTLER
!*********************************************************************
!***COMMENTS:
!*********************************************************************
LIMIT BLOCK 33
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_RCK/POROSITY
!
!*********************************************************************
!BLOCK 34  TAMARISK MEMBER OF RUSTLER
!*********************************************************************
!***COMMENTS:
!*********************************************************************
LIMIT BLOCK 34
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_RCK/POROSITY
!
!*********************************************************************
!BLOCK 35  FORTY-NINER MEMBER OF THE RUSTLER
!*********************************************************************
!***COMMENTS:
!*********************************************************************
LIMIT BLOCK 35
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_RCK/POROSITY
```

```
!
!######################################################################
!
!**********************************************************************
!BLOCK 36  BOREHOLE  = Intrusion borehole
!**********************************************************************
!***COMMENTS:
! 12 Mar 02 CWH  Change in equation for POR_COMP assign pore
!                compressibility vice bulk compressibility
!**********************************************************************
LIMIT BLOCK 36
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_RCK/POROSITY
!
!*********************************************************************
!BLOCK 37 DRF_PCS  DRIFT PART OF OPTION D PCS
! CWH: Added line to assign value for PORE_DIS
!*********************************************************************
LIMIT BLOCK 37
!HYDROLOGIC PARAMETERS
PERM_X   = 10**PRMX_LOG[B:18]
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN[B:18]
POR_COMP = COMP_RCK[B:18]/POROSITY[B:18]
SAT_RBRN = SAT_RBRN[B:18]
SAT_RGAS = SAT_RGAS[B:18]
PORE_DIS = PORE_DIS[B:18]
!**********************************************************************
! BLOCK 38 REPOSIT:WAS_AREA
!**********************************************************************
LIMIT BLOCK 38
!HYDROLOGIC PARAMETERS
PERM_X   = 10**PRMX_LOG[B:18]
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN[B:18]
POR_COMP = COMP_RCK[B:18]/POROSITY[B:18]
SAT_RBRN = SAT_RBRN[B:18]
SAT_RGAS = SAT_RGAS[B:18]
PORE_DIS = PORE_DIS[B:18]
!*********************************************************************
!
!BLOCK 39  CONC_MON concrete filled shaft
LIMIT BLOCK 39
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
PCT_A    = 0
PCT_EXP  = 0
CAP_MOD  = 1
SAT_RBRN = SAT_RBRN[B:40]
SAT_RGAS = SAT_RGAS[B:40]
SB_MIN   = 1.05*SAT_RBRN
```

```
POR_COMP = COMP_RCK / POROSITY
!
!*********************************************************************
!BLOCK 40 = SHFTU  Shaft upper
!*********************************************************************
LIMIT BLOCK 40
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN
POR_COMP = COMP_POR
PORE_DIS = PORE_DIS[B:21]
PCT_A    = 0
PCT_EXP  = 0
CAP_MOD  = 1
!
!*********************************************************************
!BLOCK 41 = SHFTL_T1  Shaft lower FROM 0 YRS TO 200 YRS
!*********************************************************************
LIMIT BLOCK 41
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN[B:40]
POR_COMP = COMP_POR
SAT_RGAS = SAT_RGAS[B:40]
SAT_RBRN = SAT_RBRN[B:40]
PORE_DIS = PORE_DIS[B:21]
PCT_A    = 0
PCT_EXP  = 0
CAP_MOD  = 1
!
!*********************************************************************
!BLOCK 42 = SHFTL_T2  Shaft lower FROM 200 YRS TO 10,000 YRS
!*********************************************************************
LIMIT BLOCK 42
PERM_X   = 10**PRMX_LOG
PERM_Y   = PERM_X
PERM_Z   = PERM_X
SB_MIN   = 1.05*SAT_RBRN[B:40]
POR_COMP = COMP_POR
SAT_RGAS = SAT_RGAS[B:40]
SAT_RBRN = SAT_RBRN[B:40]
PORE_DIS = PORE_DIS[B:21]
PCT_A    = 0
PCT_EXP  = 0
CAP_MOD  = 1
!
!*********************************************************************
!=====================================================================
!*********************************************************************
!CHAPTER 2.  COMPUTE BRINE PRESSURE INITIAL CONDITIONS
!            ACCOUNTING FOR DIP IN SPECIFIED FORMATIONS
!            (THIS FORMULATION ACCOUNTS FOR COMPRESSIBILITY OF LIQUID)
!*********************************************************************
!=====================================================================
!  1)    P0 IS THE INITIAL FAR FIELD PRESSURE IN SALADO
```

```
!        AND IS USED FOR DEFINING THE PRESSURE IN ALL OTHER BLOCKS
!        IN THE SALADO
!  2)    DEN0 IS THE FLUID DENSITY AT PRESSURE P0
!  3)    XPT AND YPT ARE CENTER COORDINATES OF SHAFT AT LEVEL OF MB139
!        I.E. THE REFERENCE POINT
!  4)    PHIREF IS THE TOTAL POTENTIAL RELATIVE TO XPT AND YPT
!  5)    DENND IS THE DENSITY CALCULATED AT THE GRID CELL CORNERS (NODES)
!  6)    PRESND IS THE LIQUID PRESSURE CALCULATED AT THE GRID CELL CORNERS
!  7)    DENEL IS THE DENSITY AVERAGED FROM THE CELL CORNERS
!  8)    PRESEL IS THE LIQUID PRESSURE AVERAGED FROM THE CELL CORNERS
!
P0     = PRESSURE[B:1]
DEN0   = DNSFLUID[B:26]*EXP(COMPRES[B:26]*(P0 - REF_PRES[B:26]))
PHIREF = (1.0/DNSFLUID[B:26] - 1.0/DEN0)/(GRAVACC[B:32]*COMPRES[B:26])
!
!*********************************************************************
!DEFINE PRESSURES IN SALADO
!*********************************************************************
!STEP 1) CALCULATE PRESSURES AT NODES WITH COORDINATES X AND Y
!STEP 2) CONVERT FROM NODAL VALUES TO CELL VALUES
LIMIT ELEMENTS 1 TO 1406
YPT   = ( Y[N:457] + Y[N:526])/2.0
XPT   = ( X[N:457] + X[N:458])/2.0
DENND   = MAKENODE(-1.0/((GRAVACC[B:32]*COMPRES[B:26])* &
                 (PHIREF - (COS(THETA1)*(Y-YPT) + SIN(THETA1)*(X-XPT)) - &
                  1.0/(GRAVACC[B:32]*DNSFLUID[B:26]*COMPRES[B:26]))))
PRESND   = (1.0/COMPRES[B:26])*LOG(DENND/DNSFLUID[B:26]) + REF_PRES[B:26]
!NOW COMPUTE THE PRESSURE AT THE ELEMENT CENTER
DENEL    = NOD2ELE(DENND)
PRESEL   = NOD2ELE(PRESND)
!*********************************************************************
!DEFINE PRESSURES IN THE CASTILE FORMATION
!ASSUME NO DIP (USING THETA2) BUT USE SAME REFERENCE ELEMENT AS
!SALADO (I.E. (XPT, YPT))
!*********************************************************************
LIMIT ELEMENTS 1506 TO 1618, 2222 TO 2244
!STEP 1) CALCULATE PRESSURES AT NODES WITH COORDINATES X AND Y
!STEP 2) CONVERT FROM NODAL VALUES TO CELL VAULES
!
DENND   = MAKENODE(-1.0/((GRAVACC[B:32]*COMPRES[B:26])* &
                 (PHIREF - (COS(THETA2)*(Y-YPT) + SIN(THETA2)*(X-XPT)) - &
                  1.0/(GRAVACC[B:32]*DNSFLUID[B:26]*COMPRES[B:26]))))
PRESND  = (1.0/COMPRES[B:26])*LOG(DENND/DNSFLUID[B:26]) + REF_PRES[B:26]
!NOW COMPUTE THE PRESSURE AT THE ELEMENT CENTER
DENEL    = NOD2ELE(DENND)
PRESEL   = NOD2ELE(PRESND)
!
!*********************************************************************
!DEFINE PRESSURES IN BRINE POCKET
!*********************************************************************
LIMIT ELEMENTS 2222 TO 2244
DENEL    = DEN0*EXP(COMPRES[B:26]*(PRESSURE[B:11] - REF_PRES[B:26]))
PRESEL   = PRESSURE[B:11]
!*********************************************************************
!DEFINE PRESSURES IN RUSTLER, DEWEY LAKE AND SANTA ROSA FORMATIONS
!*********************************************************************
LIMIT ELEMENTS 1619 TO 2221
```

```
P1 = REF_PRES[B:26]
PHIREF2 = 0.0
!XPT AND YPT ARE CENTER COORDINATES OF A NODE AT THE TOP OF THE WATER TABLE
! IN THE DEWEY LAKE
YPT   = Y[N:2112]
XPT   = ( X[N:2112] + X[N:2113])/2.0
!STEP 1) CALCULATE PRESSURES AT NODES WITH COORDINATES X AND Y
!STEP 2) CONVERT FROM NODAL VALUES TO CELL VAULES
DENND  = MAKENODE(-1.0/((GRAVACC[B:32]*COMPRES[B:26])* &
                (PHIREF2 - (COS(THETA2)*(Y-YPT) + SIN(THETA2)*(X-XPT)) - &
                  1.0/(GRAVACC[B:32]*DNSFLUID[B:26]*COMPRES[B:26]))))
PRESND = (1.0/COMPRES[B:26])*LOG(DENND/DNSFLUID[B:26]) + REF_PRES[B:26]

!NOW COMPUTE THE PRESSURE AT THE ELEMENT CENTER
DENEL    = NOD2ELE(DENND)
PRESEL   = NOD2ELE(PRESND)
!*********************************************************************
! DEFINE THE PRESSURES IN THE CULEBRA
!*********************************************************************
LIMIT ELEMENTS 1820 TO 1886
DENEL    = DEN0*EXP(COMPRES[B:26]*(PRESSURE[B:14] - REF_PRES[B:26]))
PRESEL   = PRESSURE[B:14]
!*********************************************************************
! DEFINE THE PRESSURES IN THE MAGENTA
!*********************************************************************
LIMIT ELEMENTS 1887 TO 1953
DENEL    = DEN0*EXP(COMPRES[B:26]*(PRESSURE[B:15] - REF_PRES[B:26]))
PRESEL   = PRESSURE[B:15]
!*********************************************************************
!DEFINE PRESSURES IN CAVITIES (WASTE AREAS, NORTH END EXCAVATIONS AND SHAFTS)
!*********************************************************************
!CAVITY 1
LIMIT BLOCK 6
DENEL  = DNSFLUID[B:26]*EXP(COMPRES[B:26]*(PRESSURE[B:6] - REF_PRES[B:26]))
PRESEL = PRESSURE[B:6]
!CAVITY 2
LIMIT BLOCK 7
DENEL  = DNSFLUID[B:26]*EXP(COMPRES[B:26]*(PRESSURE[B:7] - REF_PRES[B:26]))
PRESEL = PRESSURE[B:7]
!CAVITY 3
LIMIT BLOCK 8
DENEL  = DNSFLUID[B:26]*EXP(COMPRES[B:26]*(PRESSURE[B:8] - REF_PRES[B:26]))
PRESEL = PRESSURE[B:8]
!CAVITY 4
LIMIT BLOCK 9
DENEL  = DNSFLUID[B:26]*EXP(COMPRES[B:26]*(PRESSURE[B:8] - REF_PRES[B:26]))
PRESEL = PRESSURE[B:9]
! T. Hadgu (3/12/01):
! The density and pressure in BLOCK 37 (Material CPCS_F) are defined in
! the same way as for SALADO:
!
!LIMIT ELEMENTS 1493 TO 1496
!YPT   = ( Y[N:457] + Y[N:526])/2.0
!XPT   = ( X[N:457] + X[N:458])/2.0
!DENND   = MAKENODE(-1.0/((GRAVACC[B:32]*COMPRES[B:26])* &
!                  (PHIREF - (COS(THETA1)*(Y-YPT) + SIN(THETA1)*(X-XPT)) - &
!                  1.0/(GRAVACC[B:32]*DNSFLUID[B:26]*COMPRES[B:26]))))
```

```
!PRESND   = (1.0/COMPRES[B:26])*LOG(DENND/DNSFLUID[B:26]) + REF_PRES[B:26]
!NOW COMPUTE THE PRESSURE AT THE ELEMENT CENTER
!DENEL    = NOD2ELE(DENND)
!PRESEL   = NOD2ELE(PRESND)
!**********************************************************************
LIMIT ELEMENTS 1 TO 2244
! IF PRESSURES ARE NEGATIVE (INDICATING POINTS ABOVE THE WATERTABLE)
! SET THEM TO ATMPA[B:32] = 101325.0
PRESEL   = IFGT0(PRESEL,PRESEL,ATMPA[B:32])
!
!=======================================================================
!**********************************************************************
!CHAPTER 3.COMPUTE THE GRID BLOCK ELEVATIONS ACCOUNTING FOR
!          1 DEGREE DIP IN SALADO.  FIRST DO ALL BLOCKS THEN
!          CORRECT THOSE THAT ARE NOT DIPPING
!          ALSO CALCULATE THE TOTAL POTENTIAL
!**********************************************************************
!=======================================================================
LIMIT ELEMENTS 1 TO 2244
!DEFINE GRID BLOCK ELEVATIONS DUE TO DIP
! (MEASURE WITH RESPECT TO I=23+24,J=6+7,K=1)  SHAFT AT ELEVATION OF MB139
YORIGIN =  (Y[N:457] + Y[N:526])/2.0
XORIGIN =  (X[N:457] + X[N:458])/2.0
ELEVN   = MAKENODE(COS(THETA1)*(Y-YORIGIN) + SIN(THETA1)*(X-XORIGIN))
ELEVE   = NOD2ELE(ELEVN) + YORIGIN
!COMPUTE GRID BLOCK POTENTIAL
POTE    = ELEVE + 1.0/(GRAVACC[B:32]*DNSFLUID[B:26]*COMPRES[B:26]) - &
         1.0/(GRAVACC[B:32]*DENEL*COMPRES[B:26])
!**********************************************************************
!REDO CASTILE REGION (SINCE THETA2 = 0 => WITH NO DIP)
!**********************************************************************
LIMIT ELEMENTS  1506 TO 1618, 2222 TO 2244
ELEVN   = MAKENODE(COS(THETA2)*(Y-YORIGIN) + SIN(THETA2)*(X-XORIGIN))
ELEVE   = NOD2ELE(ELEVN) + YORIGIN
POTE    = ELEVE + 1.0/(GRAVACC[B:32]*DNSFLUID[B:26]*COMPRES[B:26]) - &
         1.0/(GRAVACC[B:32]*DENEL*COMPRES[B:26])
!**********************************************************************
!REDO REGIONS ABOVE SALADO (SINCE THETA2 = 0 => WITH NO DIP)
!**********************************************************************
LIMIT ELEMENTS 1619 TO 2221
ELEVN   = MAKENODE(COS(THETA2)*(Y-YORIGIN) + SIN(THETA2)*(X-XORIGIN))
ELEVE   = NOD2ELE(ELEVN) + YORIGIN
POTE    = ELEVE + 1.0/(GRAVACC[B:32]*DNSFLUID[B:26]*COMPRES[B:26]) - &
         1.0/(GRAVACC[B:32]*DENEL*COMPRES[B:26])
!************************************************************************
DELETE THETA1,THETA2, ELEVN, XORIGIN, YORIGIN, P0,P1, DENEL, PRESND
DELETE XPT,YPT,PHIREF2
EXIT
```

ALGEBRA2 File

```
$ type alg2_bf_cra1.inp
!============================================================================
!
! ALGEBRA file (Post-Brag) for calculating BRAGFLO sensitivity analysis
paramete
rs
```

```
!
! 21 August    2003 - fixed delete errors
! 05 August    2003 - add input parameters to output variable list
!
! 15 July      2003 - Corrected variables for flow in marker beds at land
withdr
awal
!                               boundaries.  Added brine flow down shaft and
acr
oss plane
!                               separating waste from non-waste.
!
! 04 June      2003 - Corrected variables BRNREPTC and BRNREPOC for CRA1
!
!    May       2003 - Made version for CRA1 run.
!
! 18 February  2002 - Made version for 2002 Technical Baseline Migration
!                     (TBM) run.  This involved: (1) replacing CCA BRAGFLO
!                     grid with new TBM grid; (2) removing shaft from model
!                     domain; (3) dividing RoR into two regions--south RoR
!                     and north RoR.
!
! 27 January   2003 - Pre-CRA (AP106) removed LDRZ_F and CPCS_F materials,
added

!                       shaft and revised element numbering
!
!
! Author of February 2002 revisions:    David L. Lord,  SNL Org. 6821
!
!
! 02 June      1997 - made version for C97 runs, for which there is no
!                     difference between undisturbed and disturbed cases as
!                     only one mesh is now used for all cases (unlike CCA
runs)
!                     However, parameter 246 no longer exists, so total
number
!                     of parameters is again 245
!
! 17 February  1997 - corrected comment labels for parameters 059 to 063
!
! 30 January   1997 - added Param number 246, which passes BRAGFLO property
!                     GRIDFLO as parameter BPMAP, and changed name of Param
!                     number 244 from BPCOMPCF to BPCOMP
!
! 02 December  1996 - revised Param number 099 to change its definition from
!                     total net brineflow in marker beds to total net inward
!                     brineflow from marker beds into DRZ (repository) region
!
! 04 September 1996 - 245 variables
!
! Authors:  Joel D. Miller, SNL Org. 9363 --> 6848
!           David A. Mc Arthur, Org. 9363 --> 2221
!
!=============================================================================
!
! Eliminate excess output
```

```
!
DELETE ALL
!
! SECTION 1:Calculate general parameters
!
GRIDVOL = DEL_X * DEL_Y * THICK
!
!***************************************************************************
!***************************************************************************
!
! Remaining inventories of steel and cellulose (kg)
!
!   Param 001: Remaining mass of steel ----------> FE_KG
!   Param 002: Remaining mass of cellulose ------> CELL_KG
!
! Remaining inventories of steel and cellulose (%/100)
!
!   Param 003: Remaining fraction of steel  -----> FE_REM
!   Param 004: Remaining fraction of cellulose --> CELL_REM
!
! Cumulative gas generation in waste disposal regions (moles)
!
!   Param 005: by corrosion ------------> FE_MOLE
!   Param 006: by total microbial ------> CELL_MOL
!   Param 007: Total gas generation ----> GAS_MOLE
!   Param 008: by humid microbial ------> CELL_M_H
!   Param 009: by inundated microbial --> CELL_M_I
!   Param 010: by total microbial ------> C_M_HI_T (= CELL_MOL)
!
! Cumulative gas generation in waste disposal regions (moles/drum)
!
!   Param 011: by corrosion ------------> FE_MOL_D
!   Param 012: by humid microbial ------> CEL_MH_D
!   Param 013: by inundated microbial --> CEL_MI_D
!   Param 014: by total microbial ------> CELMOL_D, C_MHIT_D
!   Param 016: Total gas generation ----> GASMOL_D
!
! Cumulative gas generation in waste disposal regions (m**3)
!
!   Param 017: by corrosion ------------> GAS_FE_V
!   Param 018: by humid microbial ------> GAS_CMH
!   Param 019: by inundated microbial --> GAS_CMI
!   Param 020: by total microbial ------> GAS_C_V, C_MHIT_V
!   Param 022: Total gas generation ----> GAS_VOL
!
!***************************************
!
! Limit calculation to areas with waste (WAS_AREA + REPOSIT)
!
LIMIT ELEMENT 1407 to 1439
!
! Define molecular weights of iron, cellulosics, water and brine (kg/mol)
!
!MW_FE    = 0.055847
!*********************************************
! MW for cellulosics is 0.027023 kg/mol (TBM value)
!   -D.Lord, 7-Mar-2002
```

```
!
MWCELL = MAKEGLOB(MW_CELL[B:32])
MWFE = MAKEGLOB(MW_FE[B:32])
!MW_CELL  = 0.027023
!MW_H2O   = 0.01801534
!MW_BRINE = 0.022653859
!
! Calculate mass inventories (kg) remaining
!
FE_KG     = SUM(GRIDVOL*FECONC)
CELL_KG   = SUM(GRIDVOL*CELLCONC)
!
! Maximum Fe and bio is at time = 0.0
!
MXFE      = ENVMAX(FE_KG)
MXCELL    = ENVMAX(CELL_KG)
!
! Calculate masses consumed and divide by initial amount to get fractions
gone
! Subtract fraction gone from one to get fractions remaining
!
FE_REM   = 1.0 - ((MXFE - FE_KG)/MXFE)
CELL_REM = 1.0 - ((MXCELL - CELL_KG)/MXCELL)
!
! Calculate total moles of gas (H2) generated from corrosion of Fe
!
FE_MOLE  = (MXFE - FE_KG)/MW_FE[B:32]*(4.0-STOICOR[B:18])/3.0
!
! Calculate total moles of gas (H2) generated from biodegradation of
cellulosics
!
CELL_MOL = (MXCELL - CELL_KG)/MW_CELL[B:32]*STOIMIC[B:18]
!
! Total moles of gas generated
!
GAS_MOLE = FE_MOLE + CELL_MOL
!
! Determine humid and inundated biodegradation components
!
!   Inundated rate GRATI (moles/s)
!
SATBR     = 1.0 - SATGAS
SATFAC    = 1.0 - EXP(-1000*SATBR)
LSAT      = SATBR + SAT_WICK[B:18]*(SATFAC)
LSAT      = IFGT0(LSAT-1,1,LSAT)
GRATI     = KBGSI[B:18]*(LSAT)*STOIMIC[B:18]*GRIDVOL
!
!   Humid rate GRATH (moles/s)
!
GSAT      = SATGAS - SAT_WICK[B:18]*SATFAC
GSAT      = IFLT0(GSAT,0.0,GSAT)
GRATH     = KBGSH[B:18]*(GSAT)*STOIMIC[B:18]*GRIDVOL
!
!   Determine the time interval DT by integrating a non-zero function
!
!     This is necessary because the input .cdb file has history variables and
!     associated history time steps, which prevents using DT = TIME-TIME[T:-
```

```
1]
!
!     VAL(I) = (VAL(I-1) + D(VAL)/DT)*DT where VAL is the integral of DENGAS
!     DENGAS is the gas density and is always greater than zero
!
DENGASC  = INTRIGHT(DENGAS)
DT       = (DENGASC - DENGASC[T:-1])/DENGAS
!
!   Calculate kg/m**3 of cellulose consumed as if rate is valid for entire
!     time interval (DT)
!
KGCI     = KBGSI[B:18]*LSAT*MW_CELL[B:32]*DT
KGCH     = KBGSH[B:18]*GSAT*MW_CELL[B:32]*DT
KGTOT    = KGCI + KGCH
!
!   Adjust GRATI and GRATH for step when CELLCONC goes to zero
!   Note:  KGTOT may be equal to zero if KBGSI and KBGSH are both zero
!          so to avoid dividing by zero set DENOM equal to 1, which is
!          acceptable since the coding below will use the true branch
!          for calculating GRATI and GRATIH
!
DENOM    = IFEQ0(KGTOT,1,KGTOT)
SLOPE    = CELLCONC[T:-1]/DENOM
GRATI    = IFGT0(CELLCONC,GRATI,GRATI*SLOPE)
GRATH    = IFGT0(CELLCONC,GRATH,GRATH*SLOPE)
!
!   Sum up humid and inundated over panel elements, add together for total
!
GRATHT   = SUM(GRATH)
GRATIT   = SUM(GRATI)
GRATIH   = GRATIT + GRATHT
!
!   Integrate humid, inundated, and total (note C_M_HI_T should equal
CELL_MOL)
!
CELL_M_H = INTRIGHT(GRATHT)
CELL_M_I = INTRIGHT(GRATIT)
C_M_HI_T = INTRIGHT(GRATIH)
!
! Clean up output--limit to requested quantities, delete temporary variables
!                   that are not used in another calculation later
!
DELETE MXFE, MXCELL
DELETE GRATHT, GRATIT, GRATIH, GRATI, GRATH, SATBR, DT, SATFAC
DELETE LSAT, GSAT, DENGASC, KGCI, KGCH, KGTOT, DENOM, SLOPE
!
!***************************************
!
! Convert to units of moles per drum by dividing by total number of drums
!
FE_MOL_D = FE_MOLE  / DRUMTOT[B:18]
CEL_MH_D = CELL_M_H / DRUMTOT[B:18]
CEL_MI_D = CELL_M_I / DRUMTOT[B:18]
CELMOL_D = CELL_MOL / DRUMTOT[B:18]
C_MHIT_D = C_M_HI_T / DRUMTOT[B:18]
GASMOL_D = GAS_MOLE / DRUMTOT[B:18]
!
```

```
!***************************************
!
! Convert to volumetric units (m**3) using PV=nRT at reference P & T
!
!   T =    300.15 K
!   P = 101325.00 Pa         = 101325 N/(m**2)
!   R = 8.3145    J/(mol*K) = 8.3145 (N*m)/(mol*K)
!   V = n*(R*T/P) m**3      = n moles * 0.024630 (m**3)/mole
!
GAS_FE_V = 0.02463 * FE_MOLE
GAS_CMH  = 0.02463 * CELL_M_H
GAS_CMI  = 0.02463 * CELL_M_I
GAS_C_V  = 0.02463 * CELL_MOL
C_MHIT_V = 0.02463 * C_M_HI_T
GAS_VOL  = 0.02463 * GAS_MOLE
!
!***************************************
!
!****************************************************************************
!****************************************************************************
!
! SECTION 2:Volume-averaged pressure (Pa)
!
!   Param 023: waste panel (block 18) -------------------------> WAS_PRES
!   Param 024: south rest of repository -----------------------> SRR_PRES
!   Param 025: north rest of repository -----------------------> NRR_PRES
!   Param 026: rest of repository (north + south)(block RR) ---> REP_PRES
!   Param 027: operations region (block 12) -------------------> OPS_PRES
!   Param 028: experimental region (block 13) -----------------> EXP_PRES
!   Param 029: all waste regions ------------------------------> W_R_PRES
!   Param 030: Castile brine pocket (block 11) ----------------> B_P_PRES
!   Param 999: non-waste areas (EXP & OPS)---------------------> NWA_PRES
!
!***************************************
!
! WAS_AREA
!
LIMIT ELEMENT 1407 to 1427
!
! Total volume of waste area
!
R18VOL = SUM(GRIDVOL)
!
! Add up brine pressures weighted by element volume
!
R18PRES = SUM(GRIDVOL*PRESBRIN)
!
! Determine average pressure in waste area
!
WAS_PRES = R18PRES/R18VOL
!
!***************************************
!
! SOUTH REST OF REPOSITORY
!
LIMIT ELEMENT 1428 to 1433
SRRVOL   = SUM(GRIDVOL)
```

```
SRRPRES  = SUM(GRIDVOL*PRESBRIN)
SRR_PRES = SRRPRES/SRRVOL
!
!**************************************
!
! NORTH REST OF REPOSITORY
!
LIMIT ELEMENT 1434 to 1439
NRRVOL   = SUM(GRIDVOL)
NRRPRES  = SUM(GRIDVOL*PRESBRIN)
NRR_PRES = NRRPRES/NRRVOL
!
!**************************************
!
! REST OF REPOSITORY (NORTH + SOUTH)
!
LIMIT ELEMENT 1428 to 1439
RRRVOL   = SUM(GRIDVOL)
RRRPRES  = SUM(GRIDVOL*PRESBRIN)
REP_PRES = RRRPRES/RRRVOL
!
!**************************************
!
! OPS_AREA
!
LIMIT ELEMENT 1440 to 1448
R12VOL   = SUM(GRIDVOL)
R12PRES  = SUM(GRIDVOL*PRESBRIN)
OPS_PRES = R12PRES/R12VOL
!
!**************************************
!
! EXP_AREA
!
LIMIT ELEMENT 1449 to 1454
R13VOL   = SUM(GRIDVOL)
R13PRES  = SUM(GRIDVOL*PRESBRIN)
EXP_PRES = R13PRES/R13VOL
!
!**************************************
!
! NON-WASTE AREAS (OPS + EXP)
!
LIMIT ELEMENT 1440 to 1454
RRRVOL   = SUM(GRIDVOL)
NWAPRES  = SUM(GRIDVOL*PRESBRIN)
NWA_PRES = NWAPRES/RRRVOL
!
!**************************************!
!
! Average brine pressure in waste area and rest of repository
!
W_R_PRES = (R18PRES + RRRPRES)/(R18VOL + RRRVOL)
!
!**************************************
!
! Brine pocket
```

```
!
LIMIT ELEMENT 2222 TO 2244
R11VOL   = SUM(GRIDVOL)
R11PRES  = SUM(GRIDVOL*PRESBRIN)
B_P_PRES = R11PRES/R11VOL
!
!***************************************
!
! Clean up output--limit to requested quantities (regional volumes used
below)
!
DELETE R18PRES, RRRPRES, R12PRES, R13PRES, R11PRES, SRRPRES, NRRPRES, NWAPRES
!
!**************************************************************************
!**************************************************************************
!
! Param 031: Total pore volume in repository (m**3) --> PORVOL_T
!
!***************************************
!
! WAS_AREA + REPOSIT
!
LIMIT ELEMENT 1407 to 1439
!
! Pore volume = porosity (m**3 void/m**3 rock) * volume
!
PORVOL_T = SUM(POROS*GRIDVOL)
!
!**************************************************************************
!**************************************************************************
!
! SECTION 3: Brine volume in repository (m**3)
!
!   Param 031: waste panel (block 18) -------------------------> BRNVOL_W
!   Param 032: south rest of repository -----------------------> BRNVOL_S
!   Param 033: north rest of repository -----------------------> BRNVOL_N
!   Param 034: rest of repository (north + south)(block RR) ---> BRNVOL_R
!   Param 035: all waste areas --------------------------------> BRNVOL_T
!   Param 036: operations area (block 12) ---------------------> BRNVOL_O
!   Param 037: experimental area (block 13) -------------------> BRNVOL_E
!   Param 038: all excavated areas ----------------------------> BRNVOL_A
!
!***************************************
!
! WAS_AREA
!
LIMIT ELEMENT 1407 to 1427
!
! Brine volume     = porosity * volume * brine saturation
! Brine saturation = 1.0 - SATGAS
!
BRNVOL_W = SUM(POROS*GRIDVOL*(1.0-SATGAS))
!
!***************************************
!
! SOUTH REST OF REPOSITORY
!
```

```
LIMIT ELEMENT 1428 to 1433
!
BRNVOL_S = SUM(POROS*GRIDVOL*(1.0-SATGAS))
!
!***************************************
!
! NORTH REST OF REPOSITORY
!
LIMIT ELEMENT 1434 to 1439
!
BRNVOL_N = SUM(POROS*GRIDVOL*(1.0-SATGAS))
!
!***************************************
!
! REST OF REPOSITORY (NORTH + SOUTH)
!
LIMIT ELEMENT 1428 to 1439
!
BRNVOL_R = SUM(POROS*GRIDVOL*(1.0-SATGAS))
!
!***************************************
!
! WAS_AREA + REPOSIT
!
BRNVOL_T = BRNVOL_W + BRNVOL_R
!
!***************************************
!
! OPS_AREA
!
LIMIT ELEMENT 1440 to 1448
!
BRNVOL_O = SUM(POROS*GRIDVOL*(1.0-SATGAS))
!
!***************************************
!
! EXP_AREA
!
LIMIT ELEMENT 1449 to 1454
!
BRNVOL_E = SUM(POROS*GRIDVOL*(1.0-SATGAS))
!
!***************************************
!
! All repository regions
!
BRNVOL_A = BRNVOL_T + BRNVOL_O + BRNVOL_E
!
!****************************************************************************
!****************************************************************************
!
! SECTION 4: Volume-averaged gas saturation (dimensionless)
!
!   Param 039: waste panel (block 18) -------------------------> WAS_SATG
!   Param 040: south rest of repository -----------------------> SRR_SATG
!   Param 041: north rest of repository -----------------------> NRR_SATG
!   Param 042: rest of repository (north + south) -------------> REP_SATG
```

```
!   Param 043: operation region (block 12) --------------------> OPS_SATG
!   Param 044: experimental region (block 13) -----------------> EXP_SATG
!   Param 045: non-waste (OPS & EXP) --------------------------> NWA_SATG
!   Param 046: all waste regions ------------------------------> W_R_SATG
!   Param 047:  Castile brine pocket (block 11) --------------> B_P_SATG
!
!***************************************
!
! WAS_AREA
!
LIMIT ELEMENT 1407 to 1427
!
! Add up gas saturation weighted by element volume
!
R18SATG = SUM(GRIDVOL*SATGAS)
!
! Determine average gas saturation in waste area
!
WAS_SATG = R18SATG/R18VOL
!
!***************************************
!
! SOUTH REST OF REPOSITORY
!
LIMIT ELEMENT 1428 to 1433
SRRSATG  = SUM(GRIDVOL*SATGAS)
SRR_SATG = SRRSATG/SRRVOL
!
!***************************************
!
! NORTH REST OF REPOSITORY
!
LIMIT ELEMENT 1434 to 1439
NRRSATG  = SUM(GRIDVOL*SATGAS)
NRR_SATG = NRRSATG/NRRVOL
!
!***************************************
!
! REST OF REPOSITORY (NORTH + SOUTH)
!
LIMIT ELEMENT 1428 to 1439
RRRSATG  = SUM(GRIDVOL*SATGAS)
REP_SATG = RRRSATG/RRRVOL
!
!***************************************
!
! OPS_AREA
!
LIMIT ELEMENT 1440 to 1448
R12SATG  = SUM(GRIDVOL*SATGAS)
OPS_SATG = R12SATG/R12VOL
!
!***************************************
!
! EXP_AREA
!
LIMIT ELEMENT 1449 to 1454
```

```
R13SATG  = SUM(GRIDVOL*SATGAS)
EXP_SATG = R13SATG/R13VOL
!
!***************************************
!
! Average gas saturation in non_waste areas (EXP & OPS)
!
NWA_SATG = (R12SATG + R13SATG)/(R12VOL + R13VOL)
!
!***************************************
!
! Average gas saturation in waste area and rest of repository
!
W_R_SATG = (R18SATG + RRRSATG)/(R18VOL + RRRVOL)
!
!***************************************
!
! Brine pocket
!
LIMIT ELEMENT 2222 TO 2244
R11SATG  = SUM(GRIDVOL*SATGAS)
B_P_SATG = R11SATG/R11VOL
!
!***************************************
!
! Clean up output--limit to requested quantities
!                  (R18VOL, etc. used for parameters 187-192 below)
!
DELETE R18SATG, RRRSATG, R12SATG, R13SATG, R11SATG
DELETE R11VOL, SRRSATG, NRRSATG
!
!****************************************************************************
!****************************************************************************
!
! SECTION 5: Volume-averaged brine saturation (dimensionless)
!
!   Param 048: waste panel (block 18) -------------------------> WAS_SATB
!   Param 049: south rest of repository -----------------------> SRR_SATB
!   Param 050: north rest of repository -----------------------> NRR_SATB
!   Param 051: rest of repository (block RR) ------------------> REP_SATB
!   Param 052: operations region (block 12) -------------------> OPS_SATB
!   Param 053: experimental region (block 13) -----------------> EXP_SATB
!   Param 054: all waste regions ------------------------------> W_R_SATB
!   Param 055: all NON-waste regions (OPS & EXP) --------------> NWA_SATB
!   Param 056: Castile brine pocket (block 11) ---------------> B_P_SATB
!
!***************************************
!
! WAS_AREA
!
WAS_SATB = 1.0 - WAS_SATG
!
!***************************************
!
! SOUTH REST OF REPOSITORY
!
SRR_SATB = 1.0 - SRR_SATG
```

```
!
!***************************************
!
! NORTH REST OF REPOSITORY
!
NRR_SATB = 1.0 - NRR_SATG
!
!***************************************
!
! REPOSIT
!
REP_SATB = 1.0 - REP_SATG
!
!***************************************
!
! OPS_AREA
!
OPS_SATB = 1.0 - OPS_SATG
!
!***************************************
!
! EXP_AREA
!
EXP_SATB = 1.0 - EXP_SATG
!
!***************************************
!
! Average brine saturation in NON-waste area (EXP & OPS)
!
NWA_SATB = 1.0 - NWA_SATG
!
!***************************************
!
! Average brine saturation in waste area and rest of repository
!
W_R_SATB = 1.0 - W_R_SATG
!
!***************************************
!
! Brine pocket
!
B_P_SATB = 1.0 - B_P_SATG
!
!***************************************
!
!****************************************************************************
!****************************************************************************
!
! SECTION 6: Volume-averaged porosity (m**3 void/m**3 rock)
!
!   Param 057: waste panel (block 18) -------------------------> WAS_POR
!   Param 058: south rest of repository -----------------------> SRR_POR
!   Param 059: north rest of repository -----------------------> NRR_POR
!   Param 060: rest of repository (north + south) -------------> REP_POR
!   Param 061: operations region (block 12) -------------------> OPS_POR
!   Param 062: experimental region (block 13) -----------------> EXP_POR
!   Param 063: all waste regions ------------------------------> W_R_POR
```

```
!   Param 064: all NON-waste regions (EXP & OPS)---------------> NWA_POR
!
!**************************************
!
! WAS_AREA
!
LIMIT ELEMENT 1407 to 1427
!
WAS_POR = SUM(GRIDVOL*POROS)/SUM(GRIDVOL)
!
!***************************************
!
! SOUTH REST OF REPOSITORY
!
LIMIT ELEMENT 1428 to 1433
!
SRR_POR = SUM(GRIDVOL*POROS)/SUM(GRIDVOL)
!
!***************************************
!
! NORTH REST OF REPOSITORY
!
LIMIT ELEMENT 1434 to 1439
!
NRR_POR = SUM(GRIDVOL*POROS)/SUM(GRIDVOL)

!**************************************
!
! REST OF REPOSITORY (NORTH + SOUTH)
!
LIMIT ELEMENT 1428 to 1439
!
REP_POR = SUM(GRIDVOL*POROS)/SUM(GRIDVOL)
!
!**************************************
!
! OPS_AREA
!
LIMIT ELEMENT 1440 to 1448
!
OPS_POR = SUM(GRIDVOL*POROS)/SUM(GRIDVOL)
!
!**************************************
!
! EXP_AREA
!
LIMIT ELEMENT 1449 to 1454
!
EXP_POR = SUM(GRIDVOL*POROS)/SUM(GRIDVOL)
!
!**************************************
!
! Average porosity in waste area and rest of repository
!
LIMIT ELEMENT 1440 to 1454
!
NWA_POR = SUM(GRIDVOL*POROS)/SUM(GRIDVOL)
```

```
!
!*************************************
!
! Average porosity in waste area and rest of repository
!
LIMIT ELEMENT 1407 to 1439
!
W_R_POR = SUM(GRIDVOL*POROS)/SUM(GRIDVOL)
!
!*************************************
!
!*************************************************************************
!*************************************************************************
!
! Param 063: Brine consumed (m**3) --> BRN_RMV
!
LIMIT ELEMENT OFF
!
!   Add up consumption rates (resulting units are kg/s)
!
BRN_CR = SUM(BRINRATE*GRIDVOL)
!
!   Integrate result to get kg of brine consumed
!
BRN_CON = INTRIGHT(BRN_CR)
!
!   Convert to volumetric amount (m**3) by
!      dividing by brine density (kg/m**3) at reference conditions
!
BRN_RMV = -1.0*BRN_CON/1220.0
!
!   Delete temporary variables
!
DELETE BRN_CR, BRN_CON
!
!**********************************************
!
!*************************************************************************
!*************************************************************************
!
! SECTION 7: Cumulative brineflow (m**3)
!
!   Param 065: Total brineflow into repository ------------> BRNREPTC
!   Param 066: Total brineflow into all excavated areas ---> BRNEXIC
!   Param 067: Total brineflow into waste panel -----------> BRNWPIC
!   Param 068: Total brineflow southward to the Waste Panel
!                               across plane of PC-----------------> BNWPSFLW
!   Param 069: Total brineflow into south RoR -------------> BRNSRRIC
!   Param 070: Total brineflow into north RoR -------------> BRNNRRIC
!   Param 071: Total brineflow southward to the RoR
!                               across plane of PC-----------------> BNRRSFLW
!   Param 072: Total brineflow into rest of repository ----> BRNRRIC
!   Param 073: Total brineflow into operations region -----> BRNORIC
!   Param 074: Total brineflow into experimental area -----> BRNEAIC
!   Param 075: Total brineflow out of repository ----------> BRNREPOC
!   Param 076: Total brineflow out all excavated areas ----> BRNEXOC
!   Param 077: Net brineflow into repository --------------> BRNREPNC
```

```
!   Param 078: Total brineflow out of waste panel ---------> BRNWPOC
!   Param 079: Total brineflow northward from the
!                               Waste Panel across plane of PC ----> BNWPNFLW
!   Param 080: Net brineflow into waste panel -------------> BRNWPNC
!   Param 081: Total brineflow out of south RoR -----------> BRNSRROC
!   Param 082: Total brineflow out of north RoR -----------> BRNNRROC
!   Param 083: Total brineflow northward from the
!                               RoR across plane of PC ------------> BNRRNFLW
!   Param 084: Net brineflow into north RoR ---------------> BRNNRRNC
!   Param 085: Total brineflow out of rest of repository --> BRNRROC
!   Param 086: Net brineflow into all excavated areas------> BRNEXNC
!   Param 087: Net brineflow into rest of repository ------> BRNRRNC
!   Param 088: Total brineflow out of operations region ---> BRNOROC
!   Param 089: Net brineflow into operations regions ------> BRNORNC
!   Param 090: Total brineflow out of experimental area ---> BRNEAOC
!   Param 091: Net brineflow into experimental area -------> BRNEANC
!   Param 092: Brineflow up borehole (@element 1410) -----> BRNBHUPP
!   Param 093: Brineflow up borehole (@element 1168) -----> BRNBHUPC
!   Param 094: Brineflow up borehole (@element 1845) --Z---> BRNBHRCC
!   Param 095: Brineflow up borehole (@element 1979) -----> BRNBHRUC
!   Param 096: Brineflow up borehole (@element 2155) -----> BRNBHRSC
!   Param 097: Brineflow up borehole (@element 1111) -----> BNBHLDRZ
!   Param 098: Brineflow up borehole (@element 1364) -----> BNBHUDRZ
!   Param 099: Brineflow DOWN borehole (@element 1410) ---> BRNBHDPP
!   Param 100: Brineflow DOWN borehole (@element 1168) ---> BRNBHDPC
!   Param 101: Brineflow DOWN borehole (@element 1364) ---> BNBHDDRZ
!   Param 102: Brineflow DOWN borehole (@element 1845) ---> BNBHDRCC
!   Param 103: Brineflow up shaft (@element 1496 Santa Rosa) --------->
BRNSHRSC
!   Param 104: Brineflow up shaft (@element 1493 49er/Dewey Lake) ---->
BRNSHRUC
!   Param 105: Brineflow up shaft (@element 1489 unamed/Culebra) ----->
BRNSHRCC
!   Param 106: Brineflow up shaft (@element 1381 U_DRZ/Upper 138) ---->
BNSHUDRZ
!   Param 107: Brineflow up shaft (@element 1315 Anhy AB/CONC_MON) --->
BRNSHABC
!   Param 108: Brineflow down shaft (@element 1496 Santa Rosa) --------->
BNSHDS
CZ
!   Param 109: Brineflow down shaft (@element 1493 49er/Dewey Lake) ---->
BNSHDR
UZ
!   Param 110: Brineflow down shaft (@element 1489 unamed/Culebra) ----->
BNSHDR
CC
!   Param 111: Brineflow down shaft (@element 1381 U_DRZ/Upper 138) ---->
BNSHDD
RZ
!   Param 112: Brineflow down shaft (@element 1315 Anhy AB/CONC_MON) --->
BNSHDA
BC
!
!***************************************
!
! Total cumulative brineflow into repository
!
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!       Commments by D.Lord, 02-14-2002:
!     The "repository" in the CCA calculation for total
!     brineflow was defined as the waste_panel+panel_seal+RoR.
!     Upon consulting with Teklu Hadgu and James Garner, I decided
!     to redefine the repository for the TBM calculation as
!     (waste_panel+panel_seal_1+south RoR+panel_seal_2+north_RoR).
!
!
!   Accumulate x-direction inward flows from left side of repository
!
BRNREPIX =            IFGT0(FLOWBRX[E:1407],FLOWBRX[E:1407],0.0)
BRNREPIX = BRNREPIX + IFGT0(FLOWBRX[E:1414],FLOWBRX[E:1414],0.0)
BRNREPIX = BRNREPIX + IFGT0(FLOWBRX[E:1421],FLOWBRX[E:1421],0.0)
!
!   Add x-direction inward flow contributions from right side
!
BRNREPIX = BRNREPIX + IFLT0(FLOWBRX[E:1461],-1.0*FLOWBRX[E:1461],0.0)
BRNREPIX = BRNREPIX + IFLT0(FLOWBRX[E:1462],-1.0*FLOWBRX[E:1462],0.0)
BRNREPIX = BRNREPIX + IFLT0(FLOWBRX[E:1463],-1.0*FLOWBRX[E:1463],0.0)
!
!   Accumulate y-direction inward flows from bottom of repository
!
BRNREPIY =            IFGT0(FLOWBRY[E:1407],FLOWBRY[E:1407],0.0)
BRNREPIY = BRNREPIY + IFGT0(FLOWBRY[E:1408],FLOWBRY[E:1408],0.0)
BRNREPIY = BRNREPIY + IFGT0(FLOWBRY[E:1409],FLOWBRY[E:1409],0.0)
BRNREPIY = BRNREPIY + IFGT0(FLOWBRY[E:1410],FLOWBRY[E:1410],0.0)
BRNREPIY = BRNREPIY + IFGT0(FLOWBRY[E:1411],FLOWBRY[E:1411],0.0)
BRNREPIY = BRNREPIY + IFGT0(FLOWBRY[E:1412],FLOWBRY[E:1412],0.0)
BRNREPIY = BRNREPIY + IFGT0(FLOWBRY[E:1413],FLOWBRY[E:1413],0.0)
BRNREPIY = BRNREPIY + IFGT0(FLOWBRY[E:1455],FLOWBRY[E:1455],0.0)
BRNREPIY = BRNREPIY + IFGT0(FLOWBRY[E:1466],FLOWBRY[E:1466],0.0)
BRNREPIY = BRNREPIY + IFGT0(FLOWBRY[E:1428],FLOWBRY[E:1428],0.0)
BRNREPIY = BRNREPIY + IFGT0(FLOWBRY[E:1429],FLOWBRY[E:1429],0.0)
BRNREPIY = BRNREPIY + IFGT0(FLOWBRY[E:1458],FLOWBRY[E:1458],0.0)
BRNREPIY = BRNREPIY + IFGT0(FLOWBRY[E:1472],FLOWBRY[E:1472],0.0)
BRNREPIY = BRNREPIY + IFGT0(FLOWBRY[E:1434],FLOWBRY[E:1434],0.0)
BRNREPIY = BRNREPIY + IFGT0(FLOWBRY[E:1435],FLOWBRY[E:1435],0.0)
!
!   Add Y-direction inward flow contributions from top side
!
BRNREPIY = BRNREPIY + IFLT0(FLOWBRY[E:1165],-1.0*FLOWBRY[E:1165],0.0)
BRNREPIY = BRNREPIY + IFLT0(FLOWBRY[E:1166],-1.0*FLOWBRY[E:1166],0.0)
BRNREPIY = BRNREPIY + IFLT0(FLOWBRY[E:1167],-1.0*FLOWBRY[E:1167],0.0)
BRNREPIY = BRNREPIY + IFLT0(FLOWBRY[E:1168],-1.0*FLOWBRY[E:1168],0.0)
BRNREPIY = BRNREPIY + IFLT0(FLOWBRY[E:1169],-1.0*FLOWBRY[E:1169],0.0)
BRNREPIY = BRNREPIY + IFLT0(FLOWBRY[E:1170],-1.0*FLOWBRY[E:1170],0.0)
BRNREPIY = BRNREPIY + IFLT0(FLOWBRY[E:1171],-1.0*FLOWBRY[E:1171],0.0)
BRNREPIY = BRNREPIY + IFLT0(FLOWBRY[E:1172],-1.0*FLOWBRY[E:1172],0.0)
BRNREPIY = BRNREPIY + IFLT0(FLOWBRY[E:1469],-1.0*FLOWBRY[E:1469],0.0)
BRNREPIY = BRNREPIY + IFLT0(FLOWBRY[E:1197],-1.0*FLOWBRY[E:1197],0.0)
BRNREPIY = BRNREPIY + IFLT0(FLOWBRY[E:1198],-1.0*FLOWBRY[E:1198],0.0)
BRNREPIY = BRNREPIY + IFLT0(FLOWBRY[E:1199],-1.0*FLOWBRY[E:1199],0.0)
BRNREPIY = BRNREPIY + IFLT0(FLOWBRY[E:1475],-1.0*FLOWBRY[E:1475],0.0)
BRNREPIY = BRNREPIY + IFLT0(FLOWBRY[E:1209],-1.0*FLOWBRY[E:1209],0.0)
BRNREPIY = BRNREPIY + IFLT0(FLOWBRY[E:1210],-1.0*FLOWBRY[E:1210],0.0)
!
!   Sum x- and y-direction inward flows, then integrate over time
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!
BRNREPT  = BRNREPIX + BRNREPIY
BRNREPTC = INTRIGHT(BRNREPT)
!
!   Delete flow rate temporary variables
!
DELETE BRNREPT, BRNREPIX, BRNREPIY
!
!**************************************
!   Accumulate x-direction inward flows from left side of repository
!
BRNEXIX =            IFGT0(FLOWBRX[E:1407],FLOWBRX[E:1407],0.0)
BRNEXIX = BRNEXIX + IFGT0(FLOWBRX[E:1414],FLOWBRX[E:1414],0.0)
BRNEXIX = BRNEXIX + IFGT0(FLOWBRX[E:1421],FLOWBRX[E:1421],0.0)
!
!   Add x-direction inward flow contributions from right side
!
BRNEXIX   = BRNEXIX + IFLT0(FLOWBRX[E:451],-1.0*FLOWBRX[E:451],0.0)
BRNEXIX   = BRNEXIX + IFLT0(FLOWBRX[E:474],-1.0*FLOWBRX[E:474],0.0)
BRNEXIX   = BRNEXIX + IFLT0(FLOWBRX[E:497],-1.0*FLOWBRX[E:497],0.0)
!
!   Accumulate y-direction inward flows from bottom of EXository
!
BRNEXIY =            IFGT0(FLOWBRY[E:1407],FLOWBRY[E:1407],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1408],FLOWBRY[E:1408],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1409],FLOWBRY[E:1409],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1410],FLOWBRY[E:1410],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1411],FLOWBRY[E:1411],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1412],FLOWBRY[E:1412],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1413],FLOWBRY[E:1413],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1455],FLOWBRY[E:1455],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1466],FLOWBRY[E:1466],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1428],FLOWBRY[E:1428],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1429],FLOWBRY[E:1429],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1458],FLOWBRY[E:1458],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1472],FLOWBRY[E:1472],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1434],FLOWBRY[E:1434],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1435],FLOWBRY[E:1435],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1461],FLOWBRY[E:1461],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1478],FLOWBRY[E:1478],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1440],FLOWBRY[E:1440],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1441],FLOWBRY[E:1441],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1442],FLOWBRY[E:1442],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1484],FLOWBRY[E:1484],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1449],FLOWBRY[E:1449],0.0)
BRNEXIY = BRNEXIY + IFGT0(FLOWBRY[E:1450],FLOWBRY[E:1450],0.0)
!
!   Add Y-direction inward flow contributions from top side
!
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1165],-1.0*FLOWBRY[E:1165],0.0)
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1166],-1.0*FLOWBRY[E:1166],0.0)
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1167],-1.0*FLOWBRY[E:1167],0.0)
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1168],-1.0*FLOWBRY[E:1168],0.0)
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1169],-1.0*FLOWBRY[E:1169],0.0)
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1170],-1.0*FLOWBRY[E:1170],0.0)
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1171],-1.0*FLOWBRY[E:1171],0.0)
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1172],-1.0*FLOWBRY[E:1172],0.0)
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BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1469],-1.0*FLOWBRY[E:1469],0.0)
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1197],-1.0*FLOWBRY[E:1197],0.0)
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1198],-1.0*FLOWBRY[E:1198],0.0)
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1199],-1.0*FLOWBRY[E:1199],0.0)
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1475],-1.0*FLOWBRY[E:1475],0.0)
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1209],-1.0*FLOWBRY[E:1209],0.0)
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1210],-1.0*FLOWBRY[E:1210],0.0)
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1211],-1.0*FLOWBRY[E:1211],0.0)
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1481],-1.0*FLOWBRY[E:1481],0.0)
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1221],-1.0*FLOWBRY[E:1221],0.0)
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1222],-1.0*FLOWBRY[E:1222],0.0)
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1223],-1.0*FLOWBRY[E:1223],0.0)
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1487],-1.0*FLOWBRY[E:1487],0.0)
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1233],-1.0*FLOWBRY[E:1233],0.0)
BRNEXIY = BRNEXIY + IFLT0(FLOWBRY[E:1234],-1.0*FLOWBRY[E:1234],0.0)
!
!   Sum x- and y-direction inward flows, then integrate over time
!
BRNEXI  = BRNEXIX + BRNEXIY
BRNEXIC = INTRIGHT(BRNEXI)
!
!   Delete flow rate temporary variables
!
DELETE BRNEXI, BRNEXIX, BRNEXIY
!
!**************************************
!
! Total cumulative brine flow into waste panel
!
!   Left side
!
BRNWPI   =          IFGT0(FLOWBRX[E:1407],FLOWBRX[E:1407],0.0)
BRNWPI   = BRNWPI + IFGT0(FLOWBRX[E:1414],FLOWBRX[E:1414],0.0)
BRNWPI   = BRNWPI + IFGT0(FLOWBRX[E:1421],FLOWBRX[E:1421],0.0)
!
!   Right side
!
BRNWPI   = BRNWPI + IFLT0(FLOWBRX[E:1455],-1.0*FLOWBRX[E:1455],0.0)
BRNWPI   = BRNWPI + IFLT0(FLOWBRX[E:1456],-1.0*FLOWBRX[E:1456],0.0)
BRNWPI   = BRNWPI + IFLT0(FLOWBRX[E:1457],-1.0*FLOWBRX[E:1457],0.0)
!
!   Bottom
!
BRNWPI   = BRNWPI + IFGT0(FLOWBRY[E:1407],FLOWBRY[E:1407],0.0)
BRNWPI   = BRNWPI + IFGT0(FLOWBRY[E:1408],FLOWBRY[E:1408],0.0)
BRNWPI   = BRNWPI + IFGT0(FLOWBRY[E:1409],FLOWBRY[E:1409],0.0)
BRNWPI   = BRNWPI + IFGT0(FLOWBRY[E:1410],FLOWBRY[E:1410],0.0)
BRNWPI   = BRNWPI + IFGT0(FLOWBRY[E:1411],FLOWBRY[E:1411],0.0)
BRNWPI   = BRNWPI + IFGT0(FLOWBRY[E:1412],FLOWBRY[E:1412],0.0)
BRNWPI   = BRNWPI + IFGT0(FLOWBRY[E:1413],FLOWBRY[E:1413],0.0)
!
!   Top
!
BRNWPI   = BRNWPI + IFLT0(FLOWBRY[E:1165],-1.0*FLOWBRY[E:1165],0.0)
BRNWPI   = BRNWPI + IFLT0(FLOWBRY[E:1166],-1.0*FLOWBRY[E:1166],0.0)
BRNWPI   = BRNWPI + IFLT0(FLOWBRY[E:1167],-1.0*FLOWBRY[E:1167],0.0)
BRNWPI   = BRNWPI + IFLT0(FLOWBRY[E:1168],-1.0*FLOWBRY[E:1168],0.0)
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BRNWPI   = BRNWPI + IFLT0(FLOWBRY[E:1169],-1.0*FLOWBRY[E:1169],0.0)
BRNWPI   = BRNWPI + IFLT0(FLOWBRY[E:1170],-1.0*FLOWBRY[E:1170],0.0)
BRNWPI   = BRNWPI + IFLT0(FLOWBRY[E:1171],-1.0*FLOWBRY[E:1171],0.0)
!
!   Integrate for cumulative, delete flow rate
!
BRNWPIC  = INTRIGHT(BRNWPI)
DELETE BRNWPI
!
!**************************************************
!
! Total cumulative brineflow into south rest of respository
!
!   Left side
!
BRNSRRI   =           IFGT0(FLOWBRX[E:1428],FLOWBRX[E:1428],0.0)
BRNSRRI   = BRNSRRI + IFGT0(FLOWBRX[E:1430],FLOWBRX[E:1430],0.0)
BRNSRRI   = BRNSRRI + IFGT0(FLOWBRX[E:1432],FLOWBRX[E:1432],0.0)
!
!   Right side
!
BRNSRRI   = BRNSRRI + IFLT0(FLOWBRX[E:1458],-1.0*FLOWBRX[E:1458],0.0)
BRNSRRI   = BRNSRRI + IFLT0(FLOWBRX[E:1459],-1.0*FLOWBRX[E:1459],0.0)
BRNSRRI   = BRNSRRI + IFLT0(FLOWBRX[E:1460],-1.0*FLOWBRX[E:1460],0.0)
!
!   Bottom
!
BRNSRRI   = BRNSRRI + IFGT0(FLOWBRY[E:1428],FLOWBRY[E:1428],0.0)
BRNSRRI   = BRNSRRI + IFGT0(FLOWBRY[E:1429],FLOWBRY[E:1429],0.0)
!
!       Top
!
BRNSRRI   = BRNSRRI + IFLT0(FLOWBRY[E:1197],-1.0*FLOWBRY[E:1197],0.0)
BRNSRRI   = BRNSRRI + IFLT0(FLOWBRY[E:1198],-1.0*FLOWBRY[E:1198],0.0)
!
!       Integrate for cumulative flow into south rest of repository
!
BRNSRRIC   = INTRIGHT(BRNSRRI)
DELETE BRNSRRI
!
!**************************************************
!
! Total cumulative brineflow into north rest of respository
!
!   Left side
!
BRNNRRI   =           IFGT0(FLOWBRX[E:1434],FLOWBRX[E:1434],0.0)
BRNNRRI   = BRNNRRI + IFGT0(FLOWBRX[E:1436],FLOWBRX[E:1436],0.0)
BRNNRRI   = BRNNRRI + IFGT0(FLOWBRX[E:1438],FLOWBRX[E:1438],0.0)
!
!   Right side
!
BRNNRRI   = BRNNRRI + IFLT0(FLOWBRX[E:1461],-1.0*FLOWBRX[E:1461],0.0)
BRNNRRI   = BRNNRRI + IFLT0(FLOWBRX[E:1462],-1.0*FLOWBRX[E:1462],0.0)
BRNNRRI   = BRNNRRI + IFLT0(FLOWBRX[E:1463],-1.0*FLOWBRX[E:1463],0.0)
!
!   Bottom
```

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!
BRNNRRI   = BRNNRRI + IFGT0(FLOWBRY[E:1434],FLOWBRY[E:1434],0.0)
BRNNRRI   = BRNNRRI + IFGT0(FLOWBRY[E:1435],FLOWBRY[E:1435],0.0)
!
!       Top
!
BRNNRRI   = BRNNRRI + IFLT0(FLOWBRY[E:1209],-1.0*FLOWBRY[E:1209],0.0)
BRNNRRI   = BRNNRRI + IFLT0(FLOWBRY[E:1210],-1.0*FLOWBRY[E:1210],0.0)
!
!       Integrate for cumulative flow into north rest of repository
!
BRNNRRIC   = INTRIGHT(BRNNRRI)
DELETE BRNNRRI
!
!********************************************************
!
!       Total cumulative brineflow into RoR (north + south)
!
BRNRRIC  = BRNSRRIC + BRNNRRIC
!
!**************************************
!
! Total cumulative brine flow into operations region
!
!   Left side
!
BRNORI   =          IFGT0(FLOWBRX[E:1440],FLOWBRX[E:1440],0.0)
BRNORI   = BRNORI + IFGT0(FLOWBRX[E:1443],FLOWBRX[E:1443],0.0)
BRNORI   = BRNORI + IFGT0(FLOWBRX[E:1446],FLOWBRX[E:1446],0.0)
!
!   Right side
!cc
BRNORI   = BRNORI + IFLT0(FLOWBRX[E:1484],-1.0*FLOWBRX[E:1484],0.0)
BRNORI   = BRNORI + IFLT0(FLOWBRX[E:1485],-1.0*FLOWBRX[E:1485],0.0)
BRNORI   = BRNORI + IFLT0(FLOWBRX[E:1486],-1.0*FLOWBRX[E:1486],0.0)
!
!   Bottom
!
BRNORI   = BRNORI + IFGT0(FLOWBRY[E:1440],FLOWBRY[E:1440],0.0)
BRNORI   = BRNORI + IFGT0(FLOWBRY[E:1441],FLOWBRY[E:1441],0.0)
BRNORI   = BRNORI + IFGT0(FLOWBRY[E:1442],FLOWBRY[E:1442],0.0)
!
!   Top
!
BRNORI   = BRNORI + IFLT0(FLOWBRY[E:1221],-1.0*FLOWBRY[E:1221],0.0)
BRNORI   = BRNORI + IFLT0(FLOWBRY[E:1222],-1.0*FLOWBRY[E:1222],0.0)
BRNORI   = BRNORI + IFLT0(FLOWBRY[E:1223],-1.0*FLOWBRY[E:1223],0.0)
!
!   Integrate for cumulative, delete flow rate
!
BRNORIC  = INTRIGHT(BRNORI)
DELETE BRNORI
!
!**************************************
!
! Total cumulative brine flow into experimental area
!
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```
!   Left side
!cc
BRNEAI   =           IFGT0(FLOWBRX[E:1449],FLOWBRX[E:1449],0.0)
BRNEAI   = BRNEAI + IFGT0(FLOWBRX[E:1451],FLOWBRX[E:1451],0.0)
BRNEAI   = BRNEAI + IFGT0(FLOWBRX[E:1453],FLOWBRX[E:1453],0.0)
!
!   Right side
!
BRNEAI   = BRNEAI + IFLT0(FLOWBRX[E:451],-1.0*FLOWBRX[E:451],0.0)
BRNEAI   = BRNEAI + IFLT0(FLOWBRX[E:474],-1.0*FLOWBRX[E:474],0.0)
BRNEAI   = BRNEAI + IFLT0(FLOWBRX[E:497],-1.0*FLOWBRX[E:497],0.0)
!
!   Bottom
!
BRNEAI   = BRNEAI + IFGT0(FLOWBRY[E:1449],FLOWBRY[E:1449],0.0)
BRNEAI   = BRNEAI + IFGT0(FLOWBRY[E:1450],FLOWBRY[E:1450],0.0)
!
!   Top
!
BRNEAI   = BRNEAI + IFLT0(FLOWBRY[E:1233],-1.0*FLOWBRY[E:1233],0.0)
BRNEAI   = BRNEAI + IFLT0(FLOWBRY[E:1234],-1.0*FLOWBRY[E:1234],0.0)
!
!   Integrate for cumulative, delete flow rate
!
BRNEAIC  = INTRIGHT(BRNEAI)
DELETE BRNEAI
!
!***************************************
!
! Net cumulative brineflow into repository = flow in minus flow out
!   (brine consumed by waste corrosion neglected since brine consumption
!    rate not available as history variable in bragflow output database)
!
!   Accumulate x-direction outward flows from left side of repository
!
BRNREPOX =            IFLT0(FLOWBRX[E:1407],-1.0*FLOWBRX[E:1407],0.0)
BRNREPOX = BRNREPOX + IFLT0(FLOWBRX[E:1414],-1.0*FLOWBRX[E:1414],0.0)
BRNREPOX = BRNREPOX + IFLT0(FLOWBRX[E:1421],-1.0*FLOWBRX[E:1421],0.0)
!
!   Add x-direction outward flow contributions from right side
!
BRNREPOX = BRNREPOX + IFGT0(FLOWBRX[E:1461],FLOWBRX[E:1461],0.0)
BRNREPOX = BRNREPOX + IFGT0(FLOWBRX[E:1462],FLOWBRX[E:1462],0.0)
BRNREPOX = BRNREPOX + IFGT0(FLOWBRX[E:1463],FLOWBRX[E:1463],0.0)
!
!   Accumulate y-direction outward flows from bottom of repository
!
BRNREPOY =            IFLT0(FLOWBRY[E:1407],-1.0*FLOWBRY[E:1407],0.0)
BRNREPOY = BRNREPOY + IFLT0(FLOWBRY[E:1408],-1.0*FLOWBRY[E:1408],0.0)
BRNREPOY = BRNREPOY + IFLT0(FLOWBRY[E:1409],-1.0*FLOWBRY[E:1409],0.0)
BRNREPOY = BRNREPOY + IFLT0(FLOWBRY[E:1410],-1.0*FLOWBRY[E:1410],0.0)
BRNREPOY = BRNREPOY + IFLT0(FLOWBRY[E:1411],-1.0*FLOWBRY[E:1411],0.0)
BRNREPOY = BRNREPOY + IFLT0(FLOWBRY[E:1412],-1.0*FLOWBRY[E:1412],0.0)
BRNREPOY = BRNREPOY + IFLT0(FLOWBRY[E:1413],-1.0*FLOWBRY[E:1413],0.0)
BRNREPOY = BRNREPOY + IFLT0(FLOWBRY[E:1455],-1.0*FLOWBRY[E:1455],0.0)
BRNREPOY = BRNREPOY + IFLT0(FLOWBRY[E:1466],-1.0*FLOWBRY[E:1466],0.0)
BRNREPOY = BRNREPOY + IFLT0(FLOWBRY[E:1428],-1.0*FLOWBRY[E:1428],0.0)
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BRNREPOY = BRNREPOY + IFLT0(FLOWBRY[E:1429],-1.0*FLOWBRY[E:1429],0.0)
BRNREPOY = BRNREPOY + IFLT0(FLOWBRY[E:1458],-1.0*FLOWBRY[E:1458],0.0)
BRNREPOY = BRNREPOY + IFLT0(FLOWBRY[E:1472],-1.0*FLOWBRY[E:1472],0.0)
BRNREPOY = BRNREPOY + IFLT0(FLOWBRY[E:1434],-1.0*FLOWBRY[E:1434],0.0)
BRNREPOY = BRNREPOY + IFLT0(FLOWBRY[E:1435],-1.0*FLOWBRY[E:1435],0.0)
!
!   Add Y-direction outward flow contributions from top side
!
BRNREPOY = BRNREPOY + IFGT0(FLOWBRY[E:1165],FLOWBRY[E:1165],0.0)
BRNREPOY = BRNREPOY + IFGT0(FLOWBRY[E:1166],FLOWBRY[E:1166],0.0)
BRNREPOY = BRNREPOY + IFGT0(FLOWBRY[E:1167],FLOWBRY[E:1167],0.0)
BRNREPOY = BRNREPOY + IFGT0(FLOWBRY[E:1168],FLOWBRY[E:1168],0.0)
BRNREPOY = BRNREPOY + IFGT0(FLOWBRY[E:1169],FLOWBRY[E:1169],0.0)
BRNREPOY = BRNREPOY + IFGT0(FLOWBRY[E:1170],FLOWBRY[E:1170],0.0)
BRNREPOY = BRNREPOY + IFGT0(FLOWBRY[E:1171],FLOWBRY[E:1171],0.0)
BRNREPOY = BRNREPOY + IFGT0(FLOWBRY[E:1172],FLOWBRY[E:1172],0.0)
BRNREPOY = BRNREPOY + IFGT0(FLOWBRY[E:1469],FLOWBRY[E:1469],0.0)
BRNREPOY = BRNREPOY + IFGT0(FLOWBRY[E:1197],FLOWBRY[E:1197],0.0)
BRNREPOY = BRNREPOY + IFGT0(FLOWBRY[E:1198],FLOWBRY[E:1198],0.0)
BRNREPOY = BRNREPOY + IFGT0(FLOWBRY[E:1199],FLOWBRY[E:1199],0.0)
BRNREPOY = BRNREPOY + IFGT0(FLOWBRY[E:1475],FLOWBRY[E:1475],0.0)
BRNREPOY = BRNREPOY + IFGT0(FLOWBRY[E:1209],FLOWBRY[E:1209],0.0)
BRNREPOY = BRNREPOY + IFGT0(FLOWBRY[E:1210],FLOWBRY[E:1210],0.0)
!
!   Sum x- and y-direction outward flows, then integrate over time
!
BRNREPO  = BRNREPOX + BRNREPOY
BRNREPOC = INTRIGHT(BRNREPO)
!
!   Subtract outflow from inflow to obtain net inflow
!
BRNREPNC = BRNREPTC - BRNREPOC
!
!   Delete flow rate temporary variables
!
DELETE BRNREPO, BRNREPOX, BRNREPOY
!
!****************************************
!   Accumulate x-direction inward flows from left side of repository
!
BRNEXOX =            IFGT0(FLOWBRX[E:1407],FLOWBRX[E:1407],0.0)
BRNEXOX = BRNEXOX + IFGT0(FLOWBRX[E:1414],FLOWBRX[E:1414],0.0)
BRNEXOX = BRNEXOX + IFGT0(FLOWBRX[E:1421],FLOWBRX[E:1421],0.0)
!
!   Add x-direction inward flow contributions from right side
!
BRNEXOX   = BRNEXOX + IFLT0(FLOWBRX[E:451],-1.0*FLOWBRX[E:451],0.0)
BRNEXOX   = BRNEXOX + IFLT0(FLOWBRX[E:474],-1.0*FLOWBRX[E:474],0.0)
BRNEXOX   = BRNEXOX + IFLT0(FLOWBRX[E:497],-1.0*FLOWBRX[E:497],0.0)
!
!   Accumulate y-direction inward flows from bottom of REPository
!
BRNEXOY =            IFGT0(FLOWBRY[E:1407],FLOWBRY[E:1407],0.0)
BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1408],FLOWBRY[E:1408],0.0)
BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1409],FLOWBRY[E:1409],0.0)
BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1410],FLOWBRY[E:1410],0.0)
BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1411],FLOWBRY[E:1411],0.0)
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BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1412],FLOWBRY[E:1412],0.0)
BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1413],FLOWBRY[E:1413],0.0)
BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1455],FLOWBRY[E:1455],0.0)
BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1466],FLOWBRY[E:1466],0.0)
BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1428],FLOWBRY[E:1428],0.0)
BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1429],FLOWBRY[E:1429],0.0)
BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1458],FLOWBRY[E:1458],0.0)
BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1472],FLOWBRY[E:1472],0.0)
BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1434],FLOWBRY[E:1434],0.0)
BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1435],FLOWBRY[E:1435],0.0)
BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1461],FLOWBRY[E:1461],0.0)
BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1478],FLOWBRY[E:1478],0.0)
BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1440],FLOWBRY[E:1440],0.0)
BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1441],FLOWBRY[E:1441],0.0)
BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1442],FLOWBRY[E:1442],0.0)
BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1484],FLOWBRY[E:1484],0.0)
BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1449],FLOWBRY[E:1449],0.0)
BRNEXOY = BRNEXOY + IFGT0(FLOWBRY[E:1450],FLOWBRY[E:1450],0.0)
!
!   Add Y-direction inward flow contributions from top side
!
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1165],-1.0*FLOWBRY[E:1165],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1166],-1.0*FLOWBRY[E:1166],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1167],-1.0*FLOWBRY[E:1167],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1168],-1.0*FLOWBRY[E:1168],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1169],-1.0*FLOWBRY[E:1169],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1170],-1.0*FLOWBRY[E:1170],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1171],-1.0*FLOWBRY[E:1171],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1172],-1.0*FLOWBRY[E:1172],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1469],-1.0*FLOWBRY[E:1469],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1197],-1.0*FLOWBRY[E:1197],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1198],-1.0*FLOWBRY[E:1198],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1199],-1.0*FLOWBRY[E:1199],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1475],-1.0*FLOWBRY[E:1475],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1209],-1.0*FLOWBRY[E:1209],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1210],-1.0*FLOWBRY[E:1210],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1211],-1.0*FLOWBRY[E:1211],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1481],-1.0*FLOWBRY[E:1481],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1221],-1.0*FLOWBRY[E:1221],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1222],-1.0*FLOWBRY[E:1222],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1223],-1.0*FLOWBRY[E:1223],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1487],-1.0*FLOWBRY[E:1487],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1233],-1.0*FLOWBRY[E:1233],0.0)
BRNEXOY = BRNEXOY + IFLT0(FLOWBRY[E:1234],-1.0*FLOWBRY[E:1234],0.0)
!
!   Sum x- and y-direction inward flows, then integrate over time
!
BRNEXO  = BRNEXOX + BRNEXOY
BRNEXOC = INTRIGHT(BRNEXO)
!
!
!   Subtract outflow from inflow to obtain net inflow
!
BRNEXNC = BRNEXIC - BRNEXOC
!
!   Delete flow rate temporary variables!
DELETE BRNEXO, BRNEXOX, BRNEXOY
```

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!
!**************************************
!
!   Flow from the Waste Panel across the plane of the panel closure
!   Includes DRZ, marker beds and the panel closure.
!
BNWPNFLW =            IFGT0(FLOWBRX[E:1263],FLOWBRX[E:1263],0.0)
BNWPNFLW = BNWPNFLW + IFGT0(FLOWBRX[E:1464],FLOWBRX[E:1464],0.0)
BNWPNFLW = BNWPNFLW + IFGT0(FLOWBRX[E:1465],FLOWBRX[E:1465],0.0)
BNWPNFLW = BNWPNFLW + IFGT0(FLOWBRX[E:1466],FLOWBRX[E:1466],0.0)
BNWPNFLW = BNWPNFLW + IFGT0(FLOWBRX[E:1467],FLOWBRX[E:1467],0.0)
BNWPNFLW = BNWPNFLW + IFGT0(FLOWBRX[E:1468],FLOWBRX[E:1468],0.0)
BNWPNFLW = BNWPNFLW + IFGT0(FLOWBRX[E:1469],FLOWBRX[E:1469],0.0)
BNWPNFLW = BNWPNFLW + IFGT0(FLOWBRX[E:1312],FLOWBRX[E:1312],0.0)
BNWPNFLW = BNWPNFLW + IFGT0(FLOWBRX[E:1102],FLOWBRX[E:1102],0.0)
BNWPNFLW = BNWPNFLW + IFGT0(FLOWBRX[E:1103],FLOWBRX[E:1103],0.0)
BNWPNFLW = BNWPNFLW + IFGT0(FLOWBRX[E:1369],FLOWBRX[E:1369],0.0)
!
!**************************************
!   Flow to the Waste Panel across the plane of the panel closure
!   Includes DRZ, marker beds and the panel closure.
!
BNWPSFLW =            IFLT0(FLOWBRX[E:1263],-1.0*FLOWBRX[E:1263],0.0)
BNWPSFLW = BNWPSFLW + IFLT0(FLOWBRX[E:1464],-1.0*FLOWBRX[E:1464],0.0)
BNWPSFLW = BNWPSFLW + IFLT0(FLOWBRX[E:1465],-1.0*FLOWBRX[E:1465],0.0)
BNWPSFLW = BNWPSFLW + IFLT0(FLOWBRX[E:1466],-1.0*FLOWBRX[E:1466],0.0)
BNWPSFLW = BNWPSFLW + IFLT0(FLOWBRX[E:1467],-1.0*FLOWBRX[E:1467],0.0)
BNWPSFLW = BNWPSFLW + IFLT0(FLOWBRX[E:1468],-1.0*FLOWBRX[E:1468],0.0)
BNWPSFLW = BNWPSFLW + IFLT0(FLOWBRX[E:1469],-1.0*FLOWBRX[E:1469],0.0)
BNWPSFLW = BNWPSFLW + IFLT0(FLOWBRX[E:1312],-1.0*FLOWBRX[E:1312],0.0)
BNWPSFLW = BNWPSFLW + IFLT0(FLOWBRX[E:1102],-1.0*FLOWBRX[E:1102],0.0)
BNWPSFLW = BNWPSFLW + IFLT0(FLOWBRX[E:1103],-1.0*FLOWBRX[E:1103],0.0)
BNWPSFLW = BNWPSFLW + IFLT0(FLOWBRX[E:1369],-1.0*FLOWBRX[E:1369],0.0)
!
!**************************************
!
!   Flow from the RoR across the plane of the panel closure to non-waste
!   Includes DRZ, marker beds and the panel closure.
!
BNRRNFLW =            IFGT0(FLOWBRX[E:1265],FLOWBRX[E:1265],0.0)
BNRRNFLW = BNRRNFLW + IFGT0(FLOWBRX[E:1476],FLOWBRX[E:1476],0.0)
BNRRNFLW = BNRRNFLW + IFGT0(FLOWBRX[E:1477],FLOWBRX[E:1477],0.0)
BNRRNFLW = BNRRNFLW + IFGT0(FLOWBRX[E:1478],FLOWBRX[E:1478],0.0)
BNRRNFLW = BNRRNFLW + IFGT0(FLOWBRX[E:1479],FLOWBRX[E:1479],0.0)
BNRRNFLW = BNRRNFLW + IFGT0(FLOWBRX[E:1480],FLOWBRX[E:1480],0.0)
BNRRNFLW = BNRRNFLW + IFGT0(FLOWBRX[E:1481],FLOWBRX[E:1481],0.0)
BNRRNFLW = BNRRNFLW + IFGT0(FLOWBRX[E:1314],FLOWBRX[E:1314],0.0)
BNRRNFLW = BNRRNFLW + IFGT0(FLOWBRX[E:1106],FLOWBRX[E:1106],0.0)
BNRRNFLW = BNRRNFLW + IFGT0(FLOWBRX[E:1107],FLOWBRX[E:1107],0.0)
BNRRNFLW = BNRRNFLW + IFGT0(FLOWBRX[E:1377],FLOWBRX[E:1377],0.0)
!
!**************************************
!
!   Flow from the RoR across the plane of the panel closure to non-waste
!   Includes DRZ, marker beds and the panel closure.
!
BNRRSFLW =            IFGT0(FLOWBRX[E:1265],FLOWBRX[E:1265],0.0)
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BNRRSFLW = BNRRSFLW + IFGT0(FLOWBRX[E:1476],FLOWBRX[E:1476],0.0)
BNRRSFLW = BNRRSFLW + IFGT0(FLOWBRX[E:1477],FLOWBRX[E:1477],0.0)
BNRRSFLW = BNRRSFLW + IFGT0(FLOWBRX[E:1478],FLOWBRX[E:1478],0.0)
BNRRSFLW = BNRRSFLW + IFGT0(FLOWBRX[E:1479],FLOWBRX[E:1479],0.0)
BNRRSFLW = BNRRSFLW + IFGT0(FLOWBRX[E:1480],FLOWBRX[E:1480],0.0)
BNRRSFLW = BNRRSFLW + IFGT0(FLOWBRX[E:1481],FLOWBRX[E:1481],0.0)
BNRRSFLW = BNRRSFLW + IFGT0(FLOWBRX[E:1314],FLOWBRX[E:1314],0.0)
BNRRSFLW = BNRRSFLW + IFGT0(FLOWBRX[E:1106],FLOWBRX[E:1106],0.0)
BNRRSFLW = BNRRSFLW + IFGT0(FLOWBRX[E:1107],FLOWBRX[E:1107],0.0)
BNRRSFLW = BNRRSFLW + IFGT0(FLOWBRX[E:1377],FLOWBRX[E:1377],0.0)
!
!***************************************
!
! Net cumulative brine flow into waste panel = flow in minus flow out
!
!   Left side outward flows
!
BRNWPO   =          IFLT0(FLOWBRX[E:1407],-1.0*FLOWBRX[E:1407],0.0)
BRNWPO   = BRNWPO + IFLT0(FLOWBRX[E:1414],-1.0*FLOWBRX[E:1414],0.0)
BRNWPO   = BRNWPO + IFLT0(FLOWBRX[E:1421],-1.0*FLOWBRX[E:1421],0.0)
!
!   Right side
!
BRNWPO   = BRNWPO + IFGT0(FLOWBRX[E:1455],FLOWBRX[E:1455],0.0)
BRNWPO   = BRNWPO + IFGT0(FLOWBRX[E:1456],FLOWBRX[E:1456],0.0)
BRNWPO   = BRNWPO + IFGT0(FLOWBRX[E:1457],FLOWBRX[E:1457],0.0)
!
!   Bottom
!
BRNWPO   = BRNWPO + IFLT0(FLOWBRY[E:1407],-1.0*FLOWBRY[E:1407],0.0)
BRNWPO   = BRNWPO + IFLT0(FLOWBRY[E:1408],-1.0*FLOWBRY[E:1408],0.0)
BRNWPO   = BRNWPO + IFLT0(FLOWBRY[E:1409],-1.0*FLOWBRY[E:1409],0.0)
BRNWPO   = BRNWPO + IFLT0(FLOWBRY[E:1410],-1.0*FLOWBRY[E:1410],0.0)
BRNWPO   = BRNWPO + IFLT0(FLOWBRY[E:1411],-1.0*FLOWBRY[E:1411],0.0)
BRNWPO   = BRNWPO + IFLT0(FLOWBRY[E:1412],-1.0*FLOWBRY[E:1412],0.0)
BRNWPO   = BRNWPO + IFLT0(FLOWBRY[E:1413],-1.0*FLOWBRY[E:1413],0.0)
!
!   Top
!
BRNWPO   = BRNWPO + IFGT0(FLOWBRY[E:1165],FLOWBRY[E:1165],0.0)
BRNWPO   = BRNWPO + IFGT0(FLOWBRY[E:1166],FLOWBRY[E:1166],0.0)
BRNWPO   = BRNWPO + IFGT0(FLOWBRY[E:1167],FLOWBRY[E:1167],0.0)
BRNWPO   = BRNWPO + IFGT0(FLOWBRY[E:1168],FLOWBRY[E:1168],0.0)
BRNWPO   = BRNWPO + IFGT0(FLOWBRY[E:1169],FLOWBRY[E:1169],0.0)
BRNWPO   = BRNWPO + IFGT0(FLOWBRY[E:1170],FLOWBRY[E:1170],0.0)
BRNWPO   = BRNWPO + IFGT0(FLOWBRY[E:1171],FLOWBRY[E:1171],0.0)
!
!   Integrate for cumulative outward flow, delete flow rate
!
BRNWPOC  = INTRIGHT(BRNWPO)
DELETE BRNWPO
!
!   Subtract outflow from inflow to obtain net inflow
!
BRNWPNC = BRNWPIC - BRNWPOC
!
!***************************************
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!*************************************
!
! Total cumulative brine flow out of south rest of repository
!
!    Left side outward flows
!
BRNSRRO   =           IFLT0(FLOWBRX[E:1428],-1.0*FLOWBRX[E:1428],0.0)
BRNSRRO   = BRNSRRO + IFLT0(FLOWBRX[E:1430],-1.0*FLOWBRX[E:1430],0.0)
BRNSRRO   = BRNSRRO + IFLT0(FLOWBRX[E:1432],-1.0*FLOWBRX[E:1432],0.0)
!
!    Right side outward flows
!
BRNSRRO   = BRNSRRO + IFGT0(FLOWBRX[E:1458],FLOWBRX[E:1458],0.0)
BRNSRRO   = BRNSRRO + IFGT0(FLOWBRX[E:1459],FLOWBRX[E:1459],0.0)
BRNSRRO   = BRNSRRO + IFGT0(FLOWBRX[E:1460],FLOWBRX[E:1460],0.0)
!
!       Bottom
!
BRNSRRO   = BRNSRRO + IFLT0(FLOWBRY[E:1428],-1.0*FLOWBRY[E:1428],0.0)
BRNSRRO   = BRNSRRO + IFLT0(FLOWBRY[E:1429],-1.0*FLOWBRY[E:1429],0.0)
!
!       Top
!
BRNSRRO   = BRNSRRO + IFGT0(FLOWBRY[E:1197],FLOWBRY[E:1197],0.0)
BRNSRRO   = BRNSRRO + IFGT0(FLOWBRY[E:1198],FLOWBRY[E:1198],0.0)
!
!   Integrate for cumulative outward flow, delete flow rate
!
BRNSRROC  = INTRIGHT(BRNSRRO)
DELETE BRNSRRO
!
!   Subtract outflow from inflow to obtain net inflow
!
BRNSRRNC = BRNSRRIC - BRNSRROC
!
!*************************************
!
! Total cumulative brine flow out of north rest of repository
!
!    Left side outward flows
!
BRNNRRO   =           IFLT0(FLOWBRX[E:1434],-1.0*FLOWBRX[E:1434],0.0)
BRNNRRO   = BRNNRRO + IFLT0(FLOWBRX[E:1436],-1.0*FLOWBRX[E:1436],0.0)
BRNNRRO   = BRNNRRO + IFLT0(FLOWBRX[E:1438],-1.0*FLOWBRX[E:1438],0.0)
!
!    Right side outward flows
!
BRNNRRO   = BRNNRRO + IFGT0(FLOWBRX[E:1461],FLOWBRX[E:1461],0.0)
BRNNRRO   = BRNNRRO + IFGT0(FLOWBRX[E:1462],FLOWBRX[E:1462],0.0)
BRNNRRO   = BRNNRRO + IFGT0(FLOWBRX[E:1463],FLOWBRX[E:1463],0.0)
!
!       Bottom
!
BRNNRRO   = BRNNRRO + IFLT0(FLOWBRY[E:1434],-1.0*FLOWBRY[E:1434],0.0)
BRNNRRO   = BRNNRRO + IFLT0(FLOWBRY[E:1435],-1.0*FLOWBRY[E:1435],0.0)
!
!       Top
```

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!
BRNNRRO   = BRNNRRO + IFGT0(FLOWBRY[E:1209],FLOWBRY[E:1209],0.0)
BRNNRRO   = BRNNRRO + IFGT0(FLOWBRY[E:1210],FLOWBRY[E:1210],0.0)
!
!   Integrate for cumulative outward flow, delete flow rate
!
BRNNRROC  = INTRIGHT(BRNNRRO)
DELETE BRNNRRO
!
!   Subtract outflow from inflow to obtain net inflow
!
BRNNRRNC = BRNNRRIC - BRNNRROC
!
!****************************************************************
!
! Total cumulative flow out of rest of repository (north + south)
!
BRNRROC  = BRNSRROC + BRNNRROC
!
! Net inflow into rest of repository (north + south)
!
BRNRRNC = BRNSRRNC + BRNNRRNC
!
!****************************************************************
!
! Total cumulative brine flow out of operations region
!
!   Left side outward flows
!
BRNORO   =          IFLT0(FLOWBRX[E:1440],-1.0*FLOWBRX[E:1440],0.0)
BRNORO   = BRNORO + IFLT0(FLOWBRX[E:1443],-1.0*FLOWBRX[E:1443],0.0)
BRNORO   = BRNORO + IFLT0(FLOWBRX[E:1446],-1.0*FLOWBRX[E:1446],0.0)
!
!   Right side
!cc
BRNORO   = BRNORO + IFGT0(FLOWBRX[E:1484],FLOWBRX[E:1484],0.0)
BRNORO   = BRNORO + IFGT0(FLOWBRX[E:1485],FLOWBRX[E:1485],0.0)
BRNORO   = BRNORO + IFGT0(FLOWBRX[E:1486],FLOWBRX[E:1486],0.0)
!
!   Bottom
!
BRNORO   = BRNORO + IFLT0(FLOWBRY[E:1440],-1.0*FLOWBRY[E:1440],0.0)
BRNORO   = BRNORO + IFLT0(FLOWBRY[E:1441],-1.0*FLOWBRY[E:1441],0.0)
BRNORO   = BRNORO + IFLT0(FLOWBRY[E:1442],-1.0*FLOWBRY[E:1442],0.0)
!
!   Top
!
BRNORO   = BRNORO + IFGT0(FLOWBRY[E:1221],FLOWBRY[E:1221],0.0)
BRNORO   = BRNORO + IFGT0(FLOWBRY[E:1222],FLOWBRY[E:1222],0.0)
BRNORO   = BRNORO + IFGT0(FLOWBRY[E:1222],FLOWBRY[E:1222],0.0)
!
!   Integrate for cumulative outward flow, delete flow rate
!
BRNOROC  = INTRIGHT(BRNORO)
DELETE BRNORO
!
!   Subtract outflow from inflow to obtain net inflow
```

```
!
BRNORNC = BRNORIC - BRNOROC
!
!***************************************
!
! Total cumulative brine flow out of experimental area:
!
!   Left side outward flows
!
BRNEAO   =          IFLT0(FLOWBRX[E:1449],-1.0*FLOWBRX[E:1449],0.0)
BRNEAO   = BRNEAO + IFLT0(FLOWBRX[E:1451],-1.0*FLOWBRX[E:1451],0.0)
BRNEAO   = BRNEAO + IFLT0(FLOWBRX[E:1453],-1.0*FLOWBRX[E:1453],0.0)
!
!   Right side
!
BRNEAO   = BRNEAO + IFGT0(FLOWBRX[E:451],FLOWBRX[E:451],0.0)
BRNEAO   = BRNEAO + IFGT0(FLOWBRX[E:474],FLOWBRX[E:474],0.0)
BRNEAO   = BRNEAO + IFGT0(FLOWBRX[E:497],FLOWBRX[E:497],0.0)
!
!   Bottom
!cc
BRNEAO   = BRNEAO + IFLT0(FLOWBRY[E:1449],-1.0*FLOWBRY[E:1449],0.0)
BRNEAO   = BRNEAO + IFLT0(FLOWBRY[E:1450],-1.0*FLOWBRY[E:1450],0.0)
!
!   Top
!
BRNEAO   = BRNEAO + IFGT0(FLOWBRY[E:1233],FLOWBRY[E:1233],0.0)
BRNEAO   = BRNEAO + IFGT0(FLOWBRY[E:1234],FLOWBRY[E:1234],0.0)
!
!   Integrate for cumulative outward flow, delete flow rate
!
BRNEAOC  = INTRIGHT(BRNEAO)
DELETE BRNEAO
!
!   Subtract outflow from inflow to obtain net inflow
!
BRNEANC = BRNEAIC - BRNEAOC
!
!***************************************
!
! Cumulative brineflow DOWN borehole (from the panel)
!
BNBBDP  = IFLT0(FLOWBRY[E:1410],-1.0*FLOWBRY[E:1410],0.0)
BRNBHDPP = INTRIGHT(BNBBDP)
!
DELETE BNBBDP
!
!***************************************
!
! Cumulative brineflow up borehole (into panel)
!
BRNBBUP  = IFGT0(FLOWBRY[E:1410],FLOWBRY[E:1410],0.0)
BRNBHUPP = INTRIGHT(BRNBBUP)
!
DELETE BRNBBUP
!
!***************************************
```

```
!
! Cumulative brineflow up borehole (measured at repository top boundary)
!cc
BRNBHUP  = IFGT0(FLOWBRY[E:1168],FLOWBRY[E:1168],0.0)
BRNBHUPC = INTRIGHT(BRNBHUP)
!
DELETE BRNBHUP
!
!**************************************
!
! Cumulative brineflow DOWN borehole (measured at repository top boundary)
!
BRNBHDP  = IFLT0(FLOWBRY[E:1168],-1.0*FLOWBRY[E:1168],0.0)
BRNBHDPC = INTRIGHT(BRNBHDP)
!
DELETE BRNBHDP
!
!**************************************
!
! Cumulative brineflow up borehole (measured at Rustler/Culebra interface)
!
BRNBHRC  = IFGT0(FLOWBRY[E:1845],FLOWBRY[E:1845],0.0)
BRNBHRCC = INTRIGHT(BRNBHRC)
!
DELETE BRNBHRC
!
!**************************************
!
! Cumulative brineflow DOWN borehole (measured at Rustler/Culebra interface)
!
BNBHDRC  = IFLT0(FLOWBRY[E:1845],-1.0*FLOWBRY[E:1845],0.0)
BNBHDRCC = INTRIGHT(BNBHDRC)
!
DELETE BNBHDRC
!**************************************
!
! Cumulative brineflow up borehole (past Rustler)
!
BRNBHRU  = IFGT0(FLOWBRY[E:1979],FLOWBRY[E:1979],0.0)
BRNBHRUC = INTRIGHT(BRNBHRU)
!
DELETE BRNBHRU
!

!**************************************
!
! Cumulative brineflow up borehole (to surface)
!
BRNBHRS  = IFGT0(FLOWBRY[E:2155],FLOWBRY[E:2155],0.0)
BRNBHRSC = INTRIGHT(BRNBHRS)
!
DELETE BRNBHRS
!
!**************************************
!
! Cumulative brineflow up borehole (into lower DRZ below waste panel)
!
```

```
BNBHLDR  = IFGT0(FLOWBRY[E:1111],FLOWBRY[E:1111],0.0)
BNBHLDRZ = INTRIGHT(BNBHLDR)
!
DELETE BNBHLDR
!
!**************************************
!
! Cumulative brineflow down borehole (to surface)
!
BNBHDRS  = IFGT0(FLOWBRY[E:2155],-1.0*FLOWBRY[E:2155],0.0)
BNBHDRSC = INTRIGHT(BNBHDRS)
!
Delete BNBHDRS
!
!**************************************
!
! Cumulative brineflow down borehole (into lower DRZ below waste panel)
!
BNBHDLZ  = IFGT0(FLOWBRY[E:1111],-1.0*FLOWBRY[E:1111],0.0)
BNBHDLDZ = INTRIGHT(BNBHDLZ)
!
Delete BNBHDLZ
!
!**************************************
!
! Cumulative brineflow up borehole (at top of upper DRZ region)
!
BNBHUDR  = IFGT0(FLOWBRY[E:1364],FLOWBRY[E:1364],0.0)
BNBHUDRZ = INTRIGHT(BNBHUDR)
!
Delete BNBHUDR
!
!**************************************
!
! Cumulative brineflow DOWN borehole (at top of UPPER DRZ region)
!
BNBHDDR  = IFGT0(FLOWBRY[E:1364],-1.0*FLOWBRY[E:1364],0.0)
BNBHDDRZ = INTRIGHT(BNBHDDR)
!
DELETE BNBHDDR
!
!**************************************
!!!
! Cumulative brineflow up shaft (to surface)
!
BRNSHRS  = IFGT0(FLOWBRY[E:1496],FLOWBRY[E:1496],0.0)
BRNSHRSC = INTRIGHT(BRNSHRS)
!
DELETE BRNSHRS
!
!**************************************
!
! Cumulative brineflow down shaft (from surface)
!
BNSHDSC  = IFLT0(FLOWBRY[E:1496],-1.0*FLOWBRY[E:1496],0.0)
BNSHDSCZ = INTRIGHT(BNSHDSC)
!
```

```
DELETE BNSHDSC
!
!***************************************
!
! Cumulative brineflow up shaft (past Rustler)
!
BRNSHRU  = IFGT0(FLOWBRY[E:1493],FLOWBRY[E:1493],0.0)
BRNSHRUC = INTRIGHT(BRNSHRU)
!
DELETE BRNSHRU
!
!***************************************
!
! Cumulative brineflow down shaft (past Rustler)
!
BNSHDRU  = IFLT0(FLOWBRY[E:1493],-1.0*FLOWBRY[E:1493],0.0)
BNSHDRUZ = INTRIGHT(BNSHDRU)
!
DELETE BNSHDRU
!
!***************************************
! Cumulative brineflow up shaft (into Culebra from unnamed)
!
BRNSHRC  = IFGT0(FLOWBRY[E:1489],FLOWBRY[E:1489],0.0)
BRNSHRCC = INTRIGHT(BRNSHRC)
!
DELETE BRNSHRC
!
!***************************************
!
! Cumulative brineflow down shaft (Culebra)
!
BNSHDRC  = IFLT0(FLOWBRY[E:1489],-1.0*FLOWBRY[E:1489],0.0)
BNSHDRCC = INTRIGHT(BNSHDRC)
!
DELETE BNSHDRC
!
!***************************************
!
! Cumulative brineflow up shaft (measured at DRZ upper boundary)
!
BNSHUP  = IFGT0(FLOWBRY[E:1381],FLOWBRY[E:1381],0.0)
BNSHUDRZ = INTRIGHT(BNSHUP)
!
DELETE BNSHUP
!
!***************************************
!
! Cumulative brineflow down shaft (measured at DRZ upper boundary)
!
BNSHDDR  = IFLT0(FLOWBRY[E:1481],-1.0*FLOWBRY[E:1481],0.0)
BNSHDDRZ= INTRIGHT(BNSHDDR)
!
DELETE BNSHDDR
!
!***************************************
! Cumulative brineflow up shaft (into Anhydrite AB marker bed)
```

```
!
BRNSHAB  = IFGT0(FLOWBRY[E:1315],FLOWBRY[E:1315],0.0)
BRNSHABC = INTRIGHT(BRNSHAB)
!
DELETE BRNSHAB
!
!*************************************
!
! Cumulative brineflow down shaft) (from Anhydrite AB marker bed
!
BNSHDAB  = IFLT0(FLOWBRY[E:1315],-1.0*FLOWBRY[E:1315],0.0)
BNSHDABC = INTRIGHT(BNSHDAB)
!
DELETE BNSHDAB
!
!*************************************!
!
!************************************************************************
!************************************************************************
!
! SECTION 8: Total brineflow out of marker beds toward repository (m**3)
!
!   Param 113: MB 138,        North --> BRM38NIC
!   Param 114: Anhydrite A&B, North --> BRAABNIC
!   Param 115: MB 139,        North --> BRM39NIC
!   Param 116: MB 138,        South --> BRM38SIC
!   Param 117: Anhydrite A&B, South --> BRAABSIC
!   Param 118: MB 139,        South --> BRM39SIC
!   Param 119: all marker beds -------> BRAALIC
!
!*************************************
!
! Total inward brineflow from MB 138, north (right) side
!
BRNM38NI = IFLT0(FLOWBRX[E:1384],-1.0*FLOWBRX[E:1384],0.0)
BRM38NIC = INTRIGHT(BRNM38NI)
!
!*************************************
!
! Total inward brineflow from Anhydrite A&B, north (right) side
!
BRNAABNI = IFLT0(FLOWBRX[E:1316],-1.0*FLOWBRX[E:1316],0.0)
BRAABNIC = INTRIGHT(BRNAABNI)
!
!*************************************
!
! Total inward brineflow from  MB 139, north (right) side
!
BRNM39NI = IFLT0(FLOWBRX[E:1267],-1.0*FLOWBRX[E:1267],0.0)
BRM39NIC = INTRIGHT(BRNM39NI)
!
!*************************************
!*************************************
!
! Total inward brineflow from MB 138, south (left) side
!
BRNM38SI = IFGT0(FLOWBRX[E:1361],FLOWBRX[E:1361],0.0)
```

```
BRM38SIC = INTRIGHT(BRNM38SI)
!
!**************************************
!
! Total inward brineflow from Anhydrite A&B, south (left) side
!
BRNAABSI = IFGT0(FLOWBRX[E:1173],FLOWBRX[E:1173],0.0)
BRAABSIC = INTRIGHT(BRNAABSI)
!
!**************************************
!
! Total inward brineflow from MB 139, south (left) side
!
BRNM39SI = IFGT0(FLOWBRX[E:1108],FLOWBRX[E:1108],0.0)
BRM39SIC = INTRIGHT(BRNM39SI)
!
!**************************************
!
! Total inward brineflow from all anhydrite layers
!
BRAALIC  = BRM38NIC + BRAABNIC + BRM39NIC + BRM38SIC + BRAABSIC + BRM39SIC
!
!**************************************
!
! Clean up output--limit to requested quantities
!
DELETE BRNM38NI, BRNAABNI, BRNM39NI, BRNM38SI, BRNAABSI, BRNM39SI
!
!***************************************************************************
!***************************************************************************
!
! SECTION 9: Total brineflow into marker beds away from repository (m**3)
!
!   Param 099: MB 138,         North --> BRM38NOC
!   Param 100: Anhydrite A&B, North --> BRAABNOC
!   Param 101: MB 139,         North --> BRM39NOC
!   Param 102: MB 138,         South --> BRM38SOC
!   Param 103: Anhydrite A&B, South --> BRAABSOC
!   Param 104: MB 139,         South --> BRM39SOC
!   Param 105: all marker beds -------> BRAALOC
!
!**************************************
!
! Total brineflow into MB 138 away from repository, north (right) side
!
BRNM38NO = IFGT0(FLOWBRX[E:1384],FLOWBRX[E:1384],0.0)
BRM38NOC = INTRIGHT(BRNM38NO)
!
!**************************************
!
! Total brineflow into Anhydrite A&B away from repository, north side
!
BRNAABNO = IFGT0(FLOWBRX[E:1316],FLOWBRX[E:1316],0.0)
BRAABNOC = INTRIGHT(BRNAABNO)
!
!**************************************
!
```

```
! Total brineflow into MB 139 away from repository, north (right) side
!
BRNM39NO = IFGT0(FLOWBRX[E:1267],FLOWBRX[E:1267],0.0)
BRM39NOC = INTRIGHT(BRNM39NO)
!
!***************************************
!***************************************
!
! Total brineflow into MB 138 away from repository, south (left) side
!
BRNM38SO = IFLT0(FLOWBRX[E:1361],-1.0*FLOWBRX[E:1361],0.0)
BRM38SOC = INTRIGHT(BRNM38SO)
!
!***************************************
!
! Total brineflow into Anhydrite A&B away from repository, south side
!
BRNAABSO = IFLT0(FLOWBRX[E:1173],-1.0*FLOWBRX[E:1173],0.0)
BRAABSOC = INTRIGHT(BRNAABSO)
!
!***************************************
!
! Total brineflow into MB 139 away from repository, south (left) side
!
BRNM39SO = IFLT0(FLOWBRX[E:1108],-1.0*FLOWBRX[E:1108],0.0)
BRM39SOC = INTRIGHT(BRNM39SO)
!
!***************************************
!
! Total outward brineflow into all anhydrite layers
!
BRAALOC  = BRM38NOC + BRAABNOC + BRM39NOC + BRM38SOC + BRAABSOC + BRM39SOC
!
!***************************************
!
! Clean up output--limit to requested quantities
!
DELETE BRNM38NO, BRNAABNO, BRNM39NO, BRNM38SO, BRNAABSO, BRNM39SO
!
!**************************************************************************
!**************************************************************************
!
! SECTION 10: Net brineflow through marker beds (m**3)
!
!   Param 120: MB 138,        North --> BRM38NNC
!   Param 121: Anhydrite A&B, North --> BRAABNNC
!   Param 123: MB 139,        North --> BRM39NNC
!   Param 124: MB 138,        South --> BRM38SNC
!   Param 125: Anhydrite A&B, South --> BRAABSNC
!   Param 126: MB 139,        South --> BRM39SNC
!
!***************************************
!
! Net brineflow through MB 138, north (right) side
!
BRNM38NN = FLOWBRX[E:1384]
BRM38NNC = INTRIGHT(BRNM38NN)
```

```
!
!***************************************
!
! Net brineflow through Anhydrite A&B, north (right) side
!
BRNAABNN = FLOWBRX[E:1316]
BRAABNNC = INTRIGHT(BRNAABNN)
!
!***************************************
!
! Net brineflow through MB 139, north (right) side
!
BRNM39NN = FLOWBRX[E:1267]
BRM39NNC = INTRIGHT(BRNM39NN)
!
!***************************************
!***************************************
!
! Net brineflow through MB 138, south (left) side
!
BRNM38SN = FLOWBRX[E:1361]
BRM38SNC = INTRIGHT(BRNM38SN)
!
!***************************************
!
! Net brineflow through Anhydrite A&B, south (left) side
!
BRNAABSN = FLOWBRX[E:1173]
BRAABSNC = INTRIGHT(BRNAABSN)
!
!***************************************
!
! Net brineflow through MB 139, south (left) side
!
BRNM39SN = FLOWBRX[E:1108]
BRM39SNC = INTRIGHT(BRNM39SN)
!
!***************************************
!
! Clean up output--limit to requested quantities
!
DELETE BRNM38NN, BRNAABNN, BRNM39NN, BRNM38SN, BRNAABSN, BRNM39SN
!
!**************************************************************************
!**************************************************************************
!
! Net brineflow into DRZ through all anhydrite layers
!
!   Param 112: net brineflow into DRZ from all marker beds --> BRAALNC
!
!***************************************
!
! Net brineflow into DRZ through all anhydrite layers, is the total inward
!   brineflow from all anhydrite layers minus the total outward brineflow
!
BRAALNC  = BRAALIC - BRAALOC
!
```

```
!****************************************************************************
!****************************************************************************
!
! SECTION 11: Cumulative gas flow (m**3)
!
!   Param 127: up borehole (@element 1168) ------------> GASBHUPC
!   Param 128: up borehole (@element 1364) ------------> GASBHUDZ
!   Param 129: into brine pocket (@element 1576) ------> GASBPDNC
!   Param 130: out of brine pocket (@element 1576) ----> GASBPUPC
!   Param 131: net into brine pocket (@element 1576) --> GASBPNTC
!
!   Param 132: Gas flow up shaft (@element 1496 Santa Rosa) --------->
GSSHUSCC
!   Param 133: Gas flow up shaft (@element 1493 49er/Dewey Lake) ---->
GSSHRRUC
!   Param 134: Gas flow up shaft (@element 1489 unnamed/Culebra) ---->
GSSHUCUC
!   Param 135: Gas flow up shaft (@element 1381 U_DRZ/Upper 138) ---->
GSSHUDRZ
!   Param 136: Gas flow up shaft (@element 1315 Anhy AB/CONC_MON) --->
GASSHABC
!
!**************************************
!
! Cumulative gas flow up borehole (measured at repository top boundary)
!
GASBHUP  = IFGT0(FLOWGASY[E:1168],FLOWGASY[E:1168],0.0)
GASBHUPC = INTRIGHT(GASBHUP)
!
!**************************************
!
! Cumulative gas flow up borehole (measured at top of DRZ)
!
GASBHUD  = IFGT0(FLOWGASY[E:1364],FLOWGASY[E:1364],0.0)
GASBHUDZ = INTRIGHT(GASBHUD)
!
!**************************************
!
! Cumulative gas flow into brine pocket (at top of brine pocket)
!cc
!GASBPDN  = IFLT0(FLOWGASY[E:1576],-1.0*FLOWGASY[E:1576],0.0)
!GASBPDNC = INTRIGHT(GASBPDN)
!
!**************************************
!
! Cumulative gas flow out of brine pocket (at top of brine pocket)
!cc
!GASBPUP  = IFGT0(FLOWGASY[E:1576],FLOWGASY[E:1576],0.0)
!GASBPUPC = INTRIGHT(GASBPUP)
!
!**************************************
!
! Cumulative net gas flow into brine pocket (at top of brine pocket)
!cc
!GASBPNT  = -1.0*FLOWGASY[E:1576]
!GASBPNTC = INTRIGHT(GASBPNT)
!
```

```
!**************************************
!!!
! Cumulative Gas flow up shaft (to surface)
!
GSSHUSC  = IFGT0(FLOWGASY[E:1496],FLOWGASY[E:1496],0.0)
GSSHUSCC = INTRIGHT(GSSHUSC)
!
!**************************************
!
! Cumulative brineflow up shaft (past Rustler)
!
GSSHURU  = IFGT0(FLOWGASY[E:1493],FLOWGASY[E:1493],0.0)
GSSHRRUC = INTRIGHT(GSSHURU)
!
!**************************************
!
! Cumulative brineflow up shaft (into Culebra from unnamed)
!
GSSHUCU  = IFGT0(FLOWGASY[E:1489],FLOWGASY[E:1489],0.0)
GSSHUCUC = INTRIGHT(GSSHUCU)
!
!**************************************
!
! Cumulative brineflow up shaft (measured at DRZ upper boundary)
!
GSSHUDR  = IFGT0(FLOWGASY[E:1381],FLOWGASY[E:1381],0.0)
GSSHUDRZ = INTRIGHT(GSSHUDR)
!
!**************************************
!
! Cumulative brineflow up shaft (into Anhydrite AB marker bed)
!
GASSHAB  = IFGT0(FLOWGASY[E:1315],FLOWGASY[E:1315],0.0)
GASSHABC = INTRIGHT(GASSHAB)
!!**************************************
!
! Clean up output--limit to requested quantities
!
DELETE GASBHUP, GASBHUD,
DELETE GSSHUSC, GSSHURU, GSSHUCU, GSSHUDR, GASSHAB
!
!************************************************************************
!************************************************************************
!
! SECTION 12: Total gas flow through marker beds away from repository (m**3)
!
!   Param 137: MB 138,        North --> GSM38NOC
!   Param 138: Anhydrite A&B, North --> GSAABNOC
!   Param 139: MB 139,        North --> GSM39NOC
!   Param 140: MB 138,        South --> GSM38SOC
!   Param 141: Anhydrite A&B, South --> GSAABSOC
!   Param 142: MB 139,        South --> GSM39SOC
!   Param 143: all marker beds -------> GSAALOC
!
!**************************************
!
! Total gas flow in MB 138 away from repository, north (right) side
```

```
!
GASM38NO = IFGT0(FLOWGASX[E:1384],FLOWGASX[E:1384],0.0)
GSM38NOC = INTRIGHT(GASM38NO)
!
!***************************************
!
! Total gas flow in Anhydrite A&B away from repository, north side
!
GASAABNO = IFGT0(FLOWGASX[E:1316],FLOWGASX[E:1316],0.0)
GSAABNOC = INTRIGHT(GASAABNO)
!
!***************************************
!
! Total gas flow in MB 139 away from repository, north (right) side
!
GASM39NO = IFGT0(FLOWGASX[E:1267],FLOWGASX[E:1267],0.0)
GSM39NOC = INTRIGHT(GASM39NO)
!
!***************************************
!***************************************
!
! Total gas flow in MB 138 away from repository, south (left) side
!
GASM38SO = IFLT0(FLOWGASX[E:1361],-1.0*FLOWGASX[E:1361],0.0)
GSM38SOC = INTRIGHT(GASM38SO)
!
!***************************************
!
! Total gas flow in Anhydrite A&B away from repository, south side
!
GASAABSO = IFLT0(FLOWGASX[E:1173],-1.0*FLOWGASX[E:1173],0.0)
GSAABSOC = INTRIGHT(GASAABSO)
!
!***************************************
!
! Total gas flow in MB 139 away from repository, south (left) side
!
GASM39SO = IFLT0(FLOWGASX[E:1108],-1.0*FLOWGASX[E:1108],0.0)
GSM39SOC = INTRIGHT(GASM39SO)
!
!***************************************
!
! Total gas flow into all anhydrite layers
!
GSAALOC  = GSM38NOC + GSAABNOC + GSM39NOC + GSM38SOC + GSAABSOC + GSM39SOC
!
!***************************************
!
! Clean up output--limit to requested quantities
!
DELETE GASM38NO, GASAABNO, GASM39NO, GASM38SO, GASAABSO, GASM39SO
!
!*****************************************************************************
!*****************************************************************************
!
! SECTION 13: Interbed fracturing: Length of fracturing zone (m)
!
```

```
!   Param 144: MB 138,        North --> FRACX38N
!   Param 145: Anhydrite A&B, North --> FRACXABN
!   Param 146: MB 139,        North --> FRACX39N
!   Param 147: MB 138,        South --> FRACX38S
!   Param 148: Anhydrite A&B, South --> FRACXABS
!   Param 149: MB 139,        South --> FRACX39S
!
!***************************************
!
! Fracturing in MB 138 away from repository, north (right) side
!
LIMIT ELEMENT 1384 to 1406
!
!   Define meaningful fracturing as doubling of initial permeability
!
FR_TOL38 = 2.0*PERM_X[B:5]
!
!   Set reference point for fracturing length at the north repository border
!
XREF38N = X[N:3496]
!
!   Determine average x-coordinate of element centroid as element variable
!
XECENT = NOD2ELE(X)
!
!   Compare any change in permeability against fracture criterion
!     If criterion met (i.e., permeability of an element has at least
doubled)
!     then calculate length of fracture as distance from reference point
!     to centroid of element, otherwise set fracture length to zero
!
XDIST = IFGT0(PERMBRX-FR_TOL38,XECENT-XREF38N,0.0)
!
!   Extract maximum value of fracture length at each time
!
FRACX38N = SMAX(XDIST)
!
!   Delete temporary variables (tolerance used repeated below, then deleted)
!
DELETE XREF38N, XECENT, XDIST
!
!***************************************
!
! Fracturing in Anhydrite A&B away from repository, north (right) side
!
LIMIT ELEMENT 1316 to 1338
!
FR_TOLAB = 2.0*PERM_X[B:4]
XREFABN  = X[N:3289]
XECENT   = NOD2ELE(X)
XDIST    = IFGT0(PERMBRX-FR_TOLAB,XECENT-XREFABN,0.0)
FRACXABN = SMAX(XDIST)
!
DELETE XREFABN, XECENT, XDIST
!
!***************************************
!
```

```
! Fracturing in MB 139 away from repository, north (right) side
!
LIMIT ELEMENT 1267 to 1289
!
FR_TOL39 = 2.0*PERM_X[B:3]
XREF39N  = X[N:2806]
XECENT   = NOD2ELE(X)
XDIST    = IFGT0(PERMBRX-FR_TOL39,XECENT-XREF39N,0.0)
FRACX39N = SMAX(XDIST)
!
DELETE XREF39N, XECENT, XDIST
!
!**************************************
!**************************************
!
! Fracturing in MB 138 away from repository, south (left) side
!
LIMIT ELEMENT 1339 to 1360
!
XREF38S  = X[N:3473]
XECENT   = NOD2ELE(X)
XDIST    = IFGT0(PERMBRX-FR_TOL38,XREF38S-XECENT,0.0)
FRACX38S = SMAX(XDIST)
!
DELETE XREF38S, XECENT, XDIST
!
!**************************************
!
! Fracturing in Anhydrite A&B away from repository, south (left) side
!
LIMIT ELEMENT 1290 to 1311
!
XREFABS  = X[N:3266]
XECENT   = NOD2ELE(X)
XDIST    = IFGT0(PERMBRX-FR_TOLAB,XREFABS-XECENT,0.0)
FRACXABS = SMAX(XDIST)
!
DELETE XREFABS, XECENT, XDIST
!
!**************************************
!
! Fracturing in MB 139 away from repository, south (left) side
!
LIMIT ELEMENT 1241 to 1262
!
XREF39S  = X[N:2783]
XECENT   = NOD2ELE(X)
XDIST    = IFGT0(PERMBRX-FR_TOL39,XREF39S-XECENT,0.0)
FRACX39S = SMAX(XDIST)
!
DELETE XREF39S, XECENT, XDIST
!
!**************************************
!
!**************************************************************************
!**************************************************************************
!
```

```
! SECTION 14: Interbed fracturing: Volume of fracturing zone (m**3)
!
!   Param 150: MB 138,        North --------------> VFRAC38N
!   Param 151: Anhydrite A&B, North --------------> VFRACABN
!   Param 152: MB 139,        North --------------> VFRAC39N
!   Param 153: MB 138,        South --------------> VFRAC38S
!   Param 154: Anhydrite A&B, South --------------> VFRACABS
!   Param 155: MB 139,        South --------------> VFRAC39S
!   Param 156: Total marker bed fracture volume --> VFRACTMB
!
!*************************************
!
! Volume of fracture zone in MB 138 away from repository, north (right) side
!
LIMIT ELEMENT 1384 to 1406
!
!   Extract z-direction thickness of fractured elements, set result to zero
!     for intact elements
!
EL_Z_38N = IFGT0(PERMBRX-FR_TOL38,THICK,0.0)
!
!   Set flag for each fractured element to determine number of affected
elements
!
FLAG_38N = IFGT0(EL_Z_38N,1.0,0.0)
TOTF_38N = SUM(FLAG_38N)
!
!   Check whether any number of elements has fractured, if none then
!     set to dummy number for division step to avoid divide by zero
!
TOTF_38N = IFGT0(TOTF_38N,TOTF_38N,999.0)
!
!   Obtain average fractured y-z area--note that contributions to area sum
!     from intact elements will be zero and that sum will be zero if no
!     elements have fractured
!
A_AVG38N = SUM(EL_Z_38N*DEL_Y)/TOTF_38N
!
!   Multiply average fractured element y-z area times the total fracture
length
!     to obtain fracture zone volume
!
VFRAC38N = FRACX38N * A_AVG38N
!
!   Delete temporary variables except for tolerance and z-direction thickness
!
DELETE FLAG_38N, TOTF_38N, A_AVG38N
!
!*************************************
!
! Volume of fracture zone in Anhydrite A&B away from repository, north side
!
LIMIT ELEMENT 1316 to 1338
!
EL_Z_ABN = IFGT0(PERMBRX-FR_TOLAB,THICK,0.0)
FLAG_ABN = IFGT0(EL_Z_ABN,1.0,0.0)
TOTF_ABN = SUM(FLAG_ABN)
```

```
TOTF_ABN = IFGT0(TOTF_ABN,TOTF_ABN,999.0)
A_AVGABN = SUM(EL_Z_ABN*DEL_Y)/TOTF_ABN
VFRACABN = FRACX39N * A_AVGABN
!
DELETE FLAG_ABN, TOTF_ABN, A_AVGABN
!
!***************************************
!
! Volume of fracture zone in MB 139 away from repository, north (right) side
!
LIMIT ELEMENT 1267 to 1289
!
EL_Z_39N = IFGT0(PERMBRX-FR_TOL39,THICK,0.0)
FLAG_39N = IFGT0(EL_Z_39N,1.0,0.0)
TOTF_39N = SUM(FLAG_39N)
TOTF_39N = IFGT0(TOTF_39N,TOTF_39N,999.0)
A_AVG39N = SUM(EL_Z_39N*DEL_Y)/TOTF_39N
VFRAC39N = FRACX39N * A_AVG39N
!
DELETE FLAG_39N, TOTF_39N, A_AVG39N
!
!***************************************
!***************************************
!
! Volume of fracture zone in MB 138 away from repository, south (left) side
!
LIMIT ELEMENT 1339 to 1360
!
EL_Z_38S = IFGT0(PERMBRX-FR_TOL38,THICK,0.0)
FLAG_38S = IFGT0(EL_Z_38S,1.0,0.0)
TOTF_38S = SUM(FLAG_38S)
TOTF_38S = IFGT0(TOTF_38S,TOTF_38S,999.0)
A_AVG38S = SUM(EL_Z_38S*DEL_Y)/TOTF_38S
VFRAC38S = FRACX38S * A_AVG38S
!
DELETE FLAG_38S, TOTF_38S, A_AVG38S, FR_TOL38
!
!***************************************
!
! Volume of fracture zone in Anhydrite A&B away from repository, south side
!
LIMIT ELEMENT 1290 to 1311
!
EL_Z_ABS = IFGT0(PERMBRX-FR_TOLAB,THICK,0.0)
FLAG_ABS = IFGT0(EL_Z_ABS,1.0,0.0)
TOTF_ABS = SUM(FLAG_ABS)
TOTF_ABS = IFGT0(TOTF_ABS,TOTF_ABS,999.0)
A_AVGABS = SUM(EL_Z_ABS*DEL_Y)/TOTF_ABS
VFRACABS = FRACX39S * A_AVGABS
!
DELETE FLAG_ABS, TOTF_ABS, A_AVGABS, FR_TOLAB
!
!***************************************
!
! Volume of fracture zone in MB 139 away from repository, south (left) side
!
LIMIT ELEMENT 1241 to 1262
```

```
!
EL_Z_39S = IFGT0(PERMBRX-FR_TOL39,THICK,0.0)
FLAG_39S = IFGT0(EL_Z_39S,1.0,0.0)
TOTF_39S = SUM(FLAG_39S)
TOTF_39S = IFGT0(TOTF_39S,TOTF_39S,999.0)
A_AVG39S = SUM(EL_Z_39S*DEL_Y)/TOTF_39S
VFRAC39S = FRACX39S * A_AVG39S
!
DELETE FLAG_39S, TOTF_39S, A_AVG39S, FR_TOL39
!
!**************************************
!
! Total volume of all fracture zones in marker beds away from repository
!
VFRACTMB = VFRAC38N + VFRACABN + VFRAC39N + VFRAC38S + VFRACABS + VFRAC39S
!
!**************************************
!
!***************************************************************************
!***************************************************************************
!
! SECTION 15: Interbed fracturing: Vol-avg perm in fracturing !zone (m**2)
!
!   Param 157: MB 138,        North --> APERM38N
!   Param 158: Anhydrite A&B, North --> APERMABN
!   Param 159: MB 139,        North --> APERM39N
!   Param 160: MB 138,        South --> APERM38S
!   Param 161: Anhydrite A&B, South --> APERMABS
!   Param 162: MB 139,        South --> APERM39S
!
!**************************************
!
! Volume-averaged permeability in MB 138 away from repository, north side
!
LIMIT ELEMENT 1384 to 1406
!
!   Calculate individual element volume using previously extracted z-
direction
!     thickness, with thickness set to zero for non-fractured elements
!
VOL_E38N = DEL_X * DEL_Y * EL_Z_38N
!
!   Multiply individual element permeabilites times individual element
volume,
!     note that result will be zero for intact elements
!
VPERM38N = PERMBRX * VOL_E38N
!
!   Add up total element volume of fractured elements, note that this could
!     be zero if no element has fractured--if it is zero then set it to a
!     dummy value to avoid divide by zero in next step
!
TVOLE38N = SUM(VOL_E38N)
TVOLE38N = IFGT0(TVOLE38N,TVOLE38N,-999.0)
!
!   Calculate volume-averaged permeabilities for fractured elements only,
!     for timesteps with no fracturing set average permeability to initial
```

```
value
!
APERM38N = IFGT0(TVOLE38N,SUM(VPERM38N)/TVOLE38N,PERM_X[B:5])
!
!   Delete temporary variables which aren't used later
!
DELETE EL_Z_38N, TVOLE38N, VPERM38N
!
!***************************************
!
! Volume-averaged permeability in Anhydrite A&B away from repository, north
side
!
LIMIT ELEMENT 1316 to 1338
!
VOL_EABN = DEL_X * DEL_Y * EL_Z_ABN
VPERMABN = PERMBRX * VOL_EABN
TVOLEABN = SUM(VOL_EABN)
TVOLEABN = IFGT0(TVOLEABN,TVOLEABN,-999.0)
APERMABN = IFGT0(TVOLEABN,SUM(VPERMABN)/TVOLEABN,PERM_X[B:4])
!
DELETE EL_Z_ABN, TVOLEABN, VPERMABN
!
!***************************************
!
! Volume-averaged permeability in MB 139 away from repository, north side
!
LIMIT ELEMENT 1267 to 1289
!
VOL_E39N = DEL_X * DEL_Y * EL_Z_39N
VPERM39N = PERMBRX * VOL_E39N
TVOLE39N = SUM(VOL_E39N)
TVOLE39N = IFGT0(TVOLE39N,TVOLE39N,-999.0)
APERM39N = IFGT0(TVOLE39N,SUM(VPERM39N)/TVOLE39N,PERM_X[B:3])
!
DELETE EL_Z_39N, TVOLE39N, VPERM39N
!
!***************************************
!***************************************
!
! Volume-averaged permeability in MB 138 away from repository, south side
!
LIMIT ELEMENT 1339 to 1360
!
VOL_E38S = DEL_X * DEL_Y * EL_Z_38S
VPERM38S = PERMBRX * VOL_E38S
TVOLE38S = SUM(VOL_E38S)
TVOLE38S = IFGT0(TVOLE38S,TVOLE38S,-999.0)
APERM38S = IFGT0(TVOLE38S,SUM(VPERM38S)/TVOLE38S,PERM_X[B:5])
!
DELETE EL_Z_38S, TVOLE38S, VPERM38S
!
!***************************************
!
! Volume-averaged permeability in Anhydrite A&B away from repository, south
side
!
```

```
LIMIT ELEMENT 1290 to 1311
!
VOL_EABS = DEL_X * DEL_Y * EL_Z_ABS
VPERMABS = PERMBRX * VOL_EABS
TVOLEABS = SUM(VOL_EABS)
TVOLEABS = IFGT0(TVOLEABS,TVOLEABS,-999.0)
APERMABS = IFGT0(TVOLEABS,SUM(VPERMABS)/TVOLEABS,PERM_X[B:4])
!
DELETE EL_Z_ABS, TVOLEABS, VPERMABS
!
!***************************************
!
! Volume-averaged permeability in MB 139 away from repository, south side
!
LIMIT ELEMENT 1241 to 1262
!
VOL_E39S = DEL_X * DEL_Y * EL_Z_39S
VPERM39S = PERMBRX * VOL_E39S
TVOLE39S = SUM(VOL_E39S)
TVOLE39S = IFGT0(TVOLE39S,TVOLE39S,-999.0)
APERM39S = IFGT0(TVOLE39S,SUM(VPERM39S)/TVOLE39S,PERM_X[B:3])
!
DELETE EL_Z_39S, TVOLE39S, VPERM39S
!
!***************************************
!
!****************************************************************************
!****************************************************************************
!
! SECTION 16: Interbed fracturing: Increase in pore volume in fracturing zone
(m
**3)
!
!   Param 163: MB 138,        North ------------------> PVOLI38N
!   Param 164: Anhydrite A&B, North ------------------> PVOLIABN
!   Param 165: MB 139,        North ------------------> PVOLI39N
!   Param 166: MB 138,        South ------------------> PVOLI38S
!   Param 167: Anhydrite A&B, South ------------------> PVOLIABS
!   Param 168: MB 139,        South ------------------> PVOLI39S
!   Param 169: Total frac zone pore volume increase --> PVOLI_T
!
!***************************************
!
! Increase in pore volume in MB 138, north side
!
LIMIT ELEMENT 1384 to 1406
!
!   Calculate total current pore volumes for fractured elements, note that
!     contribution from intact elements will be zero since this measure of
!     their volume was set to zero
!
PVC38N = SUM(POROS*VOL_E38N)
!
!   Extract minimum porosity values (are these always initial values?)
!
PORMIN = ENVMIN(POROS)
!
```

```
!   Sum minimum pore volume in fractured zone
!
PVM38N = SUM(PORMIN*VOL_E38N)
!
!   Increase in pore volume is the current sum minus the minimum
!
PVOLI38N = PVC38N - PVM38N
!
!   Delete temporary variables
!
DELETE VOL_E38N, PVC38N, PVM38N, PORMIN
!
!***************************************
!
! Increase in pore volume in Anhydrite A&B, north side
!
LIMIT ELEMENT 1316 to 1338
!
PVCABN   = SUM(POROS*VOL_EABN)
PORMIN   = ENVMIN(POROS)
PVMABN   = SUM(PORMIN*VOL_EABN)
PVOLIABN = PVCABN - PVMABN
!
DELETE VOL_EABN, PVCABN, PVMABN, PORMIN
!
!***************************************
!
! Increase in pore volume in MB 139, north side
!
LIMIT ELEMENT 1267 to 1289
!
PVC39N = SUM(POROS*VOL_E39N)
PORMIN = ENVMIN(POROS)
PVM39N = SUM(PORMIN*VOL_E39N)
PVOLI39N = PVC39N - PVM39N
!
DELETE VOL_E39N, PVC39N, PVM39N, PORMIN
!
!***************************************
!***************************************
!
! Increase in pore volume in MB 138, south side
!
LIMIT ELEMENT 1339 to 1360
!
PVC38S   = SUM(POROS*VOL_E38S)
PORMIN   = ENVMIN(POROS)
PVM38S   = SUM(PORMIN*VOL_E38S)
PVOLI38S = PVC38S - PVM38S
!
DELETE VOL_E38S, PVC38S, PVM38S, PORMIN
!
!***************************************
!
! Increase in pore volume in Anhydrite A&B, south side
!
LIMIT ELEMENT 1290 to 1311
```

```
!
PVCABS   = SUM(POROS*VOL_EABS)
PORMIN   = ENVMIN(POROS)
PVMABS   = SUM(PORMIN*VOL_EABS)
PVOLIABS = PVCABS - PVMABS
!
DELETE VOL_EABS, PVCABS, PVMABS, PORMIN
!
!***************************************
!
! Increase in pore volume in MB 139, south side
!
LIMIT ELEMENT 1241 to 1262
!
PVC39S   = SUM(POROS*VOL_E39S)
PORMIN   = ENVMIN(POROS)
PVM39S   = SUM(PORMIN*VOL_E39S)
PVOLI39S = PVC39S - PVM39S
!
DELETE VOL_E39S, PVC39S, PVM39S, PORMIN
!
!***************************************
!***************************************
!
! Total increase in pore volume in fractured zones
!
PVOLI_T = PVOLI38N + PVOLIABN + PVOLI39N + PVOLI38S + PVOLIABS + PVOLI39S
!
!***************************************
!
!****************************************************************************
!****************************************************************************
!
!  SECTION 17 miscellaneous
!
!   Param 170: Brine volume in brine pocket ---------------> BRNVOL_B
!   Param 171: Downward brine flow at E:658 ---------------> BNBHDNUZ
!   Param 172: Downward brine flow at E:1168 --------------> BRNBHDNC
!   Param 173: Steel mass remaining in waste panel --------> FEKG_W
!   Param 174: Steel mass remaining in waste panel --------> FEKG_W
!   Param 175: Cellulose mass remaining in waste panel ----> CELLKG_W
!   Param 176: Fraction steel remaining in waste panel ----> FEREM_W
!   Param 177: Fraction cellulose remain in waste panel ---> CELREM_W
!   Param 178: Total molesof gas generated in waste panel -> GASMOL_W
!   Param 179: Total gas volume generated in waste panel --> GASVOL_W
!   Param 180: Total pore volume in waste panel -----------> PORVOL_W
!
!***************************************
!
! Brine volume (m**3) in brine pocket
!
LIMIT ELEMENT 2222 TO 2244
!
! Brine volume     = porosity * volume * brine saturation
! Brine saturation = 1.0 - SATGAS
!
BRNVOL_B = SUM(POROS*GRIDVOL*(1.0-SATGAS))
```

```
!
!***************************************
!
! Cumulative brineflow down borehole at upper DRZ
!
BNBHDNU  = IFLT0(FLOWBRY[E:658],-1.0*FLOWBRY[E:658],0.0)
BNBHDNUZ = INTRIGHT(BNBHDNU)
!
DELETE BNBHDNU
!
!***************************************
!
! Cumulative brineflow down borehole (measured at repository top boundary)
!
BRNBHDN  = IFLT0(FLOWBRY[E:1168],-1.0*FLOWBRY[E:1168],0.0)
BRNBHDNC = INTRIGHT(BRNBHDN)
!
DELETE BRNBHDN
!
!***************************************
! Total gas volume (m**3) generated in waste panel
!
LIMIT ELEMENT 1407 to 1427
!
! Molecular weights of iron and cellulosics are defined above (kg/mol)
!
! MW_FE    = 0.055847
! MW_CELL  = 0.027023
!
! Calculate mass inventories (kg) remaining
!
FEKG_W   = SUM(GRIDVOL*FECONC)
CELLKG_W = SUM(GRIDVOL*CELLCONC)
!
! Maximum Fe and bio is at time = 0.0
!
MXFE_W   = ENVMAX(FEKG_W)
MXCELL_W = ENVMAX(CELLKG_W)
!
! Calculate masses consumed and divide by initial amount to get fractions
gone
! Subtract fraction gone from one to get fractions remaining
!
FEREM_W  = 1.0 - ((MXFE_W - FEKG_W)/MXFE_W)
CELREM_W = 1.0 - ((MXCELL_W - CELLKG_W)/MXCELL_W)
!
! Calculate total moles of gas (H2) generated from corrosion of Fe
!
FEMOL_W  = (MXFE_W - FEKG_W)/MW_FE[B:32]*(4.0-STOICOR[B:18])/3.0
!
! Calculate total moles of gas (H2) generated from biodegradation of
cellulosics
!
CELMOL_W = (MXCELL_W - CELLKG_W)/MW_CELL[B:32]*STOIMIC[B:18]
!
! Total moles of gas generated
!
```

```
GASMOL_W = FEMOL_W + CELMOL_W
!
! Convert to volumetric units (m**3) using PV=nRT at reference P & T
!
!   T =    300.15 K
!   P = 101325.00 Pa        = 101325 N/(m**2)
!   R = 8.3145    J/(mol*K) = 8.3145 (N*m)/(mol*K)
!   V = n*(R*T/P) m**3      = n moles * 0.024630 (m**3)/mole
!
GASVOL_W  = 0.02463 * GASMOL_W
!
DELETE MXFE_W,   FEMOL_W
DELETE MXCELL_W, CELMOL_W
!
!**************************************
!
! Total pore volume (m**3) in waste panel
!
LIMIT ELEMENT 1407 to 1427
!
! Pore volume = porosity (m**3 void/m**3 rock) * volume
!
PORVOL_W = SUM(POROS*GRIDVOL)
!
!**************************************
!
!**************************************************************************
!**************************************************************************
!
! SECTION 18
!
!   Param 181: Volume avgd "brine porosity" in waste panel --------->
BRNPOR_W
!   Param 182: Volume avgd "brine porosity" in S rest of repository >
BRNPOSRR
!   Param 183: Volume avgd "brine porosity" in N rest of repository >
BRNPONRR
!   Param 184: Volume avgd "brine porosity" in RoR (north + south) ->
BRNPOR_R
!   Param 185: Volume avgd "brine porosity" in waste regions ------->
BRNPOR_T
!
!**************************************
!
! "Brine porosity" (dimensionless) averaged over Waste Panel
!
!LIMIT ELEMENT 1407 to 1427
!
! Brine saturation = 1.0 - SATGAS
!
!WPVOL    = SUM(GRIDVOL)
!BRNPORW  = SUM(GRIDVOL*POROS*(1.0-SATGAS))
!BRNPOR_W = BRNPORW/WPVOL
!
!DELETE WPVOL, BRNPORW
!
!**************************************
```

```
!
! "Brine porosity" (dimensionless) averaged over S Rest of Repository
!
!LIMIT ELEMENT 1428 to 1433
!
! Brine saturation = 1.0 - SATGAS
!
! SRRVOL    = SUM(GRIDVOL)
!BRNPOSR  = SUM(GRIDVOL*POROS*(1.0-SATGAS))
!BRNPOSRR = BRNPOSR/SRRVOL
!
!DELETE BRNPOSR
!***************************************
!
! "Brine porosity" (dimensionless) averaged over N Rest of Repository
!
!LIMIT ELEMENT 1434 to 1439
!
! Brine saturation = 1.0 - SATGAS
!
! NRRVOL    = SUM(GRIDVOL)
!BRNPONR  = SUM(GRIDVOL*POROS*(1.0-SATGAS))
!BRNPONRR = BRNPONR/NRRVOL
!
!DELETE BRNPONR
!
!***************************************
!
! "Brine porosity" (dimensionless) averaged over Rest of Repository
!
!LIMIT ELEMENT 1428 to 1439
!
! Brine saturation = 1.0 - SATGAS
!
!RRVOL    = SUM(GRIDVOL)
!BRNPORR  = SUM(GRIDVOL*POROS*(1.0-SATGAS))
!BRNPOR_R = BRNPORR/RRVOL
!
!DELETE RRVOL, BRNPORR
!
!***************************************
!
! "Brine porosity" (dimensionless) averaged over Waste Panel and Rest of
!                        Repository
!
!LIMIT ELEMENT 1407 to 1439
!
! Brine saturation = 1.0 - SATGAS
!
!WRVOL    = SUM(GRIDVOL)
!BRNPORT  = SUM(GRIDVOL*POROS*(1.0-SATGAS))
!BRNPOR_T = BRNPORT/WRVOL
!
!DELETE WRVOL, BRNPORT
!
!***************************************
!
```

```
!***************************************************************************
!***************************************************************************
!
! SECTION 19 Total brined flow through marker beds
!
!   Param 186: Total brineflow out of MB 138 towards repository --> BRNM38I
!   Param 187: Total brineflow out of A. A&B towards repository --> BRNAABI
!   Param 188: Total brineflow out of MB 139 towards repository --> BRNM39I
!   Param 189: Total brineflow into MB 138 away from repository --> BRNM38O
!   Param 190: Total brineflow into A. A&B away from repository --> BRNAABO
!   Param 191: Total brineflow into MB 139 away from repository --> BRNM39O
!
!**************************************
!
! Total brineflow out of Marker Bed 138 toward repository (m**3)
!
BRNM38I  = BRM38NIC + BRM38SIC
!
!**************************************
!
! Total brineflow out of Anhydrite A&B toward repository (m**3)
!
BRNAABI  = BRAABNIC + BRAABSIC
!
!**************************************
!
! Total brineflow out of Anhydrite A&B toward repository (m**3)
!
BRNM39I  = BRM39NIC + BRM39SIC
!
!**************************************
!
! Total brineflow into Marker Bed 138 away from repository (m**3)
!
BRNM38O  = BRM38NOC + BRM38SOC
!
!**************************************
!
! Total brineflow into Anhydrite A&B away from repository (m**3)
!
BRNAABO  = BRAABNOC + BRAABSOC
!
!**************************************
!
! Total brineflow into Marker Bed 139 away from repository (m**3)
!
BRNM39O  = BRM39NOC + BRM39SOC
!
!**************************************
!
!***************************************************************************
!***************************************************************************
!
! Param 172: Brine consumed in Waste Panel (m**3) --> BRN_RMVW
!
LIMIT ELEMENT 1407 to 1427
!
```

```
!   Add up Consumption rates (resulting units are kg/s)
!
BRN_CRW  = SUM(BRINRATE*GRIDVOL)
!
!   Integrate result to get kg of brine consumed
!
BRN_CONW = INTRIGHT(BRN_CRW)
!
!   Convert to volumetric amount (m**3) by
!      dividing by brine density (kg/m**3) at reference conditions
!
BRN_RMVW = -1.0*BRN_CONW/1220.0
!
!   Delete temporary variables
!
DELETE BRN_CRW, BRN_CONW
!
!**************************************************
!
! Param 173: Brine consumed in S Rest of Repository (m**3) --> BRN_RMSR
!
LIMIT ELEMENT 1428 to 1433
!
!   Add up consumption rates (resulting units are kg/s)
!
BRN_CSRR = SUM(BRINRATE*GRIDVOL)
!
!   Integrate result to get kg of brine consumed
!
BR_CONSR  = INTRIGHT(BRN_CSRR)
!
!   Convert to volumetric amount (m**3) by
!      dividing by brine density (kg/m**3) at reference conditions
!
BRN_RMSR = -1.0*BR_CONSR/1220.0
!
!   Delete temporary variables
!
DELETE BRN_CSRR, BR_CONSR
!
!**************************************************
!
! Param 174: Brine consumed in N Rest of Repository (m**3) --> BRN_RMNR
!
LIMIT ELEMENT 1434 to 1439
!
!   Add up consumption rates (resulting units are kg/s)
!
BRN_CNRR = SUM(BRINRATE*GRIDVOL)
!
!   Integrate result to get kg of brine consumed
!
BR_CONNR  = INTRIGHT(BRN_CNRR)
!
!   Convert to volumetric amount (m**3) by
!      dividing by brine density (kg/m**3) at reference conditions
!
```

```
BRN_RMNR = -1.0*BR_CONNR/1220.0
!
!   Delete temporary variables
!
DELETE BRN_CNRR, BR_CONNR
!
!*************************************************
!
! Param 175: Brine consumed in Rest of Repository (m**3) --> BRN_RMVR
!
LIMIT ELEMENT 1428 to 1439
!
!   Add up consumption rates (resulting units are kg/s)
!
BRN_CRR = SUM(BRINRATE*GRIDVOL)
!
!   Integrate result to get kg of brine consumed
!
BRN_CONR  = INTRIGHT(BRN_CRR)
!
!   Convert to volumetric amount (m**3) by
!      dividing by brine density (kg/m**3) at reference conditions
!
BRN_RMVR = -1.0*BRN_CONR/1220.0
!
!   Delete temporary variables
!
DELETE BRN_CRR, BRN_CONR
!
!****************************************************************************
!****************************************************************************
!
! SECTION 20  Remaining materials for gas generation
!
!   Param 196: Remaining fraction of steel in south RoR -----------> FEREM_SR
!   Param 197: Remaining fraction of steel in north RoR -----------> FEREM_NR
!   Param 198: Remaining fraction of steel in Rest of Repository --> FEREM_R
!   Param 199: Remaining fraction of cellulose south RoR ----------> CELREM_S
!   Param 200: Remaining fraction of cellulose north RoR ----------> CELREM_N
!   Param 201: Remaining fraction of cellulose in Rest of Repos. --> CELREM_R
!
!*******************************************
!
!       South rest of respository
!
LIMIT ELEMENT 1428 to 1433
!
! Calculate mass inventories (kg) remaining
!
FE_KGS    = SUM(GRIDVOL*FECONC)
CELL_KGS  = SUM(GRIDVOL*CELLCONC)
!
! Maximum Fe and bio is at time = 0.0
!
MXFES     = ENVMAX(FE_KGS)
MXCELLS   = ENVMAX(CELL_KGS)
!
```

```
! Calculate masses consumed and divide by initial amount to get fractions
gone
! Subtract fraction gone from one to get fractions remaining
!
FEREM_SR   = 1.0 - ((MXFES - FE_KGS)/MXFES)
CELREM_S  = 1.0 - ((MXCELLS - CELL_KGS)/MXCELLS)
!
! Delete intermediate variables:
!
DELETE FE_KGS, CELL_KGS
!
!********************************************
!
!       North rest of respository
!
LIMIT ELEMENT 1434 to 1439
!
! Calculate mass inventories (kg) remaining
!
FE_KGN    = SUM(GRIDVOL*FECONC)
CELL_KGN  = SUM(GRIDVOL*CELLCONC)
!
! Maximum Fe and bio is at time = 0.0
!
MXFEN     = ENVMAX(FE_KGN)
MXCELLN   = ENVMAX(CELL_KGN)
!
! Calculate masses consumed and divide by initial amount to get fractions
gone
! Subtract fraction gone from one to get fractions remaining
!
FEREM_NR  = 1.0 - ((MXFEN - FE_KGN)/MXFEN)
CELREM_N  = 1.0 - ((MXCELLN - CELL_KGN)/MXCELLN)
!
! Delete intermediate variables:
!
DELETE FE_KGN, CELL_KGN

!********************************************
!
!       Rest of repository (north + south)
!
LIMIT ELEMENT 1428 to 1439
!
! Calculate mass inventories (kg) remaining
!
FE_KGR    = SUM(GRIDVOL*FECONC)
CELL_KGR  = SUM(GRIDVOL*CELLCONC)
!
! Maximum Fe and bio is at time = 0.0
!
MXFER     = ENVMAX(FE_KGR)
MXCELLR   = ENVMAX(CELL_KGR)
!
! Calculate masses consumed and divide by initial amount to get fractions
gone
! Subtract fraction gone from one to get fractions remaining
```

```
!
FEREM_R   = 1.0 - ((MXFER - FE_KGR)/MXFER)
CELREM_R  = 1.0 - ((MXCELLR - CELL_KGR)/MXCELLR)
!
! Delete intermediate variables:
!
DELETE FE_KGR, CELL_KGR
!
!*******************************************
!
! Calculate total moles of gas (H2) generated from corrosion of Fe
!
!       South Rest of repository
!
FEMOL_S  = (MXFES - FE_KGS)/MW_FE[B:32]*(4.0-STOICOR[B:18])/3.0
!
!       North rest of repository
!
FEMOL_N  = (MXFEN - FE_KGN)/MW_FE[B:32]*(4.0-STOICOR[B:18])/3.0
!
!       Rest of repository (north + south)
!
FEMOL_R  = (MXFER - FE_KGR)/MW_FE[B:32]*(4.0-STOICOR[B:18])/3.0
!
! Calculate total moles of gas (H2) generated from biodegradation of
cellulosics
!
!       South rest of repository
!
CELMOL_S = (MXCELLS - CELL_KGS)/MW_CELL[B:32]*STOIMIC[B:18]
!
!       North rest of respository
!
CELMOL_N = (MXCELLN - CELL_KGN)/MW_CELL[B:32]*STOIMIC[B:18]
!
!       Rest of repository (north + south)
!
CELMOL_R = (MXCELLR - CELL_KGR)/MW_CELL[B:32]*STOIMIC[B:18]
!
! Param 182: Total moles of gas generated in S RoR -> GASMOL_S
!
GASMOL_S = FEMOL_S + CELMOL_S
!
! Param 183: Total moles of gas generated in N RoR -> GASMOL_N
!
GASMOL_N = FEMOL_N + CELMOL_N
!
! Param 184: Total moles of gas generated in RoR --> GASMOL_R
!
GASMOL_R = FEMOL_R + CELMOL_R
!
! Delete intermediate variables:
!
DELETE MXFER,   FEMOL_R, MXFES, MXFEN, FEMOL_S, FEMOL_N
DELETE MXCELLR, CELMOL_R, MXCELLS, MXCELLN, CELMOL_S, CELMOL_N
!
!*****************************************************************************
```

```
!***************************************************************************
!
! SECTION 21  Brine flow ratios
!
!  Param 202: Cumulative Brineflow into Waste Panel excl. Borehole -->
BRWI_XBH
!  Param 203: (Salado brine inflow)/(total brine inflow) at DRZ ----->
SAL_BR_T
!  Param 204: (Salado br. inflow)/(unconsumed br. inflow) at DRZ ---->
SAL_BR_U
!  Param 205: (Salado br. inflow)/(total br. in.) at Waste Panel ---->
SB_TB_WP
!  Param 206: (Salado br. in.)/(unconsumed br. in.) at Waste Panel -->
SB_UB_WP
!
!*******************************************
!
! Cumulative brine inflow into Waste Panel, excluding Borehole
!
!   Bottom except for Borehole
!
BRWI_X   =          IFGT0(FLOWBRY[E:1407],FLOWBRY[E:1407],0.0)
BRWI_X   = BRWI_X + IFGT0(FLOWBRY[E:1408],FLOWBRY[E:1408],0.0)
BRWI_X   = BRWI_X + IFGT0(FLOWBRY[E:1409],FLOWBRY[E:1409],0.0)
BRWI_X   = BRWI_X + IFGT0(FLOWBRY[E:1411],FLOWBRY[E:1411],0.0)
BRWI_X   = BRWI_X + IFGT0(FLOWBRY[E:1412],FLOWBRY[E:1412],0.0)
BRWI_X   = BRWI_X + IFGT0(FLOWBRY[E:1413],FLOWBRY[E:1413],0.0)
!
!   Top except for Borehole
!
BRWI_X   = BRWI_X + IFLT0(FLOWBRY[E:1165],-1.0*FLOWBRY[E:1165],0.0)
BRWI_X   = BRWI_X + IFLT0(FLOWBRY[E:1166],-1.0*FLOWBRY[E:1166],0.0)
BRWI_X   = BRWI_X + IFLT0(FLOWBRY[E:1167],-1.0*FLOWBRY[E:1167],0.0)
BRWI_X   = BRWI_X + IFLT0(FLOWBRY[E:1169],-1.0*FLOWBRY[E:1169],0.0)
BRWI_X   = BRWI_X + IFLT0(FLOWBRY[E:1170],-1.0*FLOWBRY[E:1170],0.0)
BRWI_X   = BRWI_X + IFLT0(FLOWBRY[E:1171],-1.0*FLOWBRY[E:1171],0.0)
!
!   Left side
!
BRWI_X   = BRWI_X + IFGT0(FLOWBRX[E:1407],FLOWBRX[E:1407],0.0)
BRWI_X   = BRWI_X + IFGT0(FLOWBRX[E:1414],FLOWBRX[E:1414],0.0)
BRWI_X   = BRWI_X + IFGT0(FLOWBRX[E:1421],FLOWBRX[E:1421],0.0)
!
!   Right side
!
BRWI_X   = BRWI_X + IFLT0(FLOWBRX[E:1455],-1.0*FLOWBRX[E:1455],0.0)
BRWI_X   = BRWI_X + IFLT0(FLOWBRX[E:1456],-1.0*FLOWBRX[E:1456],0.0)
BRWI_X   = BRWI_X + IFLT0(FLOWBRX[E:1457],-1.0*FLOWBRX[E:1457],0.0)
!
!   Accumulate over time
!
BRWI_XBH = INTRIGHT(BRWI_X)
!
DELETE BRWI_X
!
!*******************************************
!
```

```
! (Salado brine inflow)/(total brine inflow) at DRZ
!
!   Define a dummy denominator to avoid dividing by zero
!
DENDUM05 = BRAALIC + BNBHLDRZ + BNBHDNUZ
DENDUM06 = IFEQ0(DENDUM05,1.0,DENDUM05)
!
SAL_BR_T = BRAALIC/DENDUM06
!
DELETE DENDUM05, DENDUM06
!
!********************************************
!
! (Salado brine inflow)/(unconsumed brine inflow) at DRZ
!
!   Define a dummy denominator to avoid dividing by zero
!
DENDUM07 = BRAALIC + BNBHLDRZ + BNBHDNUZ - BRN_RMV
DENDUM08 = IFEQ0(DENDUM07,1.0,DENDUM07)
!
SAL_BR_U = BRAALIC/DENDUM08
!
DELETE DENDUM07, DENDUM08
!
!********************************************
!
! (Salado brine inflow)/(total brine inflow) at Waste Panel
!
!   Define a dummy denominator to avoid dividing by zero
!
DENDUM09  = BRWI_XBH + BRNBHDNC + BRNBHUPP
DENDUM10  = IFEQ0(DENDUM09,1.0,DENDUM09)
!
SB_TB_WP = BRWI_XBH/DENDUM10
!
DELETE DENDUM09, DENDUM10
!
!********************************************
!
! (Salado brine inflow)/(unconsumed brine inflow) at Waste Panel
!
!   Define a dummy denominator to avoid dividing by zero
!
DENDUM11  = BRWI_XBH + BRNBHDNC + BRNBHUPP - BRN_RMVW
DENDUM12  = IFEQ0(DENDUM11,1.0,DENDUM11)
!
SB_UB_WP = BRWI_XBH/DENDUM12
!
DELETE DENDUM11, DENDUM12
!
!****************************************************************************
!****************************************************************************
!
! Borehole Cumulative brineflow (m**3) vertically at Magenta Dolomite Member
!
!   Param 190: Brineflow up borehole (@element 1912) -----> BRNBHUMC
!
```

```
!**************************************
!
! Borehole Cumulative brineflow up borehole (at Magenta Member)
!
BRNBHUM  = IFGT0(FLOWBRY[E:1912],FLOWBRY[E:1912],0.0)
BRNBHUMC = INTRIGHT(BRNBHUM)
!
!**************************************
!
! Cumulative brineflow up shaft (at Magenta Member)
!
BRNSHUM  = IFGT0(FLOWBRY[E:1491],FLOWBRY[E:1491],0.0)
BRNSHUMC = INTRIGHT(BRNSHUM)
!!**************************************
!
! Clean up output--limit to requested quantities
!

DELETE BRNBHUM, BRNSHUM
!
!**************************************************************************
!**************************************************************************
!
! SECTION 22 Outflow via mb's at land boundaries
!
! Total outward brineflow in marker beds across land-withdrawal boundary
(m**3)
!
!   Param 207: MB 138,        North --> BRM38NLW
!   Param 208: Anhydrite A&B, North --> BRAABNLW
!   Param 209: MB 139,        North --> BRM39NLW
!   Param 210: MB 138,        South --> BRM38SLW
!   Param 211: Anhydrite A&B, South --> BRAABSLW
!   Param 212: MB 139,        South --> BRM39SLW
!   Param 213: all marker beds -------> BRAALLWC
!
!**************************************
!
! Total outward brineflow in MB 138 across l-w boundary, north (right) side
!
BRNM38N0 = IFGT0(FLOWBRX[E:1401],FLOWBRX[E:1401],0.0)
BRM38NLW = INTRIGHT(BRNM38N0)
! in Anhydrite A&B across l-w boundary, north side
!
BRNAABN0 = IFGT0(FLOWBRX[E:1333],FLOWBRX[E:1333],0.0)
BRAABNLW = INTRIGHT(BRNAABNO)
!**************************************
!
! Total outward brineflow AABN0)
!
!**************************************
!
! Total outward brineflow in MB 139 across l-w boundary, north (right) side
!
BRNM39N0 = IFGT0(FLOWBRX[E:1284],FLOWBRX[E:1284],0.0)
BRM39NLW = INTRIGHT(BRNM39N0)
!
```

```
!***************************************
!***************************************
!
! Total outward brineflow in MB 138 across l-w boundary, south (left) side
!
BRNM38S0 = IFLT0(FLOWBRX[E:1344],-1.0*FLOWBRX[E:1344],0.0)
BRM38SLW = INTRIGHT(BRNM38S0)
!
!***************************************
!
! Total outward brineflow in Anhydrite A&B across l-w boundary, south side
!
BRNAABS0 = IFLT0(FLOWBRX[E:1295],-1.0*FLOWBRX[E:1295],0.0)
BRAABSLW = INTRIGHT(BRNAABS0)
!
!***************************************
!
! Total outward brineflow in MB 139 across l-w boundary, south (left) side
!
BRNM39S0 = IFLT0(FLOWBRX[E:1246],-1.0*FLOWBRX[E:1246],0.0)
BRM39SLW = INTRIGHT(BRNM39S0)
!
!***************************************
!
! Total outward brineflow in all anhydrite layers across l-w boundary
!
BRAALLWC = BRM38NLW + BRAABNLW + BRM39NLW + BRM38SLW + BRAABSLW + BRM39SLW
!
!***************************************
!
! Clean up output--limit to requested quantities
!
DELETE BRNM38N0, BRNAABN0, BRNM39N0, BRNM38S0, BRNAABS0, BRNM39S0
!
!****************************************************************************
!****************************************************************************
!
! SECTION 23: Contributions of gas generated from each source (%/100)
!
!   Param 214: Fraction of total gas due to steel corrosion ---------->
FR_TG_C
!   Param 215: Fraction of total gas due to total microbial ---------->
FR_TG_M
!   Param 216: Fraction of total gas due to humid microbial ---------->
FR_TG_H
!   Param 217: Fraction of total gas due to inundated microbial ------>
FR_TG_I
!   Param 218: Fraction of microbial gas from humid conditions ------->
FR_MG_H
!   Param 219: Fraction of microbial gas from inundated conditions --->
FR_MG_I
!
!***************************************
!
! Fraction of total gas due to steel corrosion
!
!   Check total amount of gas to avoid subsequent divide by zero (if total
```

```
gas
!   is equal to zero, then divide by one since fraction will be zero)
!
GAS_SUM  = IFEQ0(GAS_MOLE,1.0,GAS_MOLE)
!
!   Check total amount of microbial-generated gas to avoid divide by zero
!
GM_SUM   = IFEQ0(C_M_HI_T,1.0,C_M_HI_T)
!
FR_TG_C  = FE_MOLE/GAS_SUM
!
!***************************************
!
! Fraction of total gas due to total microbial degradation
!
FR_TG_M  = 1.0 - FR_TG_C
!
!***************************************
!
! Fraction of total gas due to humid microbial degradation
!
FR_TG_H  = FR_TG_M*(CELL_M_H/GM_SUM)
!
!***************************************
!
! Fraction of total gas due to inundated microbial degradation
!
FR_TG_I  = FR_TG_M*(1.0 - (CELL_M_H/GM_SUM))
!
!***************************************
!
! Fraction of microbial gas due to humid conditions
!
FR_MG_H  = CELL_M_H/GM_SUM
!
!***************************************
!
! Fraction of microbial gas due to inundated conditions
!
FR_MG_I  = 1.0 - (CELL_M_H/GM_SUM)
!
!***************************************
!
! Delete temporary variables
!
DELETE GAS_SUM, GM_SUM
!
!****************************************************************************
!
! SECTION 23: Total pore volumes in rest of repository (m**3)
!
! Param 220: Total pore volume in S rest of repository (m**3) --> PORVOL_S
! Param 221: Total pore volume in N rest of repository (m**3) --> PORVOL_N
! Param 222: Total pore volume in rest of repository (m**3) ----> PORVOL_R
!
!****************************************************************************
!
```

```
! SOUTH REST OF REPOSITORY
!
LIMIT ELEMENT 1428 to 1433
!
! Pore volume = porosity (m**3 void/m**3 rock) * volume
!
PORVOL_S = SUM(POROS*GRIDVOL)
!
!***************************************
!
! NORTH REST OF REPOSITORY
!
LIMIT ELEMENT 1434 to 1439
!
PORVOL_N = SUM(POROS*GRIDVOL)
!
!**************************************
!
!       REST OF REPOSITORY (NORTH + SOUTH)
!
LIMIT ELEMENT 1428 to 1439
!
! Pore volume = porosity (m**3 void/m**3 rock) * volume
!
PORVOL_R = SUM(POROS*GRIDVOL)
!
LIMIT ELEMENT OFF
!
!***************************************************************************
!
! SECTION 25: Element properties in database converted here to global
variables
!
!   Param 223: CORRMCO2 in STEEL    (element block 30) --> WGRCOR
!   Param 224: PROBDEG  in WAS_AREA (element block 18) --> WMICDFLG
!   Param 225: GRATMICI in WAS_AREA (element block 18) --> WGRMICI
!   Param 226: GRATMICH in WAS_AREA (element block 18) --> WGRMICH
!   Param 227: FBETA    in CELLULS  (element block 31) --> WFBETCEL
!   Param 228: SAT_RGAS in WAS_AREA (element block 18) --> WRGSSAT
!   Param 229: SAT_RBRN in WAS_AREA (element block 18) --> WRBRNSAT
!   Param 230: SAT_WICK in WAS_AREA (element block 18) --> WASTWICK
!   Param 231: POROSITY in S_HALITE (element block  1) --> HALPOR
!   Param 232: PRMX_LOG in S_HALITE (element block  1) --> HALPRM
!   Param 233: COMP_RCK in S_HALITE (element block  1) --> HALCOMP
!   Param 234: PRMX_LOG in S_MB139  (element block  3) --> ANHPRM
!   Param 235: COMP_RCK in S_MB139  (element block  3) --> ANHCOMP
!   Param 236: RELP_MOD in S_MB139  (element block  3) --> ANHBCVGP
!   Param 237: SAT_RBRN in S_MB139  (element block  3) --> ANRBRSAT
!   Param 238: SAT_RGAS in S_MB139  (element block  3) --> ANRGSSAT
!   Param 239: PORE_DIS in S_MB139  (element block  3) --> ANHBCEXP
!   Param 240: PRESSURE in S_HALITE (element block  1) --> SALPRES
!   Param 241: PRESSURE in CASTILER (element block 11) --> BPINTPRS
!   Param 242: PRMX_LOG in CASTILER (element block 11) --> BPPRM
!   Param 243: COMP_RCK in CASTILER (element block 11) --> BPCOMP
!   Param 244: PRMX_LOG in BH_SAND  (element block 24) --> BHPERM
!   Param 245: PRMX_LOG in CONC_PLG (element block 22) --> PLGPRM
!   Param 246: PORE_DIS in CONC_PCS (element block 21) --> CONBCEXP
```

```
!   Param 246: PRMX_LOG in SHFTL_T1 (element block 41) --> SHLPRM2
!   Param 247: PRMX_LOG in SHFTL_T2 (element block 42) --> SHLPRM3
!   Param 248: PRMX_LOG in SHFTU    (element block 40) --> SHUPRM
!   Param 249: SAT_RBRN in SHFTU    (element block 40) --> SHURBRN
!   Param 250: SAT_RGAS in SHFTU    (element block 40) --> SHURGAS
!   Param 251: PRMX_LOG in DRZ_1    (element block 19) --> DRZPRM
!
!
!**************************************
!
WGRCOR   = MAKEGLOB(CORRMCO2[B:30])
WMICDFLG = MAKEGLOB(PROBDEG[B:18])
WGRMICI  = MAKEGLOB(GRATMICI[B:18])
WGRMICH  = MAKEGLOB(GRATMICH[B:18])
WFBETCEL = MAKEGLOB(FBETA[B:31])
WRGSSAT  = MAKEGLOB(SAT_RGAS[B:18])
WRBRNSAT = MAKEGLOB(SAT_RBRN[B:18])
WASTWICK = MAKEGLOB(SAT_WICK[B:18])
HALPOR   = MAKEGLOB(POROSITY[B:1])
HALPRM   = MAKEGLOB(PRMX_LOG[B:1])
HALCOMP  = MAKEGLOB(COMP_RCK[B:1])
ANHPRM   = MAKEGLOB(PRMX_LOG[B:3])
ANHCOMP  = MAKEGLOB(COMP_RCK[B:3])
ANHBCVGP = MAKEGLOB(RELP_MOD[B:3])
ANRBRSAT = MAKEGLOB(SAT_RBRN[B:3])
ANRGSSAT = MAKEGLOB(SAT_RGAS[B:3])
ANHBCEXP = MAKEGLOB(PORE_DIS[B:3])
SALPRES  = MAKEGLOB(PRESSURE[B:1])
BPINTPRS = MAKEGLOB(PRESSURE[B:11])
BPPRM    = MAKEGLOB(PRMX_LOG[B:11])
BPCOMP   = MAKEGLOB(COMP_RCK[B:11])
BHPERM   = MAKEGLOB(PRMX_LOG[B:24])
PLGPRM   = MAKEGLOB(PRMX_LOG[B:22])
CONBCEXP = MAKEGLOB(PORE_DIS[B:21])
CONPRM   = MAKEGLOB(PRMX_LOG[B:21])
SHLPRM2  = MAKEGLOB(PRMX_LOG[B:41])
SHLPRM3  = MAKEGLOB(PRMX_LOG[B:42])
SHLPRM   = MAKEGLOB(PRMX_LOG[B:40])
SHURBRN  = MAKEGLOB(SAT_RBRN[B:40])
SHURGAS  = MAKEGLOB(SAT_RGAS[B:40])
DRZPRM   = MAKEGLOB(PRMX_LOG[B:19])
!
!***************************************************************************
!***************************************************************************
!
DELETE GRIDVOL
!
!***************************************************************************
!***************************************************************************
!
END
```

B.1.6 PREBRAG INPUT FILES FOR SCENARIOS 1, 2, 3,4,5 AND 6.

```
type BF1_CRA1_S1.INP
```

```
! TITLE:    BRAGFLO 2003 CRA1 (PREBRAG)

! SCENARIO: S1

! ANALYSTS: Joshua Stein and Bill Zelinski
! MODIFIED: 01/04/03
!===========================================================================
!   SCENARIO: UNDISTURBED SCENERIO
!           : SINGLE CLOSURE SURFACE
!           :   A)CREEP CLOSURE IN WASTE AREAS
!           : PANEL ON SOUTH, REST OF REPOSITORY ON NORTH
!               : SHAFT ADDED
!               : FRACTURING IN UPPER AND LOWER DRZ
!
!  28 Mar 02 JSS  rev4 Added REPOSIT meaterial and map to fix problem
!                   with WASTE materials.
!  02 Apr 02 JSS  rev5 Changed DRF_PCS in the PCS adjacent to the OPS_AREA
!                   to be mapped as OPS_AREA, which is appropriate for
!                   preclosed excavated regions.
!  15 Jan 03 WPZ  rev6 Added shaft.  Fracturing in both upper and lower DRZ
!  01 Apr 03 WPZ  rev7 modified to run with PREBRAG, Version 7.00 to produce
!                   input to BRAGFLO 5.0.  Accomodates constants that used to
!                   be included in BRAGFLO code that must now be included
!                   in input.
!===========================================================================
*HEADING
TITLE2 = 2003 BRAGFLO: UNDISTURBED INIT CRA
!===========================================================================
!CLOSURE INFORMATION
*CLOSURE
CONTROL, TYPE = PRESSURE, AVE = CELL
SURFACE, MODEL = JAN_96,  PRES_LITHO = 50.0E6,  TIME_OFF = 3.155693E12,&
                          PERM_FACTOR= WAS_AREA:PERM_X, PERM_EXP = 0.0
REGION,  MAT =   WAS_AREA, MODEL = JAN_96
REGION,  MAT =   REPOSIT,  MODEL = JAN_96
REGION,  MAT =   DRF_PCS,  MODEL = JAN_96
!===========================================================================
*RESET
!RESET REGIONS ARE GIVEN THE INITIAL PRESSURE AND SATURATION SPECIFIED IN
! THE INITIAL CONDITIONS AT THE RESET TIME
REGION,MAT=CAVITY_1
REGION,MAT=CAVITY_2
REGION,MAT=CAVITY_3
REGION,MAT=CAVITY_4
TIME=0.0
WASTE,MAT_OLD=CAVITY_1,MAT_NEW=WAS_AREA,&
           PRES_BRINE=101325.0, SAT_BRINE=0.0
WASTE,MAT_OLD=CAVITY_2,MAT_NEW=REPOSIT,&
           PRES_BRINE=101325.0, SAT_BRINE=0.0
!==========================================================================
*INITIAL_CONDITIONS
!BEGIN SIMULATION AT -5 YEARS
BEGIN, TIME=-1.577846E8
SATBR,   ID_BRINE =SATBREL
PRESSURE,ID_PRES  =PRESEL
CONFE  , ID_CONFE =FECONC
CONCELL, ID_CONCEL=CH2OCONC
```

```
ELEVAT,  ID_ELEV  =ELEVE
!============================================================================
*STEP_CONTROL
!TIME STEP IS REDUCED
!  1. AT   0 YEARS: WASTE IS INTRODUCED,
  TIME,BEGIN=0.0, DT=864.0
!  2. AT 200 YEARS: MATERIAL CHANGE
  TIME,BEGIN=6.311385E9, DT=864.0
!============================================================================
*MODIFY_MAP
! ID=1 => 0 YEARS : WASTE INTRODUCED, SHAFT SEALS AND FILL INTRODUCED
! ID=2 => 200 YEARS : COMPACTED SALT (TIME PERIOD 6)
TIME,TIME_ID=1, BEGIN= 0.0
TIME,TIME_ID=2, BEGIN= 6.311385E9
!********
! 0 YEARS
!********
!INTRODUCE FINAL DRZ MATERIAL
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=23,30, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=32,34, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=36,38, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=40,42, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=44,45, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=23,30, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=32,34, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=36,38, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=40,42, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=44,45, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_PCS,  TIME_ID=1, IRANGE=31,31, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=DRZ_PCS,  TIME_ID=1, IRANGE=35,35, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=DRZ_PCS,  TIME_ID=1, IRANGE=39,39, JRANGE=15,16, KRANGE=1,1
!INTRODUCE SHFTU upper shaft
MODIFY, MAT=SHFTU, TIME_ID=1, IRANGE=43,43, JRANGE=25,33, KRANGE=1,1
!INTRODUCE SHFTL_T1 lower shaft t1
MODIFY, MAT=SHFTL_T1, TIME_ID=1, IRANGE=43,43, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=SHFTL_T1, TIME_ID=1, IRANGE=43,43, JRANGE=18,24, KRANGE=1,1
!INTRODUCE CONC-MON lowest part of shaft filled with concrete
MODIFY, MAT=CONC_MON, TIME_ID=1, IRANGE=43,43, JRANGE=8,13, KRANGE=1,1
!INTRODUCE WASTE INTO PANEL REGION
MODIFY, MAT=WAS_AREA, TIME_ID=1, IRANGE=23,29, JRANGE=10,12, KRANGE=1,1
!INTRODUCE WASTE INTO REST OF REPOSITORY
MODIFY, MAT=REPOSIT, TIME_ID=1, IRANGE=32,33, JRANGE=10,12, KRANGE=1,1
MODIFY, MAT=REPOSIT, TIME_ID=1, IRANGE=36,37, JRANGE=10,12, KRANGE=1,1
!INTRODUCE PANEL SEAL BACKFILL modeled as was_area
MODIFY, MAT=DRF_PCS, TIME_ID=1, IRANGE=30,30, JRANGE=10,12, KRANGE=1,1
MODIFY, MAT=DRF_PCS, TIME_ID=1, IRANGE=34,34, JRANGE=10,12, KRANGE=1,1
MODIFY, MAT=DRF_PCS, TIME_ID=1, IRANGE=38,38, JRANGE=10,12, KRANGE=1,1
!MODIFY, MAT=OPS_AREA, TIME_ID=1, IRANGE=42,42, JRANGE=10,12, KRANGE=1,1
!INTRODUCE PANEL CLOSURE CONCRETE
MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=31,31, JRANGE=8,13, KRANGE=1,1
MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=35,35, JRANGE=8,13, KRANGE=1,1
MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=39,39, JRANGE=8,13, KRANGE=1,1
!MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=43,43, JRANGE=8,13, KRANGE=1,1
!INTRODUCE OPERATIONS REGION MATERIAL
MODIFY, MAT=OPS_AREA, TIME_ID=1, IRANGE=40,42, JRANGE=10,12, KRANGE=1,1
!INTRODUCE EXPERIMENTAL REGION MATERIAL
MODIFY, MAT=EXP_AREA, TIME_ID=1, IRANGE=44,45, JRANGE=10,12, KRANGE=1,1
```

```
!INTRODUCE UNNAMED MEMBER OF THE RUSTLER
MODIFY, MAT=UNNAMED,  TIME_ID=1, IRANGE= 1,42, JRANGE=25,25, KRANGE=1,1
MODIFY, MAT=UNNAMED,  TIME_ID=1, IRANGE=44,68, JRANGE=25,25, KRANGE=1,1
!INTRODUCE TRUE CULEBRA REGION TO ALLOW BRINE INFLOW TO SHAFT
MODIFY, MAT=CULEBRA,  TIME_ID=1, IRANGE= 1,42, JRANGE=26,26, KRANGE=1,1
MODIFY, MAT=CULEBRA,  TIME_ID=1, IRANGE=44,68, JRANGE=26,26, KRANGE=1,1
!INTRODUCE TAMARISK
MODIFY, MAT=TAMARISK,  TIME_ID=1, IRANGE= 1,42, JRANGE=27,27, KRANGE=1,1
MODIFY, MAT=TAMARISK,  TIME_ID=1, IRANGE=44,68, JRANGE=27,27, KRANGE=1,1
!INTRODUCE MAGENTA
MODIFY, MAT=MAGENTA,  TIME_ID=1, IRANGE= 1,42, JRANGE=28,28, KRANGE=1,1
MODIFY, MAT=MAGENTA,  TIME_ID=1, IRANGE=44,68, JRANGE=28,28, KRANGE=1,1
!INTRODUCE FORTY-NINER
MODIFY, MAT=FORTYNIN,  TIME_ID=1, IRANGE= 1,42, JRANGE=29,29, KRANGE=1,1
MODIFY, MAT=FORTYNIN,  TIME_ID=1, IRANGE= 44,68, JRANGE=29,29, KRANGE=1,1
!INTRODUCE DEWEY LAKE RED BEDS
MODIFY, MAT=DEWYLAKE,  TIME_ID=1, IRANGE= 1,42, JRANGE=30,31, KRANGE=1,1
MODIFY, MAT=DEWYLAKE,  TIME_ID=1, IRANGE= 44,68, JRANGE=30,31, KRANGE=1,1
!INTRODUCE SANTA ROSA FORMATION
MODIFY, MAT=SANTAROS,  TIME_ID=1, IRANGE= 1,42, JRANGE=32,33, KRANGE=1,1
MODIFY, MAT=SANTAROS,  TIME_ID=1, IRANGE= 44,68, JRANGE=32,33, KRANGE=1,1
!****************************************************************************
!            END OF TIME PERIOD 1 MATERIAL RESETS
!****************************************************************************
!********
! 200 YEARS
!********
!INTRODUCE CHANGE IN LOWER SHAFT MATERIAL
MODIFY, MAT=SHFTL_T2, TIME_ID=2, IRANGE=43,43, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=SHFTL_T2, TIME_ID=2, IRANGE=43,43, JRANGE=18,24, KRANGE=1,1

!****************************************************************************
!            END OF TIME PERIOD 2 MATERIAL RESET
!============================================================================
*GEOMETRY
COORD= CARTESIAN
!============================================================================
*SIMULATION_CONTROL
INTEGRATION, TMAX=3.155693E11, DT_INIT=8.64,DT_MIN= 8.64E-4, DT_MAX=1.728E9,&
           DT_INCR=1.25,   DT_REDU= 0.5,   AUTODT=YES,  TSWITCH=1.0,&
           MAXSTEPS=10000
!
ITERATION, DSATLIM= 2.E-1, DPRESLIM = -1.E8 , SATLIM= 1.E-3,&
           SATNORM= 0.30,  PRESNORM = 5.0E5,&
           ITMAX= 8,       IRESETMAX= 40, IJACINT= 1,&
           IJACSWITCH=41,  IJACMIN= 1,    IJACRESET= 5,&
           IUPRPFLAG =9,   IUPMFFLAG= 9,   IUPRPLOOSE= 9,&
           IUPMFLOOSE=9
!
ITERATION, DHSAT_REL= 1.0E-8,   DHPRES_REL=1.0E-8,&
           DHSAT_MIN= 1.0E-10,  DHPRES_MIN=1.0E-2
!
ITERATION, EPS_SAT  = 3.0E+0,     EPS_PRES    = 1.E-2,&
           R_EPS_SAT= 3.0E+0,     R_EPS_PRES  = 1.E-2,&
           FTOL_SAT = 1.0E-2,     FTOL_PRES   = 1.0E-2,&
           R_FTOL_SAT=1.0E-2,     R_FTOL_PRES = 1.0E-2, CONV_TEST = AND
!
```

```
NUMERICS,SOLVER=LU
NUMERICS,JACSCALE= 1.0e7,VSWITCH=NO
NUMERICS, ITRAVE= HARMONIC, IMFRAVE=UPSTREAM
!
GRAVITY, MAT= REFCON, G_ACC= GRAVACC
!
!==========================================================================
*OUTPUT_CONTROL
!
UNITS= SI
MONITOR, ILOC = 26, JLOC = 12, KLOC = 1
MONITOR, ILOC = 32, JLOC = 12, KLOC = 1
MONITOR, ILOC = 36, JLOC = 12, KLOC = 1
!
STEPS, FILE= BINARY, NSTEP=20
TIMES, FILE= ASCII,  VALUES= 0.0, 3.155693E09, 1.104493E10,&
                                  3.155693E10, 9.467079E10,&
                                  1.577847E11, 2.208985E11,&
                                  2.840124E11, 3.155693E11
PRIBIN,&
     PRESBRIN,  PRESGAS,   POROS,     DENGAS,    PERMBRX,  PERMGASX,&
     SATGAS,    FLOWGASX,  FLOWGASY,  FLOWBRX,   FLOWBRY,&
     FECONC,    CELLCONC, BRINRATE
!
PRIASC,&
     PRESBRIN,  PRESGAS,   POROS,    SATGAS,    FECONC,   CELLCONC
!
!HORIZONTAL BRINE FLOW ACROSS 2.4K SOUTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE=17,17, KRANGE=1,1
!HORIZONTAL BRINE FLOW ACROSS 2.4K SOUTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE=25,33, KRANGE=1,1
!HORIZONTAL BRINE FLOW ACROSS 2.4K NORTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE=17,17, KRANGE=1,1
!HORIZONTAL BRINE FLOW ACROSS 2.4K NORTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE=25,33, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K SOUTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE=17,17, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K SOUTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE=25,33, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K NORTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE=17,17, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K NORTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE=25,33, KRANGE=1,1
!BRINE FLOW ACROSS DRZ AND MARKER BEDS BOUNDARY
HISTORY, NAMES=   FLOWBRX,  IRANGE= 23,23,   JRANGE= 7,17, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 46,46, JRANGE= 7,17, KRANGE=1,1
!GAS FLOW ACROSS DRZ AND MARKER BEDS BOUNDARY
HISTORY, NAMES=   FLOWGASX,    IRANGE= 23,23,   JRANGE= 7,17, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 46,46, JRANGE= 7,17, KRANGE=1,1
```

```
!
!VERTICAL BRINE FLOW ACROSS BOTTOM OF UPPER DRZ
HISTORY, NAMES=   FLOWBRY,  IRANGE= 23,45,  JRANGE=13,13, KRANGE=1,1
!VERTICAL BRINE FLOW ACROSS TOP OF LOWER DRZ
HISTORY, NAMES=   FLOWBRY,  IRANGE= 23,45,  JRANGE=10,10, KRANGE=1,1
!
!VERTICAL GAS FLOW ACROSS BOTTOM OF UPPER DRZ
HISTORY, NAMES=   FLOWGASY,  IRANGE= 23,45,  JRANGE=13,13, KRANGE=1,1
!VERTICAL GAS FLOW ACROSS TOP OF LOWER DRZ
HISTORY, NAMES=   FLOWGASY,  IRANGE= 23,45,  JRANGE=10,10, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW SOUTH SIDE OF S_REPOSITORY
HISTORY, NAMES=   FLOWBRX,  IRANGE=32,32,   JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW SOUTH SIDE OF S_REPOSITORY
HISTORY, NAMES=   FLOWGASX, IRANGE=32,32,   JRANGE= 10,12, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW NORTH SIDE OF N_REPOSITORY
HISTORY, NAMES=   FLOWBRX,  IRANGE=38,38,  JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW NORTH SIDE OF REPOSITORY
HISTORY, NAMES=   FLOWGASX, IRANGE=38,38,  JRANGE= 10,12, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW SOUTH SIDE OF PANEL
HISTORY, NAMES=   FLOWBRX,  IRANGE= 23,23, JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW SOUTH SIDE OF PANE0
HISTORY, NAMES=   FLOWGASX, IRANGE= 23,23, JRANGE= 10,12, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW NORTH SIDE OF PANEL
HISTORY, NAMES=   FLOWBRX,  IRANGE=30,30,  JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW NORTH SIDE OF PANEL
HISTORY, NAMES=   FLOWGASX, IRANGE=30,30,  JRANGE= 10,12, KRANGE=1,1
!
!GAS SATURATION IN PANEL
HISTORY, NAMES=   SATGAS,   IRANGE=23,29, JRANGE= 10,12, KRANGE=1,1
!
!GAS SATURATION IN REPOSITORY
HISTORY, NAMES=   SATGAS,   IRANGE= 32,33, JRANGE= 10,12, KRANGE=1,1
HISTORY, NAMES=   SATGAS,   IRANGE= 36,37, JRANGE= 10,12, KRANGE=1,1
!
!BRINE PRESSURE IN PANEL
HISTORY, NAMES=   PRESBRIN, IRANGE=23,29,  JRANGE= 10,12,  KRANGE=1,1
!
!BRINE PRESSURE IN REPOSITORY
HISTORY, NAMES=   PRESBRIN, IRANGE= 32,33,  JRANGE= 10,12,  KRANGE=1,1
HISTORY, NAMES=   PRESBRIN, IRANGE= 36,37,  JRANGE= 10,12,  KRANGE=1,1
!
!BRINE PRESSURE IN BRINE POCKET
HISTORY, NAMES=   PRESBRIN, IRANGE= 26,26, JRANGE= 1,1,  KRANGE=1,1
!
!BRINE PRESSURE IN INTERSECTION OF BOREHOLE AND CULEBRA
HISTORY, NAMES=   PRESBRIN, IRANGE= 26,26, JRANGE= 26,26,  KRANGE=1,1
!***********************************************************************
!                  END OF HISTORY VARIABLES
!***********************************************************************
!
*REACTION_CHEMISTRY
!
WICKING, MAT= WAS_AREA, VALUE=SAT_WICK
```

```
NUMERICS, SMOOTH=ON,   ALPHARXN=-1000.0
RATES,   MAT=WAS_AREA, COR_IN=GRATCORI, COR_HUM=GRATCORH,&
                       MIC_IN=GRATMICI, MIC_HUM=GRATMICH,&
                       SCOR_GAS=STOICOR, SMIC_GAS=STOIMIC
!
VOLUME, MAT=WAS_AREA,  VOL_CHW  = VOLCHW, VOL_RHW = VOLRHW
!
DENSITY, MAT=WAS_AREA, METAL_RH= DRH_METL, BIO_RH= DRH_BIO,&
                       METAL_CH= DCH_METL, BIO_CH= DCH_BIO
!
SATURATION, MAT=WAS_AREA, VALUE= SAT_IBRN
!
MOLWTS, MAT= REFCON,  MW_FE  = MW_FE
MOLWTS, MAT= REFCON,  MW_CEL = MW_CELL
!
MISC,   MAT= REFCON,  VREPOS  = VREPOS,&
                      VPANLEX = VPANLEX,&
                      VROOM   = VROOM,&
                      ASDRUM  = ASDRUM,&
                      DRROOM  = DRROOM
!
!
!============================================================================
*PROPERTIES
! GET SOLID properties from CAMDAT file
!Salado Halite
SOLID, MAT=S_HALITE,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_0,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_1,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_PCS,&
```

```
                    PRM_X       = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z       = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR       = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                    BCLAM       = PORE_DIS,     COMPRES     = POR_COMP,&
                    SB_MIN      = SB_MIN,       PB_MIN      = PO_MIN,&
                    PC_MAX      = PC_MAX,       CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP     = PCT_EXP,      PCT_FLAG    = KPT


!
SOLID, MAT=S_MB139,&
                    PRM_X       = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z       = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR       = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                    BCLAM       = PORE_DIS,     COMPRES     = POR_COMP,&
                    SB_MIN      = SB_MIN,       PB_MIN      = PO_MIN,&
                    PC_MAX      = PC_MAX,       CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP     = PCT_EXP,      PCT_FLAG    = KPT
!
SOLID, MAT=S_ANH_AB,&
                    PRM_X       = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z       = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR       = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                    BCLAM       = PORE_DIS,     COMPRES     = POR_COMP,&
                    SB_MIN      = SB_MIN,       PB_MIN      = PO_MIN,&
                    PC_MAX      = PC_MAX,       CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP     = PCT_EXP,      PCT_FLAG    = KPT
!
SOLID, MAT=S_MB138,&
                    PRM_X       = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z       = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR       = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                    BCLAM       = PORE_DIS,     COMPRES     = POR_COMP,&
                    SB_MIN      = SB_MIN,       PB_MIN      = PO_MIN,&
                    PC_MAX      = PC_MAX,       CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP     = PCT_EXP,      PCT_FLAG    = KPT
!
SOLID, MAT=CAVITY_1,&
                    PRM_X       = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z       = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR       = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                    BCLAM       = PORE_DIS,     COMPRES     = POR_COMP,&
                    SB_MIN      = SB_MIN,       PB_MIN      = PO_MIN,&
                    PC_MAX      = PC_MAX,       CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP     = PCT_EXP,      PCT_FLAG    = KPT
!
SOLID, MAT=CAVITY_2,&
                    PRM_X       = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z       = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR       = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                    BCLAM       = PORE_DIS,     COMPRES     = POR_COMP,&
                    SB_MIN      = SB_MIN,       PB_MIN      = PO_MIN,&
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                    PC_MAX     = PC_MAX,        CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG    = KPT
!
SOLID, MAT=CAVITY_3,&
                    PRM_X      = PERM_X,        PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG    = KPT
!
SOLID, MAT=CAVITY_4,&
                    PRM_X      = PERM_X,        PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG    = KPT
!
SOLID, MAT=IMPERM_Z,&
                    PRM_X      = PERM_X,        PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG    = KPT
!
SOLID, MAT=CASTILER,&
                    PRM_X      = PERM_X,        PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG    = KPT
!
SOLID, MAT=WAS_AREA,&
                    PRM_X      = PERM_X,        PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG    = KPT
!
SOLID, MAT=REPOSIT,&
                    PRM_X      = PERM_X,        PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY    = POROSITY,&
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                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRF_PCS,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CONC_PCS,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=UNNAMED,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CULEBRA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=TAMARISK,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
```

```
SOLID, MAT=MAGENTA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=FORTYNIN,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DEWYLAKE,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=SANTAROS,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=OPS_AREA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=EXP_AREA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
```

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                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=CONC_MON,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=SHFTU,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=SHFTL_T1,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=SHFTL_T2,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
! GET FRACTURE PROPERTIES
FRACTURE, MAT= S_MB139,  FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= S_ANH_AB, FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= S_MB138,  FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
```

```
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= DRZ_0,    FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= DRZ_1,    FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
! GET FLUID (brine and gas) properties from CAMDAT file
FLUID, MAT=BRINESAL, SALINITY=WTF, DEN_BR=DNSFLUID,&
                     COMPR_BR= COMP, REF_PRES=REF_PRES, REF_TEMP= REF_TEMP,&
                     INTERP = 1, VIS_BR=VISCO
FLUID, MAT=H2,       VIS_GAS=VISCO,DGAS = OFF,&
                     H2_MOLE =1.0, CO2_MOLE=0.0, CH4_MOLE=0.0,&
                     N2_MOLE= 0.0, H2S_MOLE=0.0, O2_MOLE=0.0
FLUID, MAT=S_MB139,  KLINK=ON, B_KLINK=BKLINK, EXP_KLINK=EXPKLINK
!
FLUID, MAT= REFCON,  R_GAS    = R
FLUID, MAT= REFCON,  MW_H2O   = MW_H2O
FLUID, MAT= REFCON,  MW_SALT  = MW_NACL
FLUID, MAT= REFCON,  MW_H2    = MW_H2,   TC_H2  = TC_H2,   PC_H2  = PC_H2,&
                     ACEN_H2  = ACF_H2,  H2_CO2 = BIP_12,  H2_CH4 = BIP_13,&
                     H2_N2    = BIP_14,  H2_H2S = BIP_15,  H2_O2  = BIP_16
FLUID, MAT= REFCON,  MW_CO2   = MW_CO2,  TC_CO2 = TC_CO2,  PC_CO2 = PC_CO2,&
                     ACEN_CO2 = ACF_CO2, CO2_CH4= BIP_23,  CO2_N2 = BIP_24,&
                     CO2_H2S  = BIP_25 , CO2_O2 = BIP_26
FLUID, MAT= REFCON,  MW_CH4   = MW_CH4,  TC_CH4 = TC_CH4,  PC_CH4 = PC_CH4,&
                     ACEN_CH4 = ACF_CH4, CH4_N2 = BIP_34,  CH4_H2S= BIP_35,&
                     CH4_O2   = BIP_36
FLUID, MAT= REFCON,  MW_N2    = MW_N2,   TC_N2  = TC_N2,   PC_N2  = PC_N2,&
                     ACEN_N2  = ACF_N2,  N2_H2S = BIP_45,  N2_O2  = BIP_46
FLUID, MAT= REFCON,  MW_H2S   = MW_H2S,  TC_H2S = TC_H2S,  PC_H2S = PC_H2S,&
                     ACEN_H2S = ACF_H2S, H2S_O2 = BIP_56
FLUID, MAT= REFCON,  MW_O2    = MW_O2,   TC_O2  = TC_O2,   PC_O2  = PC_O2,&
                     ACEN_O2  = ACF_O2
FLUID, MAT= REFCON,  OMEGA_A  = OMEGAA , OMEGA_B = OMEGAB
!
*DIRICHLET
DIRICHLET, MAT=CULEBRA, PRESSURE=PRESSURE,&
               IRANGE=1,1,   JRANGE=26,26, KRANGE=1,1
DIRICHLET, MAT=CULEBRA, PRESSURE=PRESSURE,&
               IRANGE=68,68, JRANGE=26,26, KRANGE=1,1
DIRICHLET, MAT=MAGENTA, PRESSURE=PRESSURE,&
               IRANGE=1,1,   JRANGE=28,28, KRANGE=1,1
DIRICHLET, MAT=MAGENTA, PRESSURE=PRESSURE,&
               IRANGE=68,68, JRANGE=28,28, KRANGE=1,1
DIRICHLET, MAT=SANTAROS, PRESSURE=PRESSURE,&
               IRANGE=1,68,  JRANGE=33,33, KRANGE=1,1
DIRICHLET, MAT=SANTAROS, SATURATION=SAT_IBRN,&
               IRANGE=1,68,  JRANGE=33,33, KRANGE=1,1
*END
```

SCENARIO: S2

```
$ type BF1_cra1_s2.inp
! TITLE:    BRAGFLO 2003 CRA1 (PREBRAG)
! SCENARIO: S2
! ANALYSTS: Joshua Stein and Bill Zelinski
! MODIFIED: 01/04/03
!===========================================================================
!   SCENARIO: UNDISTURBED SCENERIO
!           : SINGLE CLOSURE SURFACE
!           :   A)CREEP CLOSURE IN WASTE AREAS
!           : PANEL ON SOUTH, REST OF REPOSITORY ON NORTH
!               : SHAFT ADDED
!               : FRACTURING IN UPPER AND LOWER DRZ
!
!  28 Mar 02 JSS  rev4 Added REPOSIT meaterial and map to fix problem
!                   with WASTE materials.
!  02 Apr 02 JSS  rev5 Changed DRF_PCS in the PCS adjacent to the OPS_AREA
!                   to be mapped as OPS_AREA, which is appropriate for
!                   preclosed excavated regions.
!  15 Jan 03 WPZ  rev6 Added shaft.  Fracturing in both upper and lower DRZ
!  01 Apr 03 WPZ  rev7 modified to run with PREBRAG, Version 7.00 to produce
!                   input to BRAGFLO 5.0.  Accomodates constants that used to
!                   be included in BRAGFLO code that must now be included
!                   in input.
!===========================================================================
*HEADING
TITLE2 = 2003 BRAGFLO: CRA BRAGFLO: DISTURBED C97 CALCULATION: E1 AT 350 YR
!===========================================================================
!CLOSURE INFORMATION
*CLOSURE
CONTROL, TYPE = PRESSURE, AVE = CELL
SURFACE, MODEL = JAN_96,  PRES_LITHO = 50.0E6,  TIME_OFF = 3.155693E12,&
                          PERM_FACTOR= WAS_AREA:PERM_X, PERM_EXP = 0.0
REGION,  MAT =   WAS_AREA, MODEL = JAN_96
REGION,  MAT =   REPOSIT,  MODEL = JAN_96
REGION,  MAT =   DRF_PCS,  MODEL = JAN_96
!===========================================================================
*RESET
!RESET REGIONS ARE GIVEN THE INITIAL PRESSURE AND SATURATION SPECIFIED IN
! THE INITIAL CONDITIONS AT THE RESET TIME
REGION,MAT=CAVITY_1
REGION,MAT=CAVITY_2
REGION,MAT=CAVITY_3
REGION,MAT=CAVITY_4
TIME=0.0
WASTE,MAT_OLD=CAVITY_1,MAT_NEW=WAS_AREA,&
           PRES_BRINE=101325.0, SAT_BRINE=0.0
WASTE,MAT_OLD=CAVITY_2,MAT_NEW=REPOSIT,&
           PRES_BRINE=101325.0, SAT_BRINE=0.0
!==========================================================================
*INITIAL_CONDITIONS
!BEGIN SIMULATION AT -5 YEARS
BEGIN, TIME=-1.577846E8
SATBR,   ID_BRINE =SATBREL
PRESSURE,ID_PRES  =PRESEL
CONFE  , ID_CONFE =FECONC
```

```
CONCELL, ID_CONCEL=CH2OCONC
ELEVAT,  ID_ELEV  =ELEVE
!============================================================================
*STEP_CONTROL
!TIME STEP IS REDUCED
!  1. AT   0 YEARS: WASTE IS INTRODUCED,
  TIME,BEGIN=0.0, DT=864.0
!  2. AT 200 YEARS: MATERIAL CHANGE
  TIME,BEGIN=6.311385E9, DT=864.0
!  3. AT 350 YEARS: MATERIAL CHANGE
  TIME,BEGIN=1.104492E10, DT=864.0
!  4. AT 550 YEARS: MATERIAL CHANGE
  TIME,BEGIN=1.735631E10, DT=864.0
!  5. AT 1550 YEARS: MATERIAL CHANGE
  TIME,BEGIN=4.891324E10, DT=864.0
!============================================================================
*MODIFY_MAP
TIME,TIME_ID=1, BEGIN= 0.0
TIME,TIME_ID=2, BEGIN= 6.311385E9
TIME,TIME_ID=3, BEGIN= 1.104492E10
TIME,TIME_ID=4, BEGIN= 1.735631E10
TIME,TIME_ID=5, BEGIN= 4.891324E10
!********
! 0 YEARS
!********
!INTRODUCE FINAL DRZ MATERIAL
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=23,30, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=32,34, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=36,38, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=40,42, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=44,45, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=23,30, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=32,34, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=36,38, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=40,42, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=44,45, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_PCS,  TIME_ID=1, IRANGE=31,31, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=DRZ_PCS,  TIME_ID=1, IRANGE=35,35, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=DRZ_PCS,  TIME_ID=1, IRANGE=39,39, JRANGE=15,16, KRANGE=1,1
!INTRODUCE SHFTU upper shaft
MODIFY, MAT=SHFTU, TIME_ID=1, IRANGE=43,43, JRANGE=25,33, KRANGE=1,1
!INTRODUCE SHFTL_T1 lower shaft t1
MODIFY, MAT=SHFTL_T1, TIME_ID=1, IRANGE=43,43, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=SHFTL_T1, TIME_ID=1, IRANGE=43,43, JRANGE=18,24, KRANGE=1,1
!INTRODUCE CONC-MON lowest part of shaft filled with concrete
MODIFY, MAT=CONC_MON, TIME_ID=1, IRANGE=43,43, JRANGE=8,13, KRANGE=1,1
!INTRODUCE WASTE INTO PANEL REGION
MODIFY, MAT=WAS_AREA, TIME_ID=1, IRANGE=23,29, JRANGE=10,12, KRANGE=1,1
!INTRODUCE WASTE INTO REST OF REPOSITORY
MODIFY, MAT=REPOSIT, TIME_ID=1, IRANGE=32,33, JRANGE=10,12, KRANGE=1,1
MODIFY, MAT=REPOSIT, TIME_ID=1, IRANGE=36,37, JRANGE=10,12, KRANGE=1,1
!INTRODUCE PANEL SEAL BACKFILL modeled as was_area
MODIFY, MAT=DRF_PCS, TIME_ID=1, IRANGE=30,30, JRANGE=10,12, KRANGE=1,1
MODIFY, MAT=DRF_PCS, TIME_ID=1, IRANGE=34,34, JRANGE=10,12, KRANGE=1,1
MODIFY, MAT=DRF_PCS, TIME_ID=1, IRANGE=38,38, JRANGE=10,12, KRANGE=1,1
!MODIFY, MAT=OPS_AREA, TIME_ID=1, IRANGE=42,42, JRANGE=10,12, KRANGE=1,1
!INTRODUCE PANEL CLOSURE CONCRETE
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MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=31,31, JRANGE=8,13, KRANGE=1,1
MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=35,35, JRANGE=8,13, KRANGE=1,1
MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=39,39, JRANGE=8,13, KRANGE=1,1
!MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=43,43, JRANGE=8,13, KRANGE=1,1
!INTRODUCE PANEL CLOSURE CONCRETE AT MB139 LEVEL
!MODIFY, MAT=CPCS_F, TIME_ID=1, IRANGE=31,31, JRANGE=7,7, KRANGE=1,1
!MODIFY, MAT=CPCS_F, TIME_ID=1, IRANGE=35,35, JRANGE=7,7, KRANGE=1,1
!MODIFY, MAT=CPCS_F, TIME_ID=1, IRANGE=39,39, JRANGE=7,7, KRANGE=1,1
!MODIFY, MAT=CPCS_F, TIME_ID=1, IRANGE=43,43, JRANGE=7,7, KRANGE=1,1
!INTRODUCE OPERATIONS REGION MATERIAL
MODIFY, MAT=OPS_AREA, TIME_ID=1, IRANGE=40,42, JRANGE=10,12, KRANGE=1,1
!INTRODUCE EXPERIMENTAL REGION MATERIAL
MODIFY, MAT=EXP_AREA, TIME_ID=1, IRANGE=44,45, JRANGE=10,12, KRANGE=1,1
!INTRODUCE UNNAMED MEMBER OF THE RUSTLER
MODIFY, MAT=UNNAMED,  TIME_ID=1, IRANGE= 1,42, JRANGE=25,25, KRANGE=1,1
MODIFY, MAT=UNNAMED,  TIME_ID=1, IRANGE=44,68, JRANGE=25,25, KRANGE=1,1
!INTRODUCE TRUE CULEBRA REGION TO ALLOW BRINE INFLOW TO SHAFT
MODIFY, MAT=CULEBRA,  TIME_ID=1, IRANGE= 1,42, JRANGE=26,26, KRANGE=1,1
MODIFY, MAT=CULEBRA,  TIME_ID=1, IRANGE=44,68, JRANGE=26,26, KRANGE=1,1
!INTRODUCE TAMARISK
MODIFY, MAT=TAMARISK,  TIME_ID=1, IRANGE= 1,42, JRANGE=27,27, KRANGE=1,1
MODIFY, MAT=TAMARISK,  TIME_ID=1, IRANGE=44,68, JRANGE=27,27, KRANGE=1,1
!INTRODUCE MAGENTA
MODIFY, MAT=MAGENTA,  TIME_ID=1, IRANGE= 1,42, JRANGE=28,28, KRANGE=1,1
MODIFY, MAT=MAGENTA,  TIME_ID=1, IRANGE=44,68, JRANGE=28,28, KRANGE=1,1
!INTRODUCE FORTY-NINER
MODIFY, MAT=FORTYNIN,  TIME_ID=1, IRANGE= 1,42, JRANGE=29,29, KRANGE=1,1
MODIFY, MAT=FORTYNIN,  TIME_ID=1, IRANGE= 44,68, JRANGE=29,29, KRANGE=1,1
!INTRODUCE DEWEY LAKE RED BEDS
MODIFY, MAT=DEWYLAKE,  TIME_ID=1, IRANGE= 1,42, JRANGE=30,31, KRANGE=1,1
MODIFY, MAT=DEWYLAKE,  TIME_ID=1, IRANGE= 44,68, JRANGE=30,31, KRANGE=1,1
!INTRODUCE SANTA ROSA FORMATION
MODIFY, MAT=SANTAROS,  TIME_ID=1, IRANGE= 1,42, JRANGE=32,33, KRANGE=1,1
MODIFY, MAT=SANTAROS,  TIME_ID=1, IRANGE= 44,68, JRANGE=32,33, KRANGE=1,1
!***************************************************************************
!            END OF TIME PERIOD 1 MATERIAL RESETS
!***************************************************************************
!********
! 200 YEARS
!********
!INTRODUCE CHANGE IN LOWER SHAFT MATERIAL
MODIFY, MAT=SHFTL_T2, TIME_ID=2, IRANGE=43,43, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=SHFTL_T2, TIME_ID=2, IRANGE=43,43, JRANGE=18,24, KRANGE=1,1

!***************************************************************************
!            END OF TIME PERIOD 2 MATERIAL RESET
!===========================================================================
!===========================================================================
! 350 years
!===========================================================================
! Introduce borehole material
!
MODIFY, MAT=BH_OPEN,   TIME_ID=3, IRANGE=26,26, JRANGE=1, 24, KRANGE=1,1
MODIFY, MAT=CONC_PLG,  TIME_ID=3, IRANGE=26,26, JRANGE=25,25, KRANGE=1,1
MODIFY, MAT=BH_OPEN,   TIME_ID=3, IRANGE=26,26, JRANGE=26,31, KRANGE=1,1
MODIFY, MAT=CONC_PLG,  TIME_ID=3, IRANGE=26,26, JRANGE=32,33, KRANGE=1,1
!
```

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!==============================================================================
! 550 years
!==============================================================================
! Introduce borehole material
!
MODIFY, MAT=BH_SAND,   TIME_ID=4, IRANGE=26,26, JRANGE=1, 33, KRANGE=1,1
!
!==============================================================================
! 1550 years
!==============================================================================
! Introduce borehole material
!
MODIFY, MAT=BH_CREEP,   TIME_ID=5, IRANGE=26,26, JRANGE=1, 9, KRANGE=1,1
!==============================================================================
*GEOMETRY
COORD= CARTESIAN
!==============================================================================
*SIMULATION_CONTROL
INTEGRATION, TMAX=3.155693E11, DT_INIT=8.64,DT_MIN= 8.64E-4, DT_MAX=1.728E9,&
           DT_INCR=1.25,   DT_REDU= 0.5,   AUTODT=YES,  TSWITCH=1.0,&
           MAXSTEPS=10000
!
ITERATION, DSATLIM= 2.E-1, DPRESLIM = -1.E8 , SATLIM= 1.E-3,&
           SATNORM= 0.30,  PRESNORM = 5.0E5,&
           ITMAX= 8,       IRESETMAX= 40, IJACINT= 1,&
           IJACSWITCH=41,  IJACMIN= 1,    IJACRESET= 5,&
           IUPRPFLAG =9,   IUPMFFLAG= 9,   IUPRPLOOSE= 9,&
           IUPMFLOOSE=9
!
ITERATION, DHSAT_REL= 1.0E-8,   DHPRES_REL=1.0E-8,&
           DHSAT_MIN= 1.0E-10,  DHPRES_MIN=1.0E-2
!
ITERATION, EPS_SAT  = 3.0E+0,     EPS_PRES    = 1.E-2,&
           R_EPS_SAT= 3.0E+0,     R_EPS_PRES  = 1.E-2,&
           FTOL_SAT = 1.0E-2,     FTOL_PRES   = 1.0E-2,&
           R_FTOL_SAT=1.0E-2,     R_FTOL_PRES = 1.0E-2, CONV_TEST = AND
!
NUMERICS,SOLVER=LU
NUMERICS,JACSCALE= 1.0e7,VSWITCH=NO
NUMERICS, ITRAVE= HARMONIC, IMFRAVE=UPSTREAM
!
GRAVITY, MAT= REFCON, G_ACC= GRAVACC
!
!============================================================================
*OUTPUT_CONTROL
!
UNITS= SI
MONITOR, ILOC = 26, JLOC = 12, KLOC = 1
MONITOR, ILOC = 32, JLOC = 12, KLOC = 1
MONITOR, ILOC = 36, JLOC = 12, KLOC = 1
!
STEPS, FILE= BINARY, NSTEP=20
TIMES, FILE= ASCII,  VALUES= 0.0, 3.155693E09, 1.104493E10,&
                                  3.155693E10, 9.467079E10,&
                                  1.577847E11, 2.208985E11,&
                                  2.840124E11, 3.155693E11
PRIBIN,&
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     PRESBRIN,  PRESGAS,   POROS,     DENGAS,    PERMBRX,  PERMGASX,&
     SATGAS,    FLOWGASX,  FLOWGASY,  FLOWBRX,   FLOWBRY,&
     FECONC,    CELLCONC, BRINRATE
!
PRIASC,&
     PRESBRIN,  PRESGAS,   POROS,    SATGAS,    FECONC,   CELLCONC
!
!HORIZONTAL BRINE FLOW ACROSS 2.4K SOUTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE=17,17, KRANGE=1,1
!HORIZONTAL BRINE FLOW ACROSS 2.4K SOUTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE=25,33, KRANGE=1,1
!HORIZONTAL BRINE FLOW ACROSS 2.4K NORTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE=17,17, KRANGE=1,1
!HORIZONTAL BRINE FLOW ACROSS 2.4K NORTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE=25,33, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K SOUTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE=17,17, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K SOUTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE=25,33, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K NORTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE=17,17, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K NORTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE=25,33, KRANGE=1,1
!BRINE FLOW ACROSS DRZ AND MARKER BEDS BOUNDARY
HISTORY, NAMES=   FLOWBRX,  IRANGE= 23,23,   JRANGE= 7,17, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 46,46, JRANGE= 7,17, KRANGE=1,1
!GAS FLOW ACROSS DRZ AND MARKER BEDS BOUNDARY
HISTORY, NAMES=   FLOWGASX,    IRANGE= 23,23,   JRANGE= 7,17, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 46,46, JRANGE= 7,17, KRANGE=1,1
!
!VERTICAL BRINE FLOW ACROSS BOTTOM OF UPPER DRZ
HISTORY, NAMES=   FLOWBRY,  IRANGE= 23,45,  JRANGE=13,13, KRANGE=1,1
!VERTICAL BRINE FLOW ACROSS TOP OF LOWER DRZ
HISTORY, NAMES=   FLOWBRY,  IRANGE= 23,45,  JRANGE=10,10, KRANGE=1,1
!
!VERTICAL GAS FLOW ACROSS BOTTOM OF UPPER DRZ
HISTORY, NAMES=   FLOWGASY,  IRANGE= 23,45,  JRANGE=13,13, KRANGE=1,1
!VERTICAL GAS FLOW ACROSS TOP OF LOWER DRZ
HISTORY, NAMES=   FLOWGASY,  IRANGE= 23,45,  JRANGE=10,10, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW SOUTH SIDE OF S_REPOSITORY
HISTORY, NAMES=   FLOWBRX,  IRANGE=32,32,   JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW SOUTH SIDE OF S_REPOSITORY
HISTORY, NAMES=   FLOWGASX, IRANGE=32,32,   JRANGE= 10,12, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW NORTH SIDE OF N_REPOSITORY
HISTORY, NAMES=   FLOWBRX,  IRANGE=38,38,  JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW NORTH SIDE OF REPOSITORY
HISTORY, NAMES=   FLOWGASX, IRANGE=38,38,  JRANGE= 10,12, KRANGE=1,1
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!
!HORIZONTAL BRINE FLOW SOUTH SIDE OF PANEL
HISTORY, NAMES=   FLOWBRX,  IRANGE= 23,23, JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW SOUTH SIDE OF PANE0
HISTORY, NAMES=   FLOWGASX, IRANGE= 23,23, JRANGE= 10,12, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW NORTH SIDE OF PANEL
HISTORY, NAMES=   FLOWBRX,  IRANGE=30,30,  JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW NORTH SIDE OF PANEL
HISTORY, NAMES=   FLOWGASX, IRANGE=30,30,  JRANGE= 10,12, KRANGE=1,1
!
!GAS SATURATION IN PANEL
HISTORY, NAMES=   SATGAS,   IRANGE=23,29, JRANGE= 10,12, KRANGE=1,1
!
!GAS SATURATION IN REPOSITORY
HISTORY, NAMES=   SATGAS,   IRANGE= 32,33, JRANGE= 10,12, KRANGE=1,1
HISTORY, NAMES=   SATGAS,   IRANGE= 36,37, JRANGE= 10,12, KRANGE=1,1
!
!BRINE PRESSURE IN PANEL
HISTORY, NAMES=   PRESBRIN, IRANGE=23,29,  JRANGE= 10,12,  KRANGE=1,1
!
!BRINE PRESSURE IN REPOSITORY
HISTORY, NAMES=   PRESBRIN, IRANGE= 32,33,  JRANGE= 10,12,  KRANGE=1,1
HISTORY, NAMES=   PRESBRIN, IRANGE= 36,37,  JRANGE= 10,12,  KRANGE=1,1
!
!BRINE PRESSURE IN BRINE POCKET
HISTORY, NAMES=   PRESBRIN, IRANGE= 26,26, JRANGE= 1,1,  KRANGE=1,1
!
!BRINE PRESSURE IN INTERSECTION OF BOREHOLE AND CULEBRA
HISTORY, NAMES=   PRESBRIN, IRANGE= 26,26, JRANGE= 26,26,  KRANGE=1,1
!**********************************************************************
!                 END OF HISTORY VARIABLES
!**********************************************************************
!
*REACTION_CHEMISTRY
!
WICKING, MAT= WAS_AREA, VALUE=SAT_WICK
NUMERICS, SMOOTH=ON,   ALPHARXN=-1000.0
RATES,   MAT=WAS_AREA, COR_IN=GRATCORI, COR_HUM=GRATCORH,&
                       MIC_IN=GRATMICI, MIC_HUM=GRATMICH,&
                       SCOR_GAS=STOICOR, SMIC_GAS=STOIMIC
!
VOLUME, MAT=WAS_AREA,  VOL_CHW  = VOLCHW, VOL_RHW = VOLRHW
!
DENSITY, MAT=WAS_AREA, METAL_RH= DRH_METL, BIO_RH= DRH_BIO,&
                       METAL_CH= DCH_METL, BIO_CH= DCH_BIO
!
SATURATION, MAT=WAS_AREA, VALUE= SAT_IBRN
!
MOLWTS, MAT= REFCON,  MW_FE  = MW_FE
MOLWTS, MAT= REFCON,  MW_CEL = MW_CELL
!
MISC,   MAT= REFCON,  VREPOS  = VREPOS,&
                      VPANLEX = VPANLEX,&
                      VROOM   = VROOM,&
                      ASDRUM  = ASDRUM,&
                      DRROOM  = DRROOM
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!
!
!==========================================================================
*PROPERTIES
! GET SOLID properties from CAMDAT file
!Salado Halite
SOLID, MAT=S_HALITE,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_0,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_1,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_PCS,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT


!
SOLID, MAT=S_MB139,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
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!
SOLID, MAT=S_ANH_AB,&
                   PRM_X      = PERM_X,      PRM_Y      = PERM_Y,&
                   PRM_Z      = PERM_Z,      POROSITY   = POROSITY,&
                   BCSOR      = SAT_RBRN,    BCSGR      = SAT_RGAS,&
                   BCLAM      = PORE_DIS,    COMPRES    = POR_COMP,&
                   SB_MIN     = SB_MIN,      PB_MIN     = PO_MIN,&
                   PC_MAX     = PC_MAX,      CAP_MOD    = CAP_MOD,&
                   RELP_MODEL = RELP_MOD,    PCT_A      = PCT_A,&
                   PCT_EXP    = PCT_EXP,     PCT_FLAG   = KPT
!
SOLID, MAT=S_MB138,&
                   PRM_X      = PERM_X,      PRM_Y      = PERM_Y,&
                   PRM_Z      = PERM_Z,      POROSITY   = POROSITY,&
                   BCSOR      = SAT_RBRN,    BCSGR      = SAT_RGAS,&
                   BCLAM      = PORE_DIS,    COMPRES    = POR_COMP,&
                   SB_MIN     = SB_MIN,      PB_MIN     = PO_MIN,&
                   PC_MAX     = PC_MAX,      CAP_MOD    = CAP_MOD,&
                   RELP_MODEL = RELP_MOD,    PCT_A      = PCT_A,&
                   PCT_EXP    = PCT_EXP,     PCT_FLAG   = KPT
!
SOLID, MAT=CAVITY_1,&
                   PRM_X      = PERM_X,      PRM_Y      = PERM_Y,&
                   PRM_Z      = PERM_Z,      POROSITY   = POROSITY,&
                   BCSOR      = SAT_RBRN,    BCSGR      = SAT_RGAS,&
                   BCLAM      = PORE_DIS,    COMPRES    = POR_COMP,&
                   SB_MIN     = SB_MIN,      PB_MIN     = PO_MIN,&
                   PC_MAX     = PC_MAX,      CAP_MOD    = CAP_MOD,&
                   RELP_MODEL = RELP_MOD,    PCT_A      = PCT_A,&
                   PCT_EXP    = PCT_EXP,     PCT_FLAG   = KPT
!
SOLID, MAT=CAVITY_2,&
                   PRM_X      = PERM_X,      PRM_Y      = PERM_Y,&
                   PRM_Z      = PERM_Z,      POROSITY   = POROSITY,&
                   BCSOR      = SAT_RBRN,    BCSGR      = SAT_RGAS,&
                   BCLAM      = PORE_DIS,    COMPRES    = POR_COMP,&
                   SB_MIN     = SB_MIN,      PB_MIN     = PO_MIN,&
                   PC_MAX     = PC_MAX,      CAP_MOD    = CAP_MOD,&
                   RELP_MODEL = RELP_MOD,    PCT_A      = PCT_A,&
                   PCT_EXP    = PCT_EXP,     PCT_FLAG   = KPT
!
SOLID, MAT=CAVITY_3,&
                   PRM_X      = PERM_X,      PRM_Y      = PERM_Y,&
                   PRM_Z      = PERM_Z,      POROSITY   = POROSITY,&
                   BCSOR      = SAT_RBRN,    BCSGR      = SAT_RGAS,&
                   BCLAM      = PORE_DIS,    COMPRES    = POR_COMP,&
                   SB_MIN     = SB_MIN,      PB_MIN     = PO_MIN,&
                   PC_MAX     = PC_MAX,      CAP_MOD    = CAP_MOD,&
                   RELP_MODEL = RELP_MOD,    PCT_A      = PCT_A,&
                   PCT_EXP    = PCT_EXP,     PCT_FLAG   = KPT
!
SOLID, MAT=CAVITY_4,&
                   PRM_X      = PERM_X,      PRM_Y      = PERM_Y,&
                   PRM_Z      = PERM_Z,      POROSITY   = POROSITY,&
                   BCSOR      = SAT_RBRN,    BCSGR      = SAT_RGAS,&
                   BCLAM      = PORE_DIS,    COMPRES    = POR_COMP,&
                   SB_MIN     = SB_MIN,      PB_MIN     = PO_MIN,&
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                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=IMPERM_Z,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=CASTILER,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=WAS_AREA,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=REPOSIT,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=DRF_PCS,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=CONC_PCS,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
```

```
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=UNNAMED,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CULEBRA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=TAMARISK,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=MAGENTA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=FORTYNIN,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
```

```
SOLID, MAT=DEWYLAKE,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=SANTAROS,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=OPS_AREA,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=EXP_AREA,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=CONC_MON,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=SHFTU,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
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                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG    = KPT
!
SOLID, MAT=SHFTL_T1,&
                    PRM_X      = PERM_X,        PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG    = KPT
!
SOLID, MAT=SHFTL_T2,&
                    PRM_X      = PERM_X,        PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG    = KPT
!
SOLID, MAT=CONC_PLG,&
                    PRM_X      = PERM_X,        PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG    = KPT
!
SOLID, MAT=BH_OPEN,&
                    PRM_X      = PERM_X,        PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG    = KPT
SOLID, MAT=BH_SAND,&
                    PRM_X      = PERM_X,        PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG    = KPT
SOLID, MAT=BH_CREEP,&
                    PRM_X      = PERM_X,        PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN      = PO_MIN,&
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                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
! GET FRACTURE PROPERTIES
FRACTURE, MAT= S_MB139,  FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= S_ANH_AB, FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= S_MB138,  FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= DRZ_0,    FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= DRZ_1,    FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
! GET FLUID (brine and gas) properties from CAMDAT file
FLUID, MAT=BRINESAL, SALINITY=WTF, DEN_BR=DNSFLUID,&
                     COMPR_BR= COMP, REF_PRES=REF_PRES, REF_TEMP= REF_TEMP,&
                     INTERP = 1, VIS_BR=VISCO
FLUID, MAT=H2,       VIS_GAS=VISCO,DGAS = OFF,&
                     H2_MOLE =1.0, CO2_MOLE=0.0, CH4_MOLE=0.0,&
                     N2_MOLE= 0.0, H2S_MOLE=0.0, O2_MOLE=0.0
FLUID, MAT=S_MB139,  KLINK=ON, B_KLINK=BKLINK, EXP_KLINK=EXPKLINK
!
FLUID, MAT= REFCON,  R_GAS    = R
FLUID, MAT= REFCON,  MW_H2O   = MW_H2O
FLUID, MAT= REFCON,  MW_SALT  = MW_NACL
FLUID, MAT= REFCON,  MW_H2    = MW_H2,   TC_H2  = TC_H2,   PC_H2  = PC_H2,&
                     ACEN_H2  = ACF_H2,  H2_CO2 = BIP_12,  H2_CH4 = BIP_13,&
                     H2_N2    = BIP_14,  H2_H2S = BIP_15,  H2_O2  = BIP_16
FLUID, MAT= REFCON,  MW_CO2   = MW_CO2,  TC_CO2 = TC_CO2,  PC_CO2 = PC_CO2,&
                     ACEN_CO2 = ACF_CO2, CO2_CH4= BIP_23,  CO2_N2 = BIP_24,&
                     CO2_H2S  = BIP_25 , CO2_O2 = BIP_26
FLUID, MAT= REFCON,  MW_CH4   = MW_CH4,  TC_CH4 = TC_CH4,  PC_CH4 = PC_CH4,&
                     ACEN_CH4 = ACF_CH4, CH4_N2 = BIP_34,  CH4_H2S= BIP_35,&
                     CH4_O2   = BIP_36
FLUID, MAT= REFCON,  MW_N2    = MW_N2,   TC_N2  = TC_N2,   PC_N2  = PC_N2,&
                     ACEN_N2  = ACF_N2,  N2_H2S = BIP_45,  N2_O2  = BIP_46
FLUID, MAT= REFCON,  MW_H2S   = MW_H2S,  TC_H2S = TC_H2S,  PC_H2S = PC_H2S,&
                     ACEN_H2S = ACF_H2S, H2S_O2 = BIP_56
FLUID, MAT= REFCON,  MW_O2    = MW_O2,   TC_O2  = TC_O2,   PC_O2  = PC_O2,&
                     ACEN_O2  = ACF_O2
```

```
FLUID, MAT= REFCON,  OMEGA_A  = OMEGAA , OMEGA_B = OMEGAB
!
*DIRICHLET
DIRICHLET, MAT=CULEBRA, PRESSURE=PRESSURE,&
               IRANGE=1,1,   JRANGE=26,26, KRANGE=1,1
DIRICHLET, MAT=CULEBRA, PRESSURE=PRESSURE,&
               IRANGE=68,68, JRANGE=26,26, KRANGE=1,1
DIRICHLET, MAT=MAGENTA, PRESSURE=PRESSURE,&
               IRANGE=1,1,   JRANGE=28,28, KRANGE=1,1
DIRICHLET, MAT=MAGENTA, PRESSURE=PRESSURE,&
               IRANGE=68,68, JRANGE=28,28, KRANGE=1,1
DIRICHLET, MAT=SANTAROS, PRESSURE=PRESSURE,&
               IRANGE=1,68,  JRANGE=33,33, KRANGE=1,1
DIRICHLET, MAT=SANTAROS, SATURATION=SAT_IBRN,&
               IRANGE=1,68,  JRANGE=33,33, KRANGE=1,1
*END
```

SCENARIO: S3

```
$ type bf1_cra1_s3.inp
! TITLE:    BRAGFLO 2003 CRA1 (PREBRAG)
! SCENARIO: S3
! ANALYSTS: Joshua Stein and Bill Zelinski
! MODIFIED: 01/04/03
!===========================================================================
!   SCENARIO: UNDISTURBED SCENERIO
!           : SINGLE CLOSURE SURFACE
!           :   A)CREEP CLOSURE IN WASTE AREAS
!           : PANEL ON SOUTH, REST OF REPOSITORY ON NORTH
!               : SHAFT ADDED
!               : FRACTURING IN UPPER AND LOWER DRZ
!
!  28 Mar 02 JSS  rev4 Added REPOSIT meaterial and map to fix problem
!                   with WASTE materials.
!  02 Apr 02 JSS  rev5 Changed DRF_PCS in the PCS adjacent to the OPS_AREA
!                   to be mapped as OPS_AREA, which is appropriate for
!                   preclosed excavated regions.
!  15 Jan 03 WPZ  rev6 Added shaft.  Fracturing in both upper and lower DRZ
!  01 Apr 03 WPZ  rev7 modified to run with PREBRAG, Version 7.00 to produce
!                   input to BRAGFLO 5.0.  Accomodates constants that used to
!                   be included in BRAGFLO code that must now be included
!                   in input.
!===========================================================================
*HEADING
TITLE2 = 2003 BRAGFLO: CRA, CALCULATION: E1 AT 1000 YRS
!===========================================================================
!CLOSURE INFORMATION
*CLOSURE
CONTROL, TYPE = PRESSURE, AVE = CELL
SURFACE, MODEL = JAN_96,  PRES_LITHO = 50.0E6,  TIME_OFF = 3.155693E12,&
                          PERM_FACTOR= WAS_AREA:PERM_X, PERM_EXP = 0.0
REGION,  MAT =   WAS_AREA, MODEL = JAN_96
REGION,  MAT =   REPOSIT,  MODEL = JAN_96
REGION,  MAT =   DRF_PCS,  MODEL = JAN_96
!===========================================================================
*RESET
!RESET REGIONS ARE GIVEN THE INITIAL PRESSURE AND SATURATION SPECIFIED IN
```

```
! THE INITIAL CONDITIONS AT THE RESET TIME
REGION,MAT=CAVITY_1
REGION,MAT=CAVITY_2
REGION,MAT=CAVITY_3
REGION,MAT=CAVITY_4
TIME=0.0
WASTE,MAT_OLD=CAVITY_1,MAT_NEW=WAS_AREA,&
           PRES_BRINE=101325.0, SAT_BRINE=0.0
WASTE,MAT_OLD=CAVITY_2,MAT_NEW=REPOSIT,&
           PRES_BRINE=101325.0, SAT_BRINE=0.0
!=============================================================================
*INITIAL_CONDITIONS
!BEGIN SIMULATION AT -5 YEARS
BEGIN, TIME=-1.577846E8
SATBR,   ID_BRINE =SATBREL
PRESSURE,ID_PRES  =PRESEL
CONFE  , ID_CONFE =FECONC
CONCELL, ID_CONCEL=CH2OCONC
ELEVAT,  ID_ELEV  =ELEVE
!===============================================================================
*STEP_CONTROL
!TIME STEP IS REDUCED
!  1. AT   0 YEARS: WASTE IS INTRODUCED,
  TIME,BEGIN=0.0, DT=864.0
!  2. AT 200 YEARS: MATERIAL CHANGE
  TIME,BEGIN=6.311385E9, DT=864.0
!  3. AT 1000 YEARS: MATERIAL CHANGE
  TIME,BEGIN=3.155693E10, DT=864.0
!  4. AT 1200 YEARS: MATERIAL CHANGE
  TIME,BEGIN=3.786831E10, DT=864.0
!  5. AT 2200 YEARS: MATERIAL CHANGE
  TIME,BEGIN=6.942524E10, DT=864.0
!===============================================================================
*MODIFY_MAP
! ID=1 => 0 YEARS : WASTE INTRODUCED, SHAFT SEALS AND FILL INTRODUCED
! ID=2 => 200 YEARS : COMPACTED SALT (TIME PERIOD 6)
TIME,TIME_ID=1, BEGIN= 0.0
TIME,TIME_ID=2, BEGIN= 6.311385E9
TIME,TIME_ID=3, BEGIN= 3.155693E10
TIME,TIME_ID=4, BEGIN= 3.786831E10
TIME,TIME_ID=5, BEGIN= 6.942524E10
!********
! 0 YEARS
!********
!INTRODUCE FINAL DRZ MATERIAL
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=23,30, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=32,34, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=36,38, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=40,42, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=44,45, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=23,30, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=32,34, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=36,38, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=40,42, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=44,45, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_PCS,  TIME_ID=1, IRANGE=31,31, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=DRZ_PCS,  TIME_ID=1, IRANGE=35,35, JRANGE=15,16, KRANGE=1,1
```

```
MODIFY, MAT=DRZ_PCS,  TIME_ID=1, IRANGE=39,39, JRANGE=15,16, KRANGE=1,1
!INTRODUCE SHFTU upper shaft
MODIFY, MAT=SHFTU, TIME_ID=1, IRANGE=43,43, JRANGE=25,33, KRANGE=1,1
!INTRODUCE SHFTL_T1 lower shaft t1
MODIFY, MAT=SHFTL_T1, TIME_ID=1, IRANGE=43,43, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=SHFTL_T1, TIME_ID=1, IRANGE=43,43, JRANGE=18,24, KRANGE=1,1
!INTRODUCE CONC-MON lowest part of shaft filled with concrete
MODIFY, MAT=CONC_MON, TIME_ID=1, IRANGE=43,43, JRANGE=8,13, KRANGE=1,1
!INTRODUCE WASTE INTO PANEL REGION
MODIFY, MAT=WAS_AREA, TIME_ID=1, IRANGE=23,29, JRANGE=10,12, KRANGE=1,1
!INTRODUCE WASTE INTO REST OF REPOSITORY
MODIFY, MAT=REPOSIT, TIME_ID=1, IRANGE=32,33, JRANGE=10,12, KRANGE=1,1
MODIFY, MAT=REPOSIT, TIME_ID=1, IRANGE=36,37, JRANGE=10,12, KRANGE=1,1
!INTRODUCE PANEL SEAL BACKFILL modeled as was_area
MODIFY, MAT=DRF_PCS, TIME_ID=1, IRANGE=30,30, JRANGE=10,12, KRANGE=1,1
MODIFY, MAT=DRF_PCS, TIME_ID=1, IRANGE=34,34, JRANGE=10,12, KRANGE=1,1
MODIFY, MAT=DRF_PCS, TIME_ID=1, IRANGE=38,38, JRANGE=10,12, KRANGE=1,1
!MODIFY, MAT=OPS_AREA, TIME_ID=1, IRANGE=42,42, JRANGE=10,12, KRANGE=1,1
!INTRODUCE PANEL CLOSURE CONCRETE
MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=31,31, JRANGE=8,13, KRANGE=1,1
MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=35,35, JRANGE=8,13, KRANGE=1,1
MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=39,39, JRANGE=8,13, KRANGE=1,1
!MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=43,43, JRANGE=8,13, KRANGE=1,1
!INTRODUCE PANEL CLOSURE CONCRETE AT MB139 LEVEL
!MODIFY, MAT=CPCS_F, TIME_ID=1, IRANGE=31,31, JRANGE=7,7, KRANGE=1,1
!MODIFY, MAT=CPCS_F, TIME_ID=1, IRANGE=35,35, JRANGE=7,7, KRANGE=1,1
!MODIFY, MAT=CPCS_F, TIME_ID=1, IRANGE=39,39, JRANGE=7,7, KRANGE=1,1
!MODIFY, MAT=CPCS_F, TIME_ID=1, IRANGE=43,43, JRANGE=7,7, KRANGE=1,1
!INTRODUCE OPERATIONS REGION MATERIAL
MODIFY, MAT=OPS_AREA, TIME_ID=1, IRANGE=40,42, JRANGE=10,12, KRANGE=1,1
!INTRODUCE EXPERIMENTAL REGION MATERIAL
MODIFY, MAT=EXP_AREA, TIME_ID=1, IRANGE=44,45, JRANGE=10,12, KRANGE=1,1
!INTRODUCE UNNAMED MEMBER OF THE RUSTLER
MODIFY, MAT=UNNAMED,  TIME_ID=1, IRANGE= 1,42, JRANGE=25,25, KRANGE=1,1
MODIFY, MAT=UNNAMED,  TIME_ID=1, IRANGE=44,68, JRANGE=25,25, KRANGE=1,1
!INTRODUCE TRUE CULEBRA REGION TO ALLOW BRINE INFLOW TO SHAFT
MODIFY, MAT=CULEBRA,  TIME_ID=1, IRANGE= 1,42, JRANGE=26,26, KRANGE=1,1
MODIFY, MAT=CULEBRA,  TIME_ID=1, IRANGE=44,68, JRANGE=26,26, KRANGE=1,1
!INTRODUCE TAMARISK
MODIFY, MAT=TAMARISK,  TIME_ID=1, IRANGE= 1,42, JRANGE=27,27, KRANGE=1,1
MODIFY, MAT=TAMARISK,  TIME_ID=1, IRANGE=44,68, JRANGE=27,27, KRANGE=1,1
!INTRODUCE MAGENTA
MODIFY, MAT=MAGENTA,  TIME_ID=1, IRANGE= 1,42, JRANGE=28,28, KRANGE=1,1
MODIFY, MAT=MAGENTA,  TIME_ID=1, IRANGE=44,68, JRANGE=28,28, KRANGE=1,1
!INTRODUCE FORTY-NINER
MODIFY, MAT=FORTYNIN,  TIME_ID=1, IRANGE= 1,42, JRANGE=29,29, KRANGE=1,1
MODIFY, MAT=FORTYNIN,  TIME_ID=1, IRANGE= 44,68, JRANGE=29,29, KRANGE=1,1
!INTRODUCE DEWEY LAKE RED BEDS
MODIFY, MAT=DEWYLAKE,  TIME_ID=1, IRANGE= 1,42, JRANGE=30,31, KRANGE=1,1
MODIFY, MAT=DEWYLAKE,  TIME_ID=1, IRANGE= 44,68, JRANGE=30,31, KRANGE=1,1
!INTRODUCE SANTA ROSA FORMATION
MODIFY, MAT=SANTAROS,  TIME_ID=1, IRANGE= 1,42, JRANGE=32,33, KRANGE=1,1
MODIFY, MAT=SANTAROS,  TIME_ID=1, IRANGE= 44,68, JRANGE=32,33, KRANGE=1,1
!**********************************************************************
!            END OF TIME PERIOD 1 MATERIAL RESETS
!**********************************************************************
!********
```

```
! 200 YEARS
!********
!INTRODUCE CHANGE IN LOWER SHAFT MATERIAL
MODIFY, MAT=SHFTL_T2, TIME_ID=2, IRANGE=43,43, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=SHFTL_T2, TIME_ID=2, IRANGE=43,43, JRANGE=18,24, KRANGE=1,1

!****************************************************************************
!            END OF TIME PERIOD 2 MATERIAL RESET
!============================================================================
!============================================================================
! 1000 years
!============================================================================
! Introduce borehole material
!
MODIFY, MAT=BH_OPEN,   TIME_ID=3, IRANGE=26,26, JRANGE=1, 24, KRANGE=1,1
MODIFY, MAT=CONC_PLG,  TIME_ID=3, IRANGE=26,26, JRANGE=25,25, KRANGE=1,1
MODIFY, MAT=BH_OPEN,   TIME_ID=3, IRANGE=26,26, JRANGE=26,31, KRANGE=1,1
MODIFY, MAT=CONC_PLG,  TIME_ID=3, IRANGE=26,26, JRANGE=32,33, KRANGE=1,1
!
!============================================================================
! 1200 years
!============================================================================
! Introduce borehole material
!
MODIFY, MAT=BH_SAND,   TIME_ID=4, IRANGE=26,26, JRANGE=1, 33, KRANGE=1,1
!
!============================================================================
! 2200 years
!============================================================================
! Introduce borehole material
!
MODIFY, MAT=BH_CREEP,   TIME_ID=5, IRANGE=26,26, JRANGE=1, 9, KRANGE=1,1
!
!==========================================================
*GEOMETRY
COORD= CARTESIAN
!============================================================================
*SIMULATION_CONTROL
INTEGRATION, TMAX=3.155693E11, DT_INIT=8.64,DT_MIN= 8.64E-4, DT_MAX=1.728E9,&
           DT_INCR=1.25,   DT_REDU= 0.5,   AUTODT=YES,  TSWITCH=1.0,&
           MAXSTEPS=10000
!
ITERATION, DSATLIM= 2.E-1, DPRESLIM = -1.E8 , SATLIM= 1.E-3,&
           SATNORM= 0.30,  PRESNORM = 5.0E5,&
           ITMAX= 8,       IRESETMAX= 40, IJACINT= 1,&
           IJACSWITCH=41,  IJACMIN= 1,    IJACRESET= 5,&
           IUPRPFLAG =9,   IUPMFFLAG= 9,   IUPRPLOOSE= 9,&
           IUPMFLOOSE=9
!
ITERATION, DHSAT_REL= 1.0E-8,   DHPRES_REL=1.0E-8,&
           DHSAT_MIN= 1.0E-10,  DHPRES_MIN=1.0E-2
!
ITERATION, EPS_SAT  = 3.0E+0,     EPS_PRES    = 1.E-2,&
           R_EPS_SAT= 3.0E+0,     R_EPS_PRES  = 1.E-2,&
           FTOL_SAT = 1.0E-2,     FTOL_PRES   = 1.0E-2,&
           R_FTOL_SAT=1.0E-2,     R_FTOL_PRES = 1.0E-2, CONV_TEST = AND
!
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NUMERICS,SOLVER=LU
NUMERICS,JACSCALE= 1.0e7,VSWITCH=NO
NUMERICS, ITRAVE= HARMONIC, IMFRAVE=UPSTREAM
!
GRAVITY, MAT= REFCON, G_ACC= GRAVACC
!
!==========================================================================
*OUTPUT_CONTROL
!
UNITS= SI
MONITOR, ILOC = 26, JLOC = 12, KLOC = 1
MONITOR, ILOC = 32, JLOC = 12, KLOC = 1
MONITOR, ILOC = 36, JLOC = 12, KLOC = 1
!
STEPS, FILE= BINARY, NSTEP=20
TIMES, FILE= ASCII,  VALUES= 0.0, 3.155693E09, 1.104493E10,&
                                  3.155693E10, 9.467079E10,&
                                  1.577847E11, 2.208985E11,&
                                  2.840124E11, 3.155693E11
PRIBIN,&
     PRESBRIN,  PRESGAS,   POROS,     DENGAS,    PERMBRX,  PERMGASX,&
     SATGAS,    FLOWGASX,  FLOWGASY,  FLOWBRX,   FLOWBRY,&
     FECONC,    CELLCONC, BRINRATE
!
PRIASC,&
     PRESBRIN,  PRESGAS,   POROS,    SATGAS,    FECONC,   CELLCONC
!
!HORIZONTAL BRINE FLOW ACROSS 2.4K SOUTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE=17,17, KRANGE=1,1
!HORIZONTAL BRINE FLOW ACROSS 2.4K SOUTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE=25,33, KRANGE=1,1
!HORIZONTAL BRINE FLOW ACROSS 2.4K NORTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE=17,17, KRANGE=1,1
!HORIZONTAL BRINE FLOW ACROSS 2.4K NORTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE=25,33, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K SOUTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE=17,17, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K SOUTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE=25,33, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K NORTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE=17,17, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K NORTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE=25,33, KRANGE=1,1
!BRINE FLOW ACROSS DRZ AND MARKER BEDS BOUNDARY
HISTORY, NAMES=   FLOWBRX,  IRANGE= 23,23,   JRANGE= 7,17, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 46,46, JRANGE= 7,17, KRANGE=1,1
!GAS FLOW ACROSS DRZ AND MARKER BEDS BOUNDARY
HISTORY, NAMES=   FLOWGASX,    IRANGE= 23,23,   JRANGE= 7,17, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 46,46, JRANGE= 7,17, KRANGE=1,1
```

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!
!VERTICAL BRINE FLOW ACROSS BOTTOM OF UPPER DRZ
HISTORY, NAMES=   FLOWBRY,  IRANGE= 23,45,  JRANGE=13,13, KRANGE=1,1
!VERTICAL BRINE FLOW ACROSS TOP OF LOWER DRZ
HISTORY, NAMES=   FLOWBRY,  IRANGE= 23,45,  JRANGE=10,10, KRANGE=1,1
!
!VERTICAL GAS FLOW ACROSS BOTTOM OF UPPER DRZ
HISTORY, NAMES=   FLOWGASY,  IRANGE= 23,45,  JRANGE=13,13, KRANGE=1,1
!VERTICAL GAS FLOW ACROSS TOP OF LOWER DRZ
HISTORY, NAMES=   FLOWGASY,  IRANGE= 23,45,  JRANGE=10,10, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW SOUTH SIDE OF S_REPOSITORY
HISTORY, NAMES=   FLOWBRX,  IRANGE=32,32,   JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW SOUTH SIDE OF S_REPOSITORY
HISTORY, NAMES=   FLOWGASX, IRANGE=32,32,   JRANGE= 10,12, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW NORTH SIDE OF N_REPOSITORY
HISTORY, NAMES=   FLOWBRX,  IRANGE=38,38,  JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW NORTH SIDE OF REPOSITORY
HISTORY, NAMES=   FLOWGASX, IRANGE=38,38,  JRANGE= 10,12, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW SOUTH SIDE OF PANEL
HISTORY, NAMES=   FLOWBRX,  IRANGE= 23,23, JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW SOUTH SIDE OF PANE0
HISTORY, NAMES=   FLOWGASX, IRANGE= 23,23, JRANGE= 10,12, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW NORTH SIDE OF PANEL
HISTORY, NAMES=   FLOWBRX,  IRANGE=30,30,  JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW NORTH SIDE OF PANEL
HISTORY, NAMES=   FLOWGASX, IRANGE=30,30,  JRANGE= 10,12, KRANGE=1,1
!
!GAS SATURATION IN PANEL
HISTORY, NAMES=   SATGAS,   IRANGE=23,29, JRANGE= 10,12, KRANGE=1,1
!
!GAS SATURATION IN REPOSITORY
HISTORY, NAMES=   SATGAS,   IRANGE= 32,33, JRANGE= 10,12, KRANGE=1,1
HISTORY, NAMES=   SATGAS,   IRANGE= 36,37, JRANGE= 10,12, KRANGE=1,1
!
!BRINE PRESSURE IN PANEL
HISTORY, NAMES=   PRESBRIN, IRANGE=23,29,  JRANGE= 10,12,  KRANGE=1,1
!
!BRINE PRESSURE IN REPOSITORY
HISTORY, NAMES=   PRESBRIN, IRANGE= 32,33,  JRANGE= 10,12,  KRANGE=1,1
HISTORY, NAMES=   PRESBRIN, IRANGE= 36,37,  JRANGE= 10,12,  KRANGE=1,1
!
!BRINE PRESSURE IN BRINE POCKET
HISTORY, NAMES=   PRESBRIN, IRANGE= 26,26, JRANGE= 1,1,  KRANGE=1,1
!
!BRINE PRESSURE IN INTERSECTION OF BOREHOLE AND CULEBRA
HISTORY, NAMES=   PRESBRIN, IRANGE= 26,26, JRANGE= 26,26,  KRANGE=1,1
!***********************************************************************
!                  END OF HISTORY VARIABLES
!***********************************************************************
!
*REACTION_CHEMISTRY
!
WICKING, MAT= WAS_AREA, VALUE=SAT_WICK
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NUMERICS, SMOOTH=ON,   ALPHARXN=-1000.0
RATES,    MAT=WAS_AREA, COR_IN=GRATCORI, COR_HUM=GRATCORH,&
                        MIC_IN=GRATMICI, MIC_HUM=GRATMICH,&
                        SCOR_GAS=STOICOR, SMIC_GAS=STOIMIC
!
VOLUME, MAT=WAS_AREA,  VOL_CHW  = VOLCHW, VOL_RHW = VOLRHW
!
DENSITY, MAT=WAS_AREA, METAL_RH= DRH_METL, BIO_RH= DRH_BIO,&
                       METAL_CH= DCH_METL, BIO_CH= DCH_BIO
!
SATURATION, MAT=WAS_AREA, VALUE= SAT_IBRN
!
MOLWTS, MAT= REFCON,  MW_FE  = MW_FE
MOLWTS, MAT= REFCON,  MW_CEL = MW_CELL
!
MISC,   MAT= REFCON,  VREPOS  = VREPOS,&
                      VPANLEX = VPANLEX,&
                      VROOM   = VROOM,&
                      ASDRUM  = ASDRUM,&
                      DRROOM  = DRROOM
!
!
!============================================================================
*PROPERTIES
! GET SOLID properties from CAMDAT file
!Salado Halite
SOLID, MAT=S_HALITE,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_0,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_1,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_PCS,&
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                    PRM_X      = PERM_X,      PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,      POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,    BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,    COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,      PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,      CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,    PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,     PCT_FLAG   = KPT


!
SOLID, MAT=S_MB139,&
                    PRM_X      = PERM_X,      PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,      POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,    BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,    COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,      PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,      CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,    PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,     PCT_FLAG   = KPT
!
SOLID, MAT=S_ANH_AB,&
                    PRM_X      = PERM_X,      PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,      POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,    BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,    COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,      PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,      CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,    PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,     PCT_FLAG   = KPT
!
SOLID, MAT=S_MB138,&
                    PRM_X      = PERM_X,      PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,      POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,    BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,    COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,      PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,      CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,    PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,     PCT_FLAG   = KPT
!
SOLID, MAT=CAVITY_1,&
                    PRM_X      = PERM_X,      PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,      POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,    BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,    COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,      PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,      CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,    PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,     PCT_FLAG   = KPT
!
SOLID, MAT=CAVITY_2,&
                    PRM_X      = PERM_X,      PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,      POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,    BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,    COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,      PB_MIN     = PO_MIN,&
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                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CAVITY_3,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CAVITY_4,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=IMPERM_Z,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CASTILER,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=WAS_AREA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=REPOSIT,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
```

```
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=DRF_PCS,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=CONC_PCS,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=UNNAMED,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=CULEBRA,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=TAMARISK,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
```

```
SOLID, MAT=MAGENTA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=FORTYNIN,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DEWYLAKE,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=SANTAROS,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=OPS_AREA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=EXP_AREA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
```

```
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG    = KPT
!
! SOLID, MAT=BOREHOLE,&
!                     PRM_X      = PERM_X,       PRM_Y       = PERM_Y,&
!                     PRM_Z      = PERM_Z,       POROSITY    = POROSITY,&
!                     BCSOR      = SAT_RBRN,     BCSGR       = SAT_RGAS,&
!                     BCLAM      = PORE_DIS,     COMPRES     = POR_COMP,&
!                     SB_MIN     = SB_MIN,       PB_MIN      = PO_MIN,&
!                     PC_MAX     = PC_MAX,       CAP_MOD     = CAP_MOD,&
!                     RELP_MODEL = RELP_MOD,     PCT_A       = PCT_A,&
!                     PCT_EXP    = PCT_EXP,      PCT_FLAG    = KPT
!
SOLID, MAT=CONC_MON,&
                    PRM_X      = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG    = KPT
!
SOLID, MAT=SHFTU,&
                    PRM_X      = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG    = KPT
!
SOLID, MAT=SHFTL_T1,&
                    PRM_X      = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG    = KPT
!
SOLID, MAT=SHFTL_T2,&
                    PRM_X      = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG    = KPT
!
SOLID, MAT=BH_SAND,&
                    PRM_X      = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR       = SAT_RGAS,&
```

```
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
SOLID, MAT=BH_CREEP,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CONC_PLG,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=BH_OPEN,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
! GET FRACTURE PROPERTIES
FRACTURE, MAT= S_MB139,  FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= S_ANH_AB, FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= S_MB138,  FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= DRZ_0,    FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= DRZ_1,    FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
```

```
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
! GET FLUID (brine and gas) properties from CAMDAT file
FLUID, MAT=BRINESAL, SALINITY=WTF, DEN_BR=DNSFLUID,&
                     COMPR_BR= COMP, REF_PRES=REF_PRES, REF_TEMP= REF_TEMP,&
                     INTERP = 1, VIS_BR=VISCO
FLUID, MAT=H2,       VIS_GAS=VISCO,DGAS = OFF,&
                     H2_MOLE =1.0, CO2_MOLE=0.0, CH4_MOLE=0.0,&
                     N2_MOLE= 0.0, H2S_MOLE=0.0, O2_MOLE=0.0
FLUID, MAT=S_MB139,  KLINK=ON, B_KLINK=BKLINK, EXP_KLINK=EXPKLINK
!
FLUID, MAT= REFCON,  R_GAS    = R
FLUID, MAT= REFCON,  MW_H2O   = MW_H2O
FLUID, MAT= REFCON,  MW_SALT  = MW_NACL
FLUID, MAT= REFCON,  MW_H2    = MW_H2,   TC_H2  = TC_H2,   PC_H2  = PC_H2,&
                     ACEN_H2  = ACF_H2,  H2_CO2 = BIP_12,  H2_CH4 = BIP_13,&
                     H2_N2    = BIP_14,  H2_H2S = BIP_15,  H2_O2  = BIP_16
FLUID, MAT= REFCON,  MW_CO2   = MW_CO2,  TC_CO2 = TC_CO2,  PC_CO2 = PC_CO2,&
                     ACEN_CO2 = ACF_CO2, CO2_CH4= BIP_23,  CO2_N2 = BIP_24,&
                     CO2_H2S  = BIP_25 , CO2_O2 = BIP_26
FLUID, MAT= REFCON,  MW_CH4   = MW_CH4,  TC_CH4 = TC_CH4,  PC_CH4 = PC_CH4,&
                     ACEN_CH4 = ACF_CH4, CH4_N2 = BIP_34,  CH4_H2S= BIP_35,&
                     CH4_O2   = BIP_36
FLUID, MAT= REFCON,  MW_N2    = MW_N2,   TC_N2  = TC_N2,   PC_N2  = PC_N2,&
                     ACEN_N2  = ACF_N2,  N2_H2S = BIP_45,  N2_O2  = BIP_46
FLUID, MAT= REFCON,  MW_H2S   = MW_H2S,  TC_H2S = TC_H2S,  PC_H2S = PC_H2S,&
                     ACEN_H2S = ACF_H2S, H2S_O2 = BIP_56
FLUID, MAT= REFCON,  MW_O2    = MW_O2,   TC_O2  = TC_O2,   PC_O2  = PC_O2,&
                     ACEN_O2  = ACF_O2
FLUID, MAT= REFCON,  OMEGA_A  = OMEGAA , OMEGA_B = OMEGAB
!
*DIRICHLET
DIRICHLET, MAT=CULEBRA, PRESSURE=PRESSURE,&
               IRANGE=1,1,   JRANGE=26,26, KRANGE=1,1
DIRICHLET, MAT=CULEBRA, PRESSURE=PRESSURE,&
               IRANGE=68,68, JRANGE=26,26, KRANGE=1,1
DIRICHLET, MAT=MAGENTA, PRESSURE=PRESSURE,&
               IRANGE=1,1,   JRANGE=28,28, KRANGE=1,1
DIRICHLET, MAT=MAGENTA, PRESSURE=PRESSURE,&
               IRANGE=68,68, JRANGE=28,28, KRANGE=1,1
DIRICHLET, MAT=SANTAROS, PRESSURE=PRESSURE,&
               IRANGE=1,68,  JRANGE=33,33, KRANGE=1,1
DIRICHLET, MAT=SANTAROS, SATURATION=SAT_IBRN,&
               IRANGE=1,68,  JRANGE=33,33, KRANGE=1,1
*END
ex
$
```

SCENARIO: S4

```
$ type bf1_cra1_s4.inp
! TITLE:    BRAGFLO 2003 CRA1 (PREBRAG)
! SCENARIO: S4
! ANALYSTS: Joshua Stein and Bill Zelinski
! MODIFIED: 01/04/03
```

```
!===========================================================================
!   SCENARIO: UNDISTURBED SCENERIO
!           : SINGLE CLOSURE SURFACE
!           :   A)CREEP CLOSURE IN WASTE AREAS
!           : PANEL ON SOUTH, REST OF REPOSITORY ON NORTH
!               : SHAFT ADDED
!               : FRACTURING IN UPPER AND LOWER DRZ
!
!  28 Mar 02 JSS  rev4 Added REPOSIT meaterial and map to fix problem
!                   with WASTE materials.
!  02 Apr 02 JSS  rev5 Changed DRF_PCS in the PCS adjacent to the OPS_AREA
!                   to be mapped as OPS_AREA, which is appropriate for
!                   preclosed excavated regions.
!  15 Jan 03 WPZ  rev6 Added shaft.  Fracturing in both upper and lower DRZ
!  01 Apr 03 WPZ  rev7 modified to run with PREBRAG, Version 7.00 to produce
!                   input to BRAGFLO 5.0.  Accomodates constants that used to
!                   be included in BRAGFLO code that must now be included
!                   in input.
!===========================================================================
*HEADING
TITLE2 = 2003 BRAGFLO: CRA, E2 AT 350 YRS
!===========================================================================
!CLOSURE INFORMATION
*CLOSURE
CONTROL, TYPE = PRESSURE, AVE = CELL
SURFACE, MODEL = JAN_96,  PRES_LITHO = 50.0E6,  TIME_OFF = 3.155693E12,&
                          PERM_FACTOR= WAS_AREA:PERM_X, PERM_EXP = 0.0
REGION,  MAT =   WAS_AREA, MODEL = JAN_96
REGION,  MAT =   REPOSIT,  MODEL = JAN_96
REGION,  MAT =   DRF_PCS,  MODEL = JAN_96
!===========================================================================
*RESET
!RESET REGIONS ARE GIVEN THE INITIAL PRESSURE AND SATURATION SPECIFIED IN
! THE INITIAL CONDITIONS AT THE RESET TIME
REGION,MAT=CAVITY_1
REGION,MAT=CAVITY_2
REGION,MAT=CAVITY_3
REGION,MAT=CAVITY_4
TIME=0.0
WASTE,MAT_OLD=CAVITY_1,MAT_NEW=WAS_AREA,&
           PRES_BRINE=101325.0, SAT_BRINE=0.0
WASTE,MAT_OLD=CAVITY_2,MAT_NEW=REPOSIT,&
           PRES_BRINE=101325.0, SAT_BRINE=0.0
!==========================================================================
*INITIAL_CONDITIONS
!BEGIN SIMULATION AT -5 YEARS
BEGIN, TIME=-1.577846E8
SATBR,   ID_BRINE =SATBREL
PRESSURE,ID_PRES  =PRESEL
CONFE  , ID_CONFE =FECONC
CONCELL, ID_CONCEL=CH2OCONC
ELEVAT,  ID_ELEV  =ELEVE
!============================================================================
*STEP_CONTROL
!TIME STEP IS REDUCED
!  1. AT   0 YEARS: WASTE IS INTRODUCED,
  TIME,BEGIN=0.0, DT=864.0
```

```
!  2. AT 200 YEARS: MATERIAL CHANGE
  TIME,BEGIN=6.311385E9, DT=864.0
!  3. AT 350 YEARS: MATERIAL CHANGE
  TIME,BEGIN=1.104492E10, DT=864.0
!  4. AT 550 YEARS: MATERIAL CHANGE
  TIME,BEGIN=1.735631E10, DT=864.0
!=============================================================================
*MODIFY_MAP
! ID=1 => 0 YEARS : WASTE INTRODUCED, SHAFT SEALS AND FILL INTRODUCED
! ID=2 => 200 YEARS : COMPACTED SALT (TIME PERIOD 6)
! ID=3 => 350 YEARS :
! ID=4 => 550 YEARS :
TIME,TIME_ID=1, BEGIN= 0.0
TIME,TIME_ID=2, BEGIN= 6.311385E9
TIME,TIME_ID=3, BEGIN= 1.104492E10
TIME,TIME_ID=4, BEGIN= 1.735631E10
!********
! 0 YEARS
!********
!INTRODUCE FINAL DRZ MATERIAL
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=23,30, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=32,34, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=36,38, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=40,42, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=44,45, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=23,30, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=32,34, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=36,38, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=40,42, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=44,45, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_PCS,  TIME_ID=1, IRANGE=31,31, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=DRZ_PCS,  TIME_ID=1, IRANGE=35,35, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=DRZ_PCS,  TIME_ID=1, IRANGE=39,39, JRANGE=15,16, KRANGE=1,1
!INTRODUCE SHFTU upper shaft
MODIFY, MAT=SHFTU, TIME_ID=1, IRANGE=43,43, JRANGE=25,33, KRANGE=1,1
!INTRODUCE SHFTL_T1 lower shaft t1
MODIFY, MAT=SHFTL_T1, TIME_ID=1, IRANGE=43,43, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=SHFTL_T1, TIME_ID=1, IRANGE=43,43, JRANGE=18,24, KRANGE=1,1
!INTRODUCE CONC-MON lowest part of shaft filled with concrete
MODIFY, MAT=CONC_MON, TIME_ID=1, IRANGE=43,43, JRANGE=8,13, KRANGE=1,1
!INTRODUCE WASTE INTO PANEL REGION
MODIFY, MAT=WAS_AREA, TIME_ID=1, IRANGE=23,29, JRANGE=10,12, KRANGE=1,1
!INTRODUCE WASTE INTO REST OF REPOSITORY
MODIFY, MAT=REPOSIT, TIME_ID=1, IRANGE=32,33, JRANGE=10,12, KRANGE=1,1
MODIFY, MAT=REPOSIT, TIME_ID=1, IRANGE=36,37, JRANGE=10,12, KRANGE=1,1
!INTRODUCE PANEL SEAL BACKFILL modeled as was_area
MODIFY, MAT=DRF_PCS, TIME_ID=1, IRANGE=30,30, JRANGE=10,12, KRANGE=1,1
MODIFY, MAT=DRF_PCS, TIME_ID=1, IRANGE=34,34, JRANGE=10,12, KRANGE=1,1
MODIFY, MAT=DRF_PCS, TIME_ID=1, IRANGE=38,38, JRANGE=10,12, KRANGE=1,1
!MODIFY, MAT=OPS_AREA, TIME_ID=1, IRANGE=42,42, JRANGE=10,12, KRANGE=1,1
!INTRODUCE PANEL CLOSURE CONCRETE
MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=31,31, JRANGE=8,13, KRANGE=1,1
MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=35,35, JRANGE=8,13, KRANGE=1,1
MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=39,39, JRANGE=8,13, KRANGE=1,1
!MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=43,43, JRANGE=8,13, KRANGE=1,1
!INTRODUCE PANEL CLOSURE CONCRETE AT MB139 LEVEL
!MODIFY, MAT=CPCS_F, TIME_ID=1, IRANGE=31,31, JRANGE=7,7, KRANGE=1,1
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!MODIFY, MAT=CPCS_F, TIME_ID=1, IRANGE=35,35, JRANGE=7,7, KRANGE=1,1
!MODIFY, MAT=CPCS_F, TIME_ID=1, IRANGE=39,39, JRANGE=7,7, KRANGE=1,1
!MODIFY, MAT=CPCS_F, TIME_ID=1, IRANGE=43,43, JRANGE=7,7, KRANGE=1,1
!INTRODUCE OPERATIONS REGION MATERIAL
MODIFY, MAT=OPS_AREA, TIME_ID=1, IRANGE=40,42, JRANGE=10,12, KRANGE=1,1
!INTRODUCE EXPERIMENTAL REGION MATERIAL
MODIFY, MAT=EXP_AREA, TIME_ID=1, IRANGE=44,45, JRANGE=10,12, KRANGE=1,1
!INTRODUCE UNNAMED MEMBER OF THE RUSTLER
MODIFY, MAT=UNNAMED,  TIME_ID=1, IRANGE= 1,42, JRANGE=25,25, KRANGE=1,1
MODIFY, MAT=UNNAMED,  TIME_ID=1, IRANGE=44,68, JRANGE=25,25, KRANGE=1,1
!INTRODUCE TRUE CULEBRA REGION TO ALLOW BRINE INFLOW TO SHAFT
MODIFY, MAT=CULEBRA,  TIME_ID=1, IRANGE= 1,42, JRANGE=26,26, KRANGE=1,1
MODIFY, MAT=CULEBRA,  TIME_ID=1, IRANGE=44,68, JRANGE=26,26, KRANGE=1,1
!INTRODUCE TAMARISK
MODIFY, MAT=TAMARISK,  TIME_ID=1, IRANGE= 1,42, JRANGE=27,27, KRANGE=1,1
MODIFY, MAT=TAMARISK,  TIME_ID=1, IRANGE=44,68, JRANGE=27,27, KRANGE=1,1
!INTRODUCE MAGENTA
MODIFY, MAT=MAGENTA,  TIME_ID=1, IRANGE= 1,42, JRANGE=28,28, KRANGE=1,1
MODIFY, MAT=MAGENTA,  TIME_ID=1, IRANGE=44,68, JRANGE=28,28, KRANGE=1,1
!INTRODUCE FORTY-NINER
MODIFY, MAT=FORTYNIN,  TIME_ID=1, IRANGE= 1,42, JRANGE=29,29, KRANGE=1,1
MODIFY, MAT=FORTYNIN,  TIME_ID=1, IRANGE= 44,68, JRANGE=29,29, KRANGE=1,1
!INTRODUCE DEWEY LAKE RED BEDS
MODIFY, MAT=DEWYLAKE,  TIME_ID=1, IRANGE= 1,42, JRANGE=30,31, KRANGE=1,1
MODIFY, MAT=DEWYLAKE,  TIME_ID=1, IRANGE= 44,68, JRANGE=30,31, KRANGE=1,1
!INTRODUCE SANTA ROSA FORMATION
MODIFY, MAT=SANTAROS,  TIME_ID=1, IRANGE= 1,42, JRANGE=32,33, KRANGE=1,1
MODIFY, MAT=SANTAROS,  TIME_ID=1, IRANGE= 44,68, JRANGE=32,33, KRANGE=1,1
!****************************************************************************
!            END OF TIME PERIOD 1 MATERIAL RESETS
!****************************************************************************
!********
! 200 YEARS
!********
!INTRODUCE CHANGE IN LOWER SHAFT MATERIAL
MODIFY, MAT=SHFTL_T2, TIME_ID=2, IRANGE=43,43, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=SHFTL_T2, TIME_ID=2, IRANGE=43,43, JRANGE=18,24, KRANGE=1,1

!****************************************************************************
!            END OF TIME PERIOD 2 MATERIAL RESET
!============================================================================
!============================================================================
! 350 years
!============================================================================
! Introduce borehole material
!
MODIFY, MAT=BH_OPEN,   TIME_ID=3, IRANGE=26,26, JRANGE=10,24, KRANGE=1,1
MODIFY, MAT=CONC_PLG,  TIME_ID=3, IRANGE=26,26, JRANGE=25,25, KRANGE=1,1
MODIFY, MAT=BH_OPEN,   TIME_ID=3, IRANGE=26,26, JRANGE=26,31, KRANGE=1,1
MODIFY, MAT=CONC_PLG,  TIME_ID=3, IRANGE=26,26, JRANGE=32,33, KRANGE=1,1
!
!============================================================================
! 550 years
!============================================================================
! Introduce borehole material
!
MODIFY, MAT=BH_SAND,   TIME_ID=4, IRANGE=26,26, JRANGE=10,33, KRANGE=1,1
```

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!
!============================================================
*GEOMETRY
COORD= CARTESIAN
!==============================================================================
*SIMULATION_CONTROL
INTEGRATION, TMAX=3.155693E11, DT_INIT=8.64,DT_MIN= 8.64E-4, DT_MAX=1.728E9,&
           DT_INCR=1.25,   DT_REDU= 0.5,   AUTODT=YES,  TSWITCH=1.0,&
           MAXSTEPS=10000
!
ITERATION, DSATLIM= 2.E-1, DPRESLIM = -1.E8 , SATLIM= 1.E-3,&
           SATNORM= 0.30,  PRESNORM = 5.0E5,&
           ITMAX= 8,       IRESETMAX= 40, IJACINT= 1,&
           IJACSWITCH=41,  IJACMIN= 1,    IJACRESET= 5,&
           IUPRPFLAG =9,   IUPMFFLAG= 9,   IUPRPLOOSE= 9,&
           IUPMFLOOSE=9
!
ITERATION, DHSAT_REL= 1.0E-8,   DHPRES_REL=1.0E-8,&
           DHSAT_MIN= 1.0E-10,  DHPRES_MIN=1.0E-2
!
ITERATION, EPS_SAT  = 3.0E+0,     EPS_PRES    = 1.E-2,&
           R_EPS_SAT= 3.0E+0,     R_EPS_PRES  = 1.E-2,&
           FTOL_SAT = 1.0E-2,     FTOL_PRES   = 1.0E-2,&
           R_FTOL_SAT=1.0E-2,     R_FTOL_PRES = 1.0E-2, CONV_TEST = AND
!
NUMERICS,SOLVER=LU
NUMERICS,JACSCALE= 1.0e7,VSWITCH=NO
NUMERICS, ITRAVE= HARMONIC, IMFRAVE=UPSTREAM
!
GRAVITY, MAT= REFCON, G_ACC= GRAVACC
!
!============================================================================
*OUTPUT_CONTROL
!
UNITS= SI
MONITOR, ILOC = 26, JLOC = 12, KLOC = 1
MONITOR, ILOC = 32, JLOC = 12, KLOC = 1
MONITOR, ILOC = 36, JLOC = 12, KLOC = 1
!
STEPS, FILE= BINARY, NSTEP=20
TIMES, FILE= ASCII,  VALUES= 0.0, 3.155693E09, 1.104493E10,&
                                  3.155693E10, 9.467079E10,&
                                  1.577847E11, 2.208985E11,&
                                  2.840124E11, 3.155693E11
PRIBIN,&
     PRESBRIN,  PRESGAS,   POROS,     DENGAS,    PERMBRX,  PERMGASX,&
     SATGAS,    FLOWGASX,  FLOWGASY,  FLOWBRX,   FLOWBRY,&
     FECONC,    CELLCONC, BRINRATE
!
PRIASC,&
     PRESBRIN,  PRESGAS,   POROS,    SATGAS,    FECONC,   CELLCONC
!
!HORIZONTAL BRINE FLOW ACROSS 2.4K SOUTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE=17,17, KRANGE=1,1
!HORIZONTAL BRINE FLOW ACROSS 2.4K SOUTH BOUNDARY (ABOVE SALADO)
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HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE=25,33, KRANGE=1,1
!HORIZONTAL BRINE FLOW ACROSS 2.4K NORTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE=17,17, KRANGE=1,1
!HORIZONTAL BRINE FLOW ACROSS 2.4K NORTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE=25,33, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K SOUTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE=17,17, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K SOUTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE=25,33, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K NORTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE=17,17, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K NORTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE=25,33, KRANGE=1,1
!BRINE FLOW ACROSS DRZ AND MARKER BEDS BOUNDARY
HISTORY, NAMES=   FLOWBRX,  IRANGE= 23,23,   JRANGE= 7,17, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 46,46, JRANGE= 7,17, KRANGE=1,1
!GAS FLOW ACROSS DRZ AND MARKER BEDS BOUNDARY
HISTORY, NAMES=   FLOWGASX,    IRANGE= 23,23,   JRANGE= 7,17, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 46,46, JRANGE= 7,17, KRANGE=1,1
!
!VERTICAL BRINE FLOW ACROSS BOTTOM OF UPPER DRZ
HISTORY, NAMES=   FLOWBRY,  IRANGE= 23,45,  JRANGE=13,13, KRANGE=1,1
!VERTICAL BRINE FLOW ACROSS TOP OF LOWER DRZ
HISTORY, NAMES=   FLOWBRY,  IRANGE= 23,45,  JRANGE=10,10, KRANGE=1,1
!
!VERTICAL GAS FLOW ACROSS BOTTOM OF UPPER DRZ
HISTORY, NAMES=   FLOWGASY,  IRANGE= 23,45,  JRANGE=13,13, KRANGE=1,1
!VERTICAL GAS FLOW ACROSS TOP OF LOWER DRZ
HISTORY, NAMES=   FLOWGASY,  IRANGE= 23,45,  JRANGE=10,10, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW SOUTH SIDE OF S_REPOSITORY
HISTORY, NAMES=   FLOWBRX,  IRANGE=32,32,   JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW SOUTH SIDE OF S_REPOSITORY
HISTORY, NAMES=   FLOWGASX, IRANGE=32,32,   JRANGE= 10,12, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW NORTH SIDE OF N_REPOSITORY
HISTORY, NAMES=   FLOWBRX,  IRANGE=38,38,  JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW NORTH SIDE OF REPOSITORY
HISTORY, NAMES=   FLOWGASX, IRANGE=38,38,  JRANGE= 10,12, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW SOUTH SIDE OF PANEL
HISTORY, NAMES=   FLOWBRX,  IRANGE= 23,23, JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW SOUTH SIDE OF PANE0
HISTORY, NAMES=   FLOWGASX, IRANGE= 23,23, JRANGE= 10,12, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW NORTH SIDE OF PANEL
HISTORY, NAMES=   FLOWBRX,  IRANGE=30,30,  JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW NORTH SIDE OF PANEL
HISTORY, NAMES=   FLOWGASX, IRANGE=30,30,  JRANGE= 10,12, KRANGE=1,1
!
!GAS SATURATION IN PANEL
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HISTORY, NAMES=   SATGAS,   IRANGE=23,29, JRANGE= 10,12, KRANGE=1,1
!
!GAS SATURATION IN REPOSITORY
HISTORY, NAMES=   SATGAS,   IRANGE= 32,33, JRANGE= 10,12, KRANGE=1,1
HISTORY, NAMES=   SATGAS,   IRANGE= 36,37, JRANGE= 10,12, KRANGE=1,1
!
!BRINE PRESSURE IN PANEL
HISTORY, NAMES=   PRESBRIN, IRANGE=23,29,  JRANGE= 10,12,  KRANGE=1,1
!
!BRINE PRESSURE IN REPOSITORY
HISTORY, NAMES=   PRESBRIN, IRANGE= 32,33,  JRANGE= 10,12,  KRANGE=1,1
HISTORY, NAMES=   PRESBRIN, IRANGE= 36,37,  JRANGE= 10,12,  KRANGE=1,1
!
!BRINE PRESSURE IN BRINE POCKET
HISTORY, NAMES=   PRESBRIN, IRANGE= 26,26, JRANGE= 1,1,  KRANGE=1,1
!
!BRINE PRESSURE IN INTERSECTION OF BOREHOLE AND CULEBRA
HISTORY, NAMES=   PRESBRIN, IRANGE= 26,26, JRANGE= 26,26,  KRANGE=1,1
!**********************************************************************
!                 END OF HISTORY VARIABLES
!**********************************************************************
!
*REACTION_CHEMISTRY
!
WICKING, MAT= WAS_AREA, VALUE=SAT_WICK
NUMERICS, SMOOTH=ON,   ALPHARXN=-1000.0
RATES,   MAT=WAS_AREA, COR_IN=GRATCORI, COR_HUM=GRATCORH,&
                       MIC_IN=GRATMICI, MIC_HUM=GRATMICH,&
                       SCOR_GAS=STOICOR, SMIC_GAS=STOIMIC
!
VOLUME, MAT=WAS_AREA,  VOL_CHW  = VOLCHW, VOL_RHW = VOLRHW
!
DENSITY, MAT=WAS_AREA, METAL_RH= DRH_METL, BIO_RH= DRH_BIO,&
                       METAL_CH= DCH_METL, BIO_CH= DCH_BIO
!
SATURATION, MAT=WAS_AREA, VALUE= SAT_IBRN
!
MOLWTS, MAT= REFCON,  MW_FE  = MW_FE
MOLWTS, MAT= REFCON,  MW_CEL = MW_CELL
!
MISC,   MAT= REFCON,  VREPOS  = VREPOS,&
                      VPANLEX = VPANLEX,&
                      VROOM   = VROOM,&
                      ASDRUM  = ASDRUM,&
                      DRROOM  = DRROOM
!
!
!============================================================================
*PROPERTIES
! GET SOLID properties from CAMDAT file
!Salado Halite
SOLID, MAT=S_HALITE,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
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                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_0,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_1,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_PCS,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT


!
SOLID, MAT=S_MB139,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=S_ANH_AB,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=S_MB138,&
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                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CAVITY_1,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CAVITY_2,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CAVITY_3,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CAVITY_4,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=IMPERM_Z,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
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                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CASTILER,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=WAS_AREA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=REPOSIT,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRF_PCS,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CONC_PCS,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=UNNAMED,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
```

```
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=CULEBRA,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=TAMARISK,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=MAGENTA,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=FORTYNIN,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=DEWYLAKE,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=SANTAROS,&
                    PRM_X      = PERM_X,        PRM_Y      = PERM_Y,&
```

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                    PRM_Z       = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR       = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM       = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN      = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX      = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,       PCT_A      = PCT_A,&
                    PCT_EXP     = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=OPS_AREA,&
                    PRM_X       = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z       = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR       = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM       = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN      = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX      = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,       PCT_A      = PCT_A,&
                    PCT_EXP     = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=EXP_AREA,&
                    PRM_X       = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z       = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR       = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM       = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN      = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX      = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,       PCT_A      = PCT_A,&
                    PCT_EXP     = PCT_EXP,       PCT_FLAG   = KPT
!
! SOLID, MAT=BOREHOLE,&
!                     PRM_X       = PERM_X,        PRM_Y      = PERM_Y,&
!                     PRM_Z       = PERM_Z,        POROSITY   = POROSITY,&
!                     BCSOR       = SAT_RBRN,      BCSGR      = SAT_RGAS,&
!                     BCLAM       = PORE_DIS,      COMPRES    = POR_COMP,&
!                     SB_MIN      = SB_MIN,        PB_MIN     = PO_MIN,&
!                     PC_MAX      = PC_MAX,        CAP_MOD    = CAP_MOD,&
!                     RELP_MODEL = RELP_MOD,       PCT_A      = PCT_A,&
!                     PCT_EXP     = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=CONC_MON,&
                    PRM_X       = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z       = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR       = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM       = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN      = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX      = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,       PCT_A      = PCT_A,&
                    PCT_EXP     = PCT_EXP,       PCT_FLAG   = KPT
!
SOLID, MAT=SHFTU,&
                    PRM_X       = PERM_X,        PRM_Y      = PERM_Y,&
                    PRM_Z       = PERM_Z,        POROSITY   = POROSITY,&
                    BCSOR       = SAT_RBRN,      BCSGR      = SAT_RGAS,&
                    BCLAM       = PORE_DIS,      COMPRES    = POR_COMP,&
                    SB_MIN      = SB_MIN,        PB_MIN     = PO_MIN,&
                    PC_MAX      = PC_MAX,        CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,       PCT_A      = PCT_A,&
                    PCT_EXP     = PCT_EXP,       PCT_FLAG   = KPT
```

```
!
SOLID, MAT=SHFTL_T1,&
                    PRM_X       = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z       = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR       = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                    BCLAM       = PORE_DIS,     COMPRES     = POR_COMP,&
                    SB_MIN      = SB_MIN,       PB_MIN      = PO_MIN,&
                    PC_MAX      = PC_MAX,       CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP     = PCT_EXP,      PCT_FLAG    = KPT
!
SOLID, MAT=SHFTL_T2,&
                    PRM_X       = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z       = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR       = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                    BCLAM       = PORE_DIS,     COMPRES     = POR_COMP,&
                    SB_MIN      = SB_MIN,       PB_MIN      = PO_MIN,&
                    PC_MAX      = PC_MAX,       CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP     = PCT_EXP,      PCT_FLAG    = KPT
!
SOLID, MAT=CONC_PLG,&
                    PRM_X       = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z       = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR       = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                    BCLAM       = PORE_DIS,     COMPRES     = POR_COMP,&
                    SB_MIN      = SB_MIN,       PB_MIN      = PO_MIN,&
                    PC_MAX      = PC_MAX,       CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP     = PCT_EXP,      PCT_FLAG    = KPT
!
SOLID, MAT=BH_OPEN,&
                    PRM_X       = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z       = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR       = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                    BCLAM       = PORE_DIS,     COMPRES     = POR_COMP,&
                    SB_MIN      = SB_MIN,       PB_MIN      = PO_MIN,&
                    PC_MAX      = PC_MAX,       CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP     = PCT_EXP,      PCT_FLAG    = KPT
SOLID, MAT=BH_SAND,&
                    PRM_X       = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z       = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR       = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                    BCLAM       = PORE_DIS,     COMPRES     = POR_COMP,&
                    SB_MIN      = SB_MIN,       PB_MIN      = PO_MIN,&
                    PC_MAX      = PC_MAX,       CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP     = PCT_EXP,      PCT_FLAG    = KPT
SOLID, MAT=BH_CREEP,&
                    PRM_X       = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z       = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR       = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                    BCLAM       = PORE_DIS,     COMPRES     = POR_COMP,&
                    SB_MIN      = SB_MIN,       PB_MIN      = PO_MIN,&
                    PC_MAX      = PC_MAX,       CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
```

```
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
! GET FRACTURE PROPERTIES
FRACTURE, MAT= S_MB139,  FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= S_ANH_AB, FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= S_MB138,  FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= DRZ_0,    FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= DRZ_1,    FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
! GET FLUID (brine and gas) properties from CAMDAT file
FLUID, MAT=BRINESAL, SALINITY=WTF, DEN_BR=DNSFLUID,&
                     COMPR_BR= COMP, REF_PRES=REF_PRES, REF_TEMP= REF_TEMP,&
                     INTERP = 1, VIS_BR=VISCO
FLUID, MAT=H2,       VIS_GAS=VISCO,DGAS = OFF,&
                     H2_MOLE =1.0, CO2_MOLE=0.0, CH4_MOLE=0.0,&
                     N2_MOLE= 0.0, H2S_MOLE=0.0, O2_MOLE=0.0
FLUID, MAT=S_MB139,  KLINK=ON, B_KLINK=BKLINK, EXP_KLINK=EXPKLINK
!
FLUID, MAT= REFCON,  R_GAS    = R
FLUID, MAT= REFCON,  MW_H2O   = MW_H2O
FLUID, MAT= REFCON,  MW_SALT  = MW_NACL
FLUID, MAT= REFCON,  MW_H2    = MW_H2,   TC_H2  = TC_H2,   PC_H2  = PC_H2,&
                     ACEN_H2  = ACF_H2,  H2_CO2 = BIP_12,  H2_CH4 = BIP_13,&
                     H2_N2    = BIP_14,  H2_H2S = BIP_15,  H2_O2  = BIP_16
FLUID, MAT= REFCON,  MW_CO2   = MW_CO2,  TC_CO2 = TC_CO2,  PC_CO2 = PC_CO2,&
                     ACEN_CO2 = ACF_CO2, CO2_CH4= BIP_23,  CO2_N2 = BIP_24,&
                     CO2_H2S  = BIP_25 , CO2_O2= BIP_26
FLUID, MAT= REFCON,  MW_CH4   = MW_CH4,  TC_CH4 = TC_CH4,  PC_CH4 = PC_CH4,&
                     ACEN_CH4 = ACF_CH4, CH4_N2 = BIP_34,  CH4_H2S= BIP_35,&
                     CH4_O2   = BIP_36
FLUID, MAT= REFCON,  MW_N2    = MW_N2,   TC_N2  = TC_N2,   PC_N2  = PC_N2,&
                     ACEN_N2  = ACF_N2,  N2_H2S = BIP_45,  N2_O2  = BIP_46
FLUID, MAT= REFCON,  MW_H2S   = MW_H2S,  TC_H2S = TC_H2S,  PC_H2S = PC_H2S,&
                     ACEN_H2S = ACF_H2S, H2S_O2 = BIP_56
FLUID, MAT= REFCON,  MW_O2    = MW_O2,   TC_O2  = TC_O2,   PC_O2  = PC_O2,&
                     ACEN_O2  = ACF_O2
FLUID, MAT= REFCON,  OMEGA_A  = OMEGAA , OMEGA_B = OMEGAB
!
```

```
*DIRICHLET
DIRICHLET, MAT=CULEBRA, PRESSURE=PRESSURE,&
               IRANGE=1,1,   JRANGE=26,26, KRANGE=1,1
DIRICHLET, MAT=CULEBRA, PRESSURE=PRESSURE,&
               IRANGE=68,68, JRANGE=26,26, KRANGE=1,1
DIRICHLET, MAT=MAGENTA, PRESSURE=PRESSURE,&
               IRANGE=1,1,   JRANGE=28,28, KRANGE=1,1
DIRICHLET, MAT=MAGENTA, PRESSURE=PRESSURE,&
               IRANGE=68,68, JRANGE=28,28, KRANGE=1,1
DIRICHLET, MAT=SANTAROS, PRESSURE=PRESSURE,&
               IRANGE=1,68,  JRANGE=33,33, KRANGE=1,1
DIRICHLET, MAT=SANTAROS, SATURATION=SAT_IBRN,&
               IRANGE=1,68,  JRANGE=33,33, KRANGE=1,1
*END
ex
$
```

SCENARIO: S5

```
$ type bf1_cra1_s5.inp
! TITLE:    BRAGFLO 2003 CRA1 (PREBRAG)
! SCENARIO: S5
! ANALYSTS: Joshua Stein and Bill Zelinski
! MODIFIED: 01/04/03
!============================================================================
!   SCENARIO: UNDISTURBED SCENERIO
!           : SINGLE CLOSURE SURFACE
!           :   A)CREEP CLOSURE IN WASTE AREAS
!           : PANEL ON SOUTH, REST OF REPOSITORY ON NORTH
!               : SHAFT ADDED
!               : FRACTURING IN UPPER AND LOWER DRZ
!
!  28 Mar 02 JSS  rev4 Added REPOSIT meaterial and map to fix problem
!                   with WASTE materials.
!  02 Apr 02 JSS  rev5 Changed DRF_PCS in the PCS adjacent to the OPS_AREA
!                   to be mapped as OPS_AREA, which is appropriate for
!                   preclosed excavated regions.
!  15 Jan 03 WPZ  rev6 Added shaft.  Fracturing in both upper and lower DRZ
!  01 Apr 03 WPZ  rev7 modified to run with PREBRAG, Version 7.00 to produce
!                   input to BRAGFLO 5.0.  Accomodates constants that used to
!                   be included in BRAGFLO code that must now be included
!                   in input.
!============================================================================
*HEADING
TITLE2 = 2003 BRAGFLO: CRA E2 AT 1000 YRS
!============================================================================
!CLOSURE INFORMATION
*CLOSURE
CONTROL, TYPE = PRESSURE, AVE = CELL
SURFACE, MODEL = JAN_96,  PRES_LITHO = 50.0E6,  TIME_OFF = 3.155693E12,&
                          PERM_FACTOR= WAS_AREA:PERM_X, PERM_EXP = 0.0
REGION,  MAT =   WAS_AREA, MODEL = JAN_96
REGION,  MAT =   REPOSIT,  MODEL = JAN_96
REGION,  MAT =   DRF_PCS,  MODEL = JAN_96
!============================================================================
*RESET
!RESET REGIONS ARE GIVEN THE INITIAL PRESSURE AND SATURATION SPECIFIED IN
```

```
! THE INITIAL CONDITIONS AT THE RESET TIME
REGION,MAT=CAVITY_1
REGION,MAT=CAVITY_2
REGION,MAT=CAVITY_3
REGION,MAT=CAVITY_4
TIME=0.0
WASTE,MAT_OLD=CAVITY_1,MAT_NEW=WAS_AREA,&
           PRES_BRINE=101325.0, SAT_BRINE=0.0
WASTE,MAT_OLD=CAVITY_2,MAT_NEW=REPOSIT,&
           PRES_BRINE=101325.0, SAT_BRINE=0.0
!==========================================================================
*INITIAL_CONDITIONS
!BEGIN SIMULATION AT -5 YEARS
BEGIN, TIME=-1.577846E8
SATBR,   ID_BRINE =SATBREL
PRESSURE,ID_PRES  =PRESEL
CONFE  , ID_CONFE =FECONC
CONCELL, ID_CONCEL=CH2OCONC
ELEVAT,  ID_ELEV  =ELEVE
!=============================================================================
*STEP_CONTROL
!TIME STEP IS REDUCED
!  1. AT   0 YEARS: WASTE IS INTRODUCED,
  TIME,BEGIN=0.0, DT=864.0
!  2. AT 200 YEARS: MATERIAL CHANGE
  TIME,BEGIN=6.311385E9, DT=864.0
!  3. AT 1000 YEARS: MATERIAL CHANGE
  TIME,BEGIN=3.155693E10, DT=864.0
!  4. AT 1200 YEARS: MATERIAL CHANGE
  TIME,BEGIN=3.786831E10, DT=864.0
!=============================================================================
*MODIFY_MAP
! ID=1 => 0 YEARS : WASTE INTRODUCED, SHAFT SEALS AND FILL INTRODUCED
! ID=2 => 200 YEARS : COMPACTED SALT (TIME PERIOD 6)
! ID=3 => 1000 YEARS :
! ID=4 => 1200 YEARS :
TIME,TIME_ID=1, BEGIN= 0.0
TIME,TIME_ID=2, BEGIN= 6.311385E9
TIME,TIME_ID=3, BEGIN= 3.155693E10
TIME,TIME_ID=4, BEGIN= 3.786831E10
!********
! 0 YEARS
!********
!INTRODUCE FINAL DRZ MATERIAL
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=23,30, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=32,34, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=36,38, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=40,42, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=44,45, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=23,30, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=32,34, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=36,38, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=40,42, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=44,45, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_PCS,  TIME_ID=1, IRANGE=31,31, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=DRZ_PCS,  TIME_ID=1, IRANGE=35,35, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=DRZ_PCS,  TIME_ID=1, IRANGE=39,39, JRANGE=15,16, KRANGE=1,1
```

```
!INTRODUCE SHFTU upper shaft
MODIFY, MAT=SHFTU, TIME_ID=1, IRANGE=43,43, JRANGE=25,33, KRANGE=1,1
!INTRODUCE SHFTL_T1 lower shaft t1
MODIFY, MAT=SHFTL_T1, TIME_ID=1, IRANGE=43,43, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=SHFTL_T1, TIME_ID=1, IRANGE=43,43, JRANGE=18,24, KRANGE=1,1
!INTRODUCE CONC-MON lowest part of shaft filled with concrete
MODIFY, MAT=CONC_MON, TIME_ID=1, IRANGE=43,43, JRANGE=8,13, KRANGE=1,1
!INTRODUCE WASTE INTO PANEL REGION
MODIFY, MAT=WAS_AREA, TIME_ID=1, IRANGE=23,29, JRANGE=10,12, KRANGE=1,1
!INTRODUCE WASTE INTO REST OF REPOSITORY
MODIFY, MAT=REPOSIT, TIME_ID=1, IRANGE=32,33, JRANGE=10,12, KRANGE=1,1
MODIFY, MAT=REPOSIT, TIME_ID=1, IRANGE=36,37, JRANGE=10,12, KRANGE=1,1
!INTRODUCE PANEL SEAL BACKFILL modeled as was_area
MODIFY, MAT=DRF_PCS, TIME_ID=1, IRANGE=30,30, JRANGE=10,12, KRANGE=1,1
MODIFY, MAT=DRF_PCS, TIME_ID=1, IRANGE=34,34, JRANGE=10,12, KRANGE=1,1
MODIFY, MAT=DRF_PCS, TIME_ID=1, IRANGE=38,38, JRANGE=10,12, KRANGE=1,1
!MODIFY, MAT=OPS_AREA, TIME_ID=1, IRANGE=42,42, JRANGE=10,12, KRANGE=1,1
!INTRODUCE PANEL CLOSURE CONCRETE
MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=31,31, JRANGE=8,13, KRANGE=1,1
MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=35,35, JRANGE=8,13, KRANGE=1,1
MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=39,39, JRANGE=8,13, KRANGE=1,1
!MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=43,43, JRANGE=8,13, KRANGE=1,1
!INTRODUCE PANEL CLOSURE CONCRETE AT MB139 LEVEL
!MODIFY, MAT=CPCS_F, TIME_ID=1, IRANGE=31,31, JRANGE=7,7, KRANGE=1,1
!MODIFY, MAT=CPCS_F, TIME_ID=1, IRANGE=35,35, JRANGE=7,7, KRANGE=1,1
!MODIFY, MAT=CPCS_F, TIME_ID=1, IRANGE=39,39, JRANGE=7,7, KRANGE=1,1
!MODIFY, MAT=CPCS_F, TIME_ID=1, IRANGE=43,43, JRANGE=7,7, KRANGE=1,1
!INTRODUCE OPERATIONS REGION MATERIAL
MODIFY, MAT=OPS_AREA, TIME_ID=1, IRANGE=40,42, JRANGE=10,12, KRANGE=1,1
!INTRODUCE EXPERIMENTAL REGION MATERIAL
MODIFY, MAT=EXP_AREA, TIME_ID=1, IRANGE=44,45, JRANGE=10,12, KRANGE=1,1
!INTRODUCE UNNAMED MEMBER OF THE RUSTLER
MODIFY, MAT=UNNAMED,  TIME_ID=1, IRANGE= 1,42, JRANGE=25,25, KRANGE=1,1
MODIFY, MAT=UNNAMED,  TIME_ID=1, IRANGE=44,68, JRANGE=25,25, KRANGE=1,1
!INTRODUCE TRUE CULEBRA REGION TO ALLOW BRINE INFLOW TO SHAFT
MODIFY, MAT=CULEBRA,  TIME_ID=1, IRANGE= 1,42, JRANGE=26,26, KRANGE=1,1
MODIFY, MAT=CULEBRA,  TIME_ID=1, IRANGE=44,68, JRANGE=26,26, KRANGE=1,1
!INTRODUCE TAMARISK
MODIFY, MAT=TAMARISK,  TIME_ID=1, IRANGE= 1,42, JRANGE=27,27, KRANGE=1,1
MODIFY, MAT=TAMARISK,  TIME_ID=1, IRANGE=44,68, JRANGE=27,27, KRANGE=1,1
!INTRODUCE MAGENTA
MODIFY, MAT=MAGENTA,  TIME_ID=1, IRANGE= 1,42, JRANGE=28,28, KRANGE=1,1
MODIFY, MAT=MAGENTA,  TIME_ID=1, IRANGE=44,68, JRANGE=28,28, KRANGE=1,1
!INTRODUCE FORTY-NINER
MODIFY, MAT=FORTYNIN,  TIME_ID=1, IRANGE= 1,42, JRANGE=29,29, KRANGE=1,1
MODIFY, MAT=FORTYNIN,  TIME_ID=1, IRANGE= 44,68, JRANGE=29,29, KRANGE=1,1
!INTRODUCE DEWEY LAKE RED BEDS
MODIFY, MAT=DEWYLAKE,  TIME_ID=1, IRANGE= 1,42, JRANGE=30,31, KRANGE=1,1
MODIFY, MAT=DEWYLAKE,  TIME_ID=1, IRANGE= 44,68, JRANGE=30,31, KRANGE=1,1
!INTRODUCE SANTA ROSA FORMATION
MODIFY, MAT=SANTAROS,  TIME_ID=1, IRANGE= 1,42, JRANGE=32,33, KRANGE=1,1
MODIFY, MAT=SANTAROS,  TIME_ID=1, IRANGE= 44,68, JRANGE=32,33, KRANGE=1,1
!***********************************************************************
!            END OF TIME PERIOD 1 MATERIAL RESETS
!***********************************************************************
!********
! 200 YEARS
```

```
!********
!INTRODUCE CHANGE IN LOWER SHAFT MATERIAL
MODIFY, MAT=SHFTL_T2, TIME_ID=2, IRANGE=43,43, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=SHFTL_T2, TIME_ID=2, IRANGE=43,43, JRANGE=18,24, KRANGE=1,1

!****************************************************************************
!            END OF TIME PERIOD 2 MATERIAL RESET
!============================================================================
!============================================================================
! 1000 years
!============================================================================
! Introduce borehole material
!
MODIFY, MAT=BH_OPEN,   TIME_ID=3, IRANGE=26,26, JRANGE=10,24, KRANGE=1,1
MODIFY, MAT=CONC_PLG,  TIME_ID=3, IRANGE=26,26, JRANGE=25,25, KRANGE=1,1
MODIFY, MAT=BH_OPEN,   TIME_ID=3, IRANGE=26,26, JRANGE=26,31, KRANGE=1,1
MODIFY, MAT=CONC_PLG,  TIME_ID=3, IRANGE=26,26, JRANGE=32,33, KRANGE=1,1
!
!============================================================================
! 1200 years
!============================================================================
! Introduce borehole material
!
MODIFY, MAT=BH_SAND,   TIME_ID=4, IRANGE=26,26, JRANGE=10,33, KRANGE=1,1
!
!============================================================================
*GEOMETRY
COORD= CARTESIAN
!============================================================================
*SIMULATION_CONTROL
INTEGRATION, TMAX=3.155693E11, DT_INIT=8.64,DT_MIN= 8.64E-4, DT_MAX=1.728E9,&
           DT_INCR=1.25,   DT_REDU= 0.5,   AUTODT=YES,  TSWITCH=1.0,&
           MAXSTEPS=10000
!
ITERATION, DSATLIM= 2.E-1, DPRESLIM = -1.E8 , SATLIM= 1.E-3,&
           SATNORM= 0.30,  PRESNORM = 5.0E5,&
           ITMAX= 8,       IRESETMAX= 40, IJACINT= 1,&
           IJACSWITCH=41,  IJACMIN= 1,    IJACRESET= 5,&
           IUPRPFLAG =9,   IUPMFFLAG= 9,   IUPRPLOOSE= 9,&
           IUPMFLOOSE=9
!
ITERATION, DHSAT_REL= 1.0E-8,   DHPRES_REL=1.0E-8,&
           DHSAT_MIN= 1.0E-10,  DHPRES_MIN=1.0E-2
!
ITERATION, EPS_SAT  = 3.0E+0,     EPS_PRES    = 1.E-2,&
           R_EPS_SAT= 3.0E+0,     R_EPS_PRES  = 1.E-2,&
           FTOL_SAT = 1.0E-2,     FTOL_PRES   = 1.0E-2,&
           R_FTOL_SAT=1.0E-2,     R_FTOL_PRES = 1.0E-2, CONV_TEST = AND
!
NUMERICS,SOLVER=LU
NUMERICS,JACSCALE= 1.0e7,VSWITCH=NO
NUMERICS, ITRAVE= HARMONIC, IMFRAVE=UPSTREAM
!
GRAVITY, MAT= REFCON, G_ACC= GRAVACC
!
!==========================================================================
*OUTPUT_CONTROL
```

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!
UNITS= SI
MONITOR, ILOC = 26, JLOC = 12, KLOC = 1
MONITOR, ILOC = 32, JLOC = 12, KLOC = 1
MONITOR, ILOC = 36, JLOC = 12, KLOC = 1
!
STEPS, FILE= BINARY, NSTEP=20
TIMES, FILE= ASCII,  VALUES= 0.0, 3.155693E09, 1.104493E10,&
                                  3.155693E10, 9.467079E10,&
                                  1.577847E11, 2.208985E11,&
                                  2.840124E11, 3.155693E11
PRIBIN,&
     PRESBRIN,  PRESGAS,   POROS,     DENGAS,    PERMBRX,  PERMGASX,&
     SATGAS,    FLOWGASX,  FLOWGASY,  FLOWBRX,   FLOWBRY,&
     FECONC,    CELLCONC, BRINRATE
!
PRIASC,&
     PRESBRIN,  PRESGAS,   POROS,    SATGAS,    FECONC,   CELLCONC
!
!HORIZONTAL BRINE FLOW ACROSS 2.4K SOUTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE=17,17, KRANGE=1,1
!HORIZONTAL BRINE FLOW ACROSS 2.4K SOUTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE=25,33, KRANGE=1,1
!HORIZONTAL BRINE FLOW ACROSS 2.4K NORTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE=17,17, KRANGE=1,1
!HORIZONTAL BRINE FLOW ACROSS 2.4K NORTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE=25,33, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K SOUTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE=17,17, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K SOUTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE=25,33, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K NORTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE=17,17, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K NORTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE=25,33, KRANGE=1,1
!BRINE FLOW ACROSS DRZ AND MARKER BEDS BOUNDARY
HISTORY, NAMES=   FLOWBRX,  IRANGE= 23,23,   JRANGE= 7,17, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 46,46, JRANGE= 7,17, KRANGE=1,1
!GAS FLOW ACROSS DRZ AND MARKER BEDS BOUNDARY
HISTORY, NAMES=   FLOWGASX,    IRANGE= 23,23,   JRANGE= 7,17, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 46,46, JRANGE= 7,17, KRANGE=1,1
!
!VERTICAL BRINE FLOW ACROSS BOTTOM OF UPPER DRZ
HISTORY, NAMES=   FLOWBRY,  IRANGE= 23,45,  JRANGE=13,13, KRANGE=1,1
!VERTICAL BRINE FLOW ACROSS TOP OF LOWER DRZ
HISTORY, NAMES=   FLOWBRY,  IRANGE= 23,45,  JRANGE=10,10, KRANGE=1,1
!
!VERTICAL GAS FLOW ACROSS BOTTOM OF UPPER DRZ
HISTORY, NAMES=   FLOWGASY,  IRANGE= 23,45,  JRANGE=13,13, KRANGE=1,1
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!VERTICAL GAS FLOW ACROSS TOP OF LOWER DRZ
HISTORY, NAMES=   FLOWGASY,  IRANGE= 23,45,  JRANGE=10,10, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW SOUTH SIDE OF S_REPOSITORY
HISTORY, NAMES=   FLOWBRX,  IRANGE=32,32,   JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW SOUTH SIDE OF S_REPOSITORY
HISTORY, NAMES=   FLOWGASX, IRANGE=32,32,   JRANGE= 10,12, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW NORTH SIDE OF N_REPOSITORY
HISTORY, NAMES=   FLOWBRX,  IRANGE=38,38,  JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW NORTH SIDE OF REPOSITORY
HISTORY, NAMES=   FLOWGASX, IRANGE=38,38,  JRANGE= 10,12, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW SOUTH SIDE OF PANEL
HISTORY, NAMES=   FLOWBRX,  IRANGE= 23,23, JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW SOUTH SIDE OF PANE0
HISTORY, NAMES=   FLOWGASX, IRANGE= 23,23, JRANGE= 10,12, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW NORTH SIDE OF PANEL
HISTORY, NAMES=   FLOWBRX,  IRANGE=30,30,  JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW NORTH SIDE OF PANEL
HISTORY, NAMES=   FLOWGASX, IRANGE=30,30,  JRANGE= 10,12, KRANGE=1,1
!
!GAS SATURATION IN PANEL
HISTORY, NAMES=   SATGAS,   IRANGE=23,29, JRANGE= 10,12, KRANGE=1,1
!
!GAS SATURATION IN REPOSITORY
HISTORY, NAMES=   SATGAS,   IRANGE= 32,33, JRANGE= 10,12, KRANGE=1,1
HISTORY, NAMES=   SATGAS,   IRANGE= 36,37, JRANGE= 10,12, KRANGE=1,1
!
!BRINE PRESSURE IN PANEL
HISTORY, NAMES=   PRESBRIN, IRANGE=23,29,  JRANGE= 10,12,  KRANGE=1,1
!
!BRINE PRESSURE IN REPOSITORY
HISTORY, NAMES=   PRESBRIN, IRANGE= 32,33,  JRANGE= 10,12,  KRANGE=1,1
HISTORY, NAMES=   PRESBRIN, IRANGE= 36,37,  JRANGE= 10,12,  KRANGE=1,1
!
!BRINE PRESSURE IN BRINE POCKET
HISTORY, NAMES=   PRESBRIN, IRANGE= 26,26, JRANGE= 1,1,  KRANGE=1,1
!
!BRINE PRESSURE IN INTERSECTION OF BOREHOLE AND CULEBRA
HISTORY, NAMES=   PRESBRIN, IRANGE= 26,26, JRANGE= 26,26,  KRANGE=1,1
!**********************************************************************
!                  END OF HISTORY VARIABLES
!**********************************************************************
!
*REACTION_CHEMISTRY
!
WICKING, MAT= WAS_AREA, VALUE=SAT_WICK
NUMERICS, SMOOTH=ON,   ALPHARXN=-1000.0
RATES,   MAT=WAS_AREA, COR_IN=GRATCORI, COR_HUM=GRATCORH,&
                       MIC_IN=GRATMICI, MIC_HUM=GRATMICH,&
                       SCOR_GAS=STOICOR, SMIC_GAS=STOIMIC
!
VOLUME, MAT=WAS_AREA,  VOL_CHW  = VOLCHW, VOL_RHW = VOLRHW
!
DENSITY, MAT=WAS_AREA, METAL_RH= DRH_METL, BIO_RH= DRH_BIO,&
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                       METAL_CH= DCH_METL, BIO_CH= DCH_BIO
!
SATURATION, MAT=WAS_AREA, VALUE= SAT_IBRN
!
MOLWTS, MAT= REFCON,  MW_FE  = MW_FE
MOLWTS, MAT= REFCON,  MW_CEL = MW_CELL
!
MISC,   MAT= REFCON,  VREPOS  = VREPOS,&
                      VPANLEX = VPANLEX,&
                      VROOM   = VROOM,&
                      ASDRUM  = ASDRUM,&
                      DRROOM  = DRROOM
!
!
!============================================================================
*PROPERTIES
! GET SOLID properties from CAMDAT file
!Salado Halite
SOLID, MAT=S_HALITE,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_0,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_1,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_PCS,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
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!
SOLID, MAT=S_MB139,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=S_ANH_AB,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=S_MB138,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CAVITY_1,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CAVITY_2,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CAVITY_3,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
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                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CAVITY_4,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=IMPERM_Z,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CASTILER,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=WAS_AREA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=REPOSIT,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRF_PCS,&
```

```
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CONC_PCS,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=UNNAMED,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CULEBRA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=TAMARISK,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=MAGENTA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
```

```
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=FORTYNIN,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DEWYLAKE,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=SANTAROS,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=OPS_AREA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=EXP_AREA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
! SOLID, MAT=BOREHOLE,&
!                   PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
!                   PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
!                   BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
!                   BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
```

```
!                     SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
!                     PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
!                     RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
!                     PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CONC_MON,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=SHFTU,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=SHFTL_T1,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=SHFTL_T2,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=BH_SAND,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
SOLID, MAT=BH_CREEP,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
```

```
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CONC_PLG,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=BH_OPEN,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
! GET FRACTURE PROPERTIES
FRACTURE, MAT= S_MB139,  FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= S_ANH_AB, FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= S_MB138,  FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= DRZ_0,    FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= DRZ_1,    FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
! GET FLUID (brine and gas) properties from CAMDAT file
FLUID, MAT=BRINESAL, SALINITY=WTF, DEN_BR=DNSFLUID,&
                     COMPR_BR= COMP, REF_PRES=REF_PRES, REF_TEMP= REF_TEMP,&
                     INTERP = 1, VIS_BR=VISCO
```

```
FLUID, MAT=H2,        VIS_GAS=VISCO,DGAS = OFF,&
                      H2_MOLE =1.0, CO2_MOLE=0.0, CH4_MOLE=0.0,&
                      N2_MOLE= 0.0, H2S_MOLE=0.0, O2_MOLE=0.0
FLUID, MAT=S_MB139,   KLINK=ON, B_KLINK=BKLINK, EXP_KLINK=EXPKLINK
!
FLUID, MAT= REFCON,   R_GAS    = R
FLUID, MAT= REFCON,   MW_H2O   = MW_H2O
FLUID, MAT= REFCON,   MW_SALT  = MW_NACL
FLUID, MAT= REFCON,   MW_H2    = MW_H2,   TC_H2  = TC_H2,   PC_H2  = PC_H2,&
                      ACEN_H2  = ACF_H2,  H2_CO2 = BIP_12,  H2_CH4 = BIP_13,&
                      H2_N2    = BIP_14,  H2_H2S = BIP_15,  H2_O2  = BIP_16
FLUID, MAT= REFCON,   MW_CO2   = MW_CO2,  TC_CO2 = TC_CO2,  PC_CO2 = PC_CO2,&
                      ACEN_CO2 = ACF_CO2, CO2_CH4= BIP_23,  CO2_N2 = BIP_24,&
                      CO2_H2S  = BIP_25 , CO2_O2 = BIP_26
FLUID, MAT= REFCON,   MW_CH4   = MW_CH4,  TC_CH4 = TC_CH4,  PC_CH4 = PC_CH4,&
                      ACEN_CH4 = ACF_CH4, CH4_N2 = BIP_34,  CH4_H2S= BIP_35,&
                      CH4_O2   = BIP_36
FLUID, MAT= REFCON,   MW_N2    = MW_N2,   TC_N2  = TC_N2,   PC_N2  = PC_N2,&
                      ACEN_N2  = ACF_N2,  N2_H2S = BIP_45,  N2_O2  = BIP_46
FLUID, MAT= REFCON,   MW_H2S   = MW_H2S,  TC_H2S = TC_H2S,  PC_H2S = PC_H2S,&
                      ACEN_H2S = ACF_H2S, H2S_O2 = BIP_56
FLUID, MAT= REFCON,   MW_O2    = MW_O2,   TC_O2  = TC_O2,   PC_O2  = PC_O2,&
                      ACEN_O2  = ACF_O2
FLUID, MAT= REFCON,   OMEGA_A  = OMEGAA , OMEGA_B = OMEGAB
!
*DIRICHLET
DIRICHLET, MAT=CULEBRA, PRESSURE=PRESSURE,&
               IRANGE=1,1,   JRANGE=26,26, KRANGE=1,1
DIRICHLET, MAT=CULEBRA, PRESSURE=PRESSURE,&
               IRANGE=68,68, JRANGE=26,26, KRANGE=1,1
DIRICHLET, MAT=MAGENTA, PRESSURE=PRESSURE,&
               IRANGE=1,1,   JRANGE=28,28, KRANGE=1,1
DIRICHLET, MAT=MAGENTA, PRESSURE=PRESSURE,&
               IRANGE=68,68, JRANGE=28,28, KRANGE=1,1
DIRICHLET, MAT=SANTAROS, PRESSURE=PRESSURE,&
               IRANGE=1,68,  JRANGE=33,33, KRANGE=1,1
DIRICHLET, MAT=SANTAROS, SATURATION=SAT_IBRN,&
               IRANGE=1,68,  JRANGE=33,33, KRANGE=1,1
*END
ex
$
```

SCENARIO: S6

```
$ type bf1_cra1_s6.inp
! TITLE:    BRAGFLO 2003 CRA1 (PREBRAG)
! SCENARIO: S6
! ANALYSTS: Joshua Stein and Bill Zelinski
! MODIFIED: 01/04/03
!===========================================================================
!   SCENARIO: UNDISTURBED SCENERIO
!           : SINGLE CLOSURE SURFACE
!           :   A)CREEP CLOSURE IN WASTE AREAS
!           : PANEL ON SOUTH, REST OF REPOSITORY ON NORTH
!               : SHAFT ADDED
!               : FRACTURING IN UPPER AND LOWER DRZ
!
```

```
!  28 Mar 02 JSS  rev4 Added REPOSIT meaterial and map to fix problem
!                   with WASTE materials.
!  02 Apr 02 JSS  rev5 Changed DRF_PCS in the PCS adjacent to the OPS_AREA
!                   to be mapped as OPS_AREA, which is appropriate for
!                   preclosed excavated regions.
!  15 Jan 03 WPZ  rev6 Added shaft.  Fracturing in both upper and lower DRZ
!  01 Apr 03 WPZ  rev7 modified to run with PREBRAG, Version 7.00 to produce
!                   input to BRAGFLO 5.0.  Accomodates constants that used to
!                   be included in BRAGFLO code that must now be included
!                   in input.
!
!  NOTE:E1 does not consider conrete plugs because fluid can migrate through
!  repository and up the old borehole where the plugs have failed.
!
!============================================================================
*HEADING
TITLE2 = 2003 BRAGFLO: CRA E2 @ 1000 YRS,E1 @ 2000 YRS
!============================================================================
!CLOSURE INFORMATION
*CLOSURE
CONTROL, TYPE = PRESSURE, AVE = CELL
SURFACE, MODEL = JAN_96,  PRES_LITHO = 50.0E6,  TIME_OFF = 3.155693E12,&
                          PERM_FACTOR= WAS_AREA:PERM_X, PERM_EXP = 0.0
REGION,  MAT =   WAS_AREA, MODEL = JAN_96
REGION,  MAT =   REPOSIT,  MODEL = JAN_96
REGION,  MAT =   DRF_PCS,  MODEL = JAN_96
!============================================================================
*RESET
!RESET REGIONS ARE GIVEN THE INITIAL PRESSURE AND SATURATION SPECIFIED IN
! THE INITIAL CONDITIONS AT THE RESET TIME
REGION,MAT=CAVITY_1
REGION,MAT=CAVITY_2
REGION,MAT=CAVITY_3
REGION,MAT=CAVITY_4
TIME=0.0
WASTE,MAT_OLD=CAVITY_1,MAT_NEW=WAS_AREA,&
           PRES_BRINE=101325.0, SAT_BRINE=0.0
WASTE,MAT_OLD=CAVITY_2,MAT_NEW=REPOSIT,&
           PRES_BRINE=101325.0, SAT_BRINE=0.0
!===========================================================================
*INITIAL_CONDITIONS
!BEGIN SIMULATION AT -5 YEARS
BEGIN, TIME=-1.577846E8
SATBR,   ID_BRINE =SATBREL
PRESSURE,ID_PRES  =PRESEL
CONFE  , ID_CONFE =FECONC
CONCELL, ID_CONCEL=CH2OCONC
ELEVAT,  ID_ELEV  =ELEVE
!==============================================================================
*STEP_CONTROL
!TIME STEP IS REDUCED
!  1. AT   0 YEARS: WASTE IS INTRODUCED,
  TIME,BEGIN=0.0, DT=864.0
!  2. AT 200 YEARS: MATERIAL CHANGE
  TIME,BEGIN=6.311385E9, DT=864.0
!  3. AT 1000 YEARS: MATERIAL CHANGE
  TIME,BEGIN=3.155693E10, DT=864.0
```

```
!  4. AT 2000 YEARS: MATERIAL CHANGE
  TIME,BEGIN=6.311385E10, DT=864.0
!  5. AT 2200 YEARS: MATERIAL CHANGE
  TIME,BEGIN=6.942524E10, DT=864.0
!  6. AT 3200 YEARS: MATERIAL CHANGE
  TIME,BEGIN=1.009822E11, DT=864.0
!==============================================================================
*MODIFY_MAP
! ID=1 => 0 YEARS : WASTE INTRODUCED, SHAFT SEALS AND FILL INTRODUCED
! ID=2 => 200 YEARS : MATERIAL CHANGE
! ID=3 => 1000 YEARS : BOREHOLE INTRUSION (E2) WITH SILTY SAND PROPERTIES
! ID=4 => 2000 YEARS : BOREHOLE INTRUSION (E1) modeled without plugs
! ID=5 => 2200 YEARS : BOREHOLES WITH SILTY SAND PROPERTIES
! ID=6 => 3200 YEARS : LOWER PORTION OF E1 INTRUSION CREEPS TO REDUCE PERM
!                      ONE ORDER OF MAGNITUDE
TIME,TIME_ID=1, BEGIN= 0.0
TIME,TIME_ID=2, BEGIN= 3.155693E9
TIME,TIME_ID=3, BEGIN= 3.155693E10
TIME,TIME_ID=4, BEGIN= 6.311385E10
TIME,TIME_ID=5, BEGIN= 6.942524E10
TIME,TIME_ID=6, BEGIN= 1.009822E11
!********
! 0 YEARS
!********
!INTRODUCE FINAL DRZ MATERIAL
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=23,30, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=32,34, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=36,38, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=40,42, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=44,45, JRANGE=7,9,  KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=23,30, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=32,34, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=36,38, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=40,42, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_1,    TIME_ID=1, IRANGE=44,45, JRANGE=13,16, KRANGE=1,1
MODIFY, MAT=DRZ_PCS,  TIME_ID=1, IRANGE=31,31, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=DRZ_PCS,  TIME_ID=1, IRANGE=35,35, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=DRZ_PCS,  TIME_ID=1, IRANGE=39,39, JRANGE=15,16, KRANGE=1,1
!INTRODUCE SHFTU upper shaft
MODIFY, MAT=SHFTU, TIME_ID=1, IRANGE=43,43, JRANGE=25,33, KRANGE=1,1
!INTRODUCE SHFTL_T1 lower shaft t1
MODIFY, MAT=SHFTL_T1, TIME_ID=1, IRANGE=43,43, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=SHFTL_T1, TIME_ID=1, IRANGE=43,43, JRANGE=18,24, KRANGE=1,1
!INTRODUCE CONC-MON lowest part of shaft filled with concrete
MODIFY, MAT=CONC_MON, TIME_ID=1, IRANGE=43,43, JRANGE=8,13, KRANGE=1,1
!INTRODUCE WASTE INTO PANEL REGION
MODIFY, MAT=WAS_AREA, TIME_ID=1, IRANGE=23,29, JRANGE=10,12, KRANGE=1,1
!INTRODUCE WASTE INTO REST OF REPOSITORY
MODIFY, MAT=REPOSIT, TIME_ID=1, IRANGE=32,33, JRANGE=10,12, KRANGE=1,1
MODIFY, MAT=REPOSIT, TIME_ID=1, IRANGE=36,37, JRANGE=10,12, KRANGE=1,1
!INTRODUCE PANEL SEAL BACKFILL modeled as was_area
MODIFY, MAT=DRF_PCS, TIME_ID=1, IRANGE=30,30, JRANGE=10,12, KRANGE=1,1
MODIFY, MAT=DRF_PCS, TIME_ID=1, IRANGE=34,34, JRANGE=10,12, KRANGE=1,1
MODIFY, MAT=DRF_PCS, TIME_ID=1, IRANGE=38,38, JRANGE=10,12, KRANGE=1,1
!MODIFY, MAT=OPS_AREA, TIME_ID=1, IRANGE=42,42, JRANGE=10,12, KRANGE=1,1
!INTRODUCE PANEL CLOSURE CONCRETE
MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=31,31, JRANGE=8,13, KRANGE=1,1
```

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MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=35,35, JRANGE=8,13, KRANGE=1,1
MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=39,39, JRANGE=8,13, KRANGE=1,1
!MODIFY, MAT=CONC_PCS, TIME_ID=1, IRANGE=43,43, JRANGE=8,13, KRANGE=1,1
!INTRODUCE OPERATIONS REGION MATERIAL
MODIFY, MAT=OPS_AREA, TIME_ID=1, IRANGE=40,42, JRANGE=10,12, KRANGE=1,1
!INTRODUCE EXPERIMENTAL REGION MATERIAL
MODIFY, MAT=EXP_AREA, TIME_ID=1, IRANGE=44,45, JRANGE=10,12, KRANGE=1,1
!INTRODUCE UNNAMED MEMBER OF THE RUSTLER
MODIFY, MAT=UNNAMED,  TIME_ID=1, IRANGE= 1,42, JRANGE=25,25, KRANGE=1,1
MODIFY, MAT=UNNAMED,  TIME_ID=1, IRANGE=44,68, JRANGE=25,25, KRANGE=1,1
!INTRODUCE TRUE CULEBRA REGION TO ALLOW BRINE INFLOW TO SHAFT
MODIFY, MAT=CULEBRA,  TIME_ID=1, IRANGE= 1,42, JRANGE=26,26, KRANGE=1,1
MODIFY, MAT=CULEBRA,  TIME_ID=1, IRANGE=44,68, JRANGE=26,26, KRANGE=1,1
!INTRODUCE TAMARISK
MODIFY, MAT=TAMARISK,  TIME_ID=1, IRANGE= 1,42, JRANGE=27,27, KRANGE=1,1
MODIFY, MAT=TAMARISK,  TIME_ID=1, IRANGE=44,68, JRANGE=27,27, KRANGE=1,1
!INTRODUCE MAGENTA
MODIFY, MAT=MAGENTA,  TIME_ID=1, IRANGE= 1,42, JRANGE=28,28, KRANGE=1,1
MODIFY, MAT=MAGENTA,  TIME_ID=1, IRANGE=44,68, JRANGE=28,28, KRANGE=1,1
!INTRODUCE FORTY-NINER
MODIFY, MAT=FORTYNIN,  TIME_ID=1, IRANGE= 1,42, JRANGE=29,29, KRANGE=1,1
MODIFY, MAT=FORTYNIN,  TIME_ID=1, IRANGE= 44,68, JRANGE=29,29, KRANGE=1,1
!INTRODUCE DEWEY LAKE RED BEDS
MODIFY, MAT=DEWYLAKE,  TIME_ID=1, IRANGE= 1,42, JRANGE=30,31, KRANGE=1,1
MODIFY, MAT=DEWYLAKE,  TIME_ID=1, IRANGE= 44,68, JRANGE=30,31, KRANGE=1,1
!INTRODUCE SANTA ROSA FORMATION
MODIFY, MAT=SANTAROS,  TIME_ID=1, IRANGE= 1,42, JRANGE=32,33, KRANGE=1,1
MODIFY, MAT=SANTAROS,  TIME_ID=1, IRANGE= 44,68, JRANGE=32,33, KRANGE=1,1
!****************************************************************************
!            END OF TIME PERIOD 1 MATERIAL RESETS
!****************************************************************************
!********
! 200 YEARS
!********
!INTRODUCE CHANGE IN LOWER SHAFT MATERIAL
MODIFY, MAT=SHFTL_T2, TIME_ID=2, IRANGE=43,43, JRANGE=15,16, KRANGE=1,1
MODIFY, MAT=SHFTL_T2, TIME_ID=2, IRANGE=43,43, JRANGE=18,24, KRANGE=1,1

!****************************************************************************
!            END OF TIME PERIOD 2 MATERIAL RESET
!============================================================================
!****************************************************************************
!********
!1000 YEARS
!********
!INTRODUCE INTRUSION BOREHOLE MATERIALS
MODIFY, MAT=BH_SAND,   TIME_ID=3, IRANGE=26,26, JRANGE=10,33, KRANGE=1,1
!****************************************************************************
!            END OF TIME PERIOD 3 MATERIAL RESETS
!****************************************************************************
!********
! 2000 YEARS
!********
!INTRODUCE E1 BOREHOLE PROPERTIES 1000 YEARS AFTER FIRST INTRUSION
!ONLY THE BOREHOLE PORTION THAT CONNECTS THE BRINE POCKET TO THE PANEL
!IS MODIFIED.
MODIFY, MAT=BH_OPEN,   TIME_ID=4, IRANGE=26,26, JRANGE=1,9, KRANGE=1,1
```

```
!**********************************************************************
!            END OF TIME PERIOD 4 MATERIAL RESETS
!**********************************************************************
!********
! 2200 YEARS
!********
!NOW BOTH BOREHOLES HAVE THE SAME PROPERTIES (OF SILTY SAND)
MODIFY, MAT=BH_SAND,   TIME_ID=5, IRANGE=26,26, JRANGE=1,9, KRANGE=1,1
!**********************************************************************
!            END OF TIME PERIOD 5 MATERIAL RESETS
!**********************************************************************
!********
! 3200 YEARS
!********
!PORTION OF E1 BOREHOLE BELOW PANEL CLOSES (PERM REDUCED 1 ORDER OF
!MAGNITUDE)
MODIFY, MAT=BH_CREEP,   TIME_ID=6, IRANGE=26,26, JRANGE=1,9, KRANGE=1,1
!**********************************************************************
!            END OF TIME PERIOD 6 MATERIAL RESETS
!**********************************************************************
!======================================================================
*GEOMETRY
COORD= CARTESIAN
!======================================================================
*SIMULATION_CONTROL
INTEGRATION, TMAX=3.155693E11, DT_INIT=8.64,DT_MIN= 8.64E-4, DT_MAX=1.728E9,&
           DT_INCR=1.25,   DT_REDU= 0.5,   AUTODT=YES,  TSWITCH=1.0,&
           MAXSTEPS=10000
!
ITERATION, DSATLIM= 2.E-1, DPRESLIM = -1.E8 , SATLIM= 1.E-3,&
           SATNORM= 0.30,  PRESNORM = 5.0E5,&
           ITMAX= 8,       IRESETMAX= 40, IJACINT= 1,&
           IJACSWITCH=41,  IJACMIN= 1,    IJACRESET= 5,&
           IUPRPFLAG =9,   IUPMFFLAG= 9,   IUPRPLOOSE= 9,&
           IUPMFLOOSE=9
!
ITERATION, DHSAT_REL= 1.0E-8,   DHPRES_REL=1.0E-8,&
           DHSAT_MIN= 1.0E-10,  DHPRES_MIN=1.0E-2
!
ITERATION, EPS_SAT  = 3.0E+0,     EPS_PRES    = 1.E-2,&
           R_EPS_SAT= 3.0E+0,     R_EPS_PRES  = 1.E-2,&
           FTOL_SAT = 1.0E-2,     FTOL_PRES   = 1.0E-2,&
           R_FTOL_SAT=1.0E-2,     R_FTOL_PRES = 1.0E-2, CONV_TEST = AND
!
NUMERICS,SOLVER=LU
NUMERICS,JACSCALE= 1.0e7,VSWITCH=NO
NUMERICS, ITRAVE= HARMONIC, IMFRAVE=UPSTREAM
!
GRAVITY, MAT= REFCON, G_ACC= GRAVACC
!
!====================================================================
*OUTPUT_CONTROL
!
UNITS= SI
MONITOR, ILOC = 26, JLOC = 12, KLOC = 1
MONITOR, ILOC = 32, JLOC = 12, KLOC = 1
MONITOR, ILOC = 36, JLOC = 12, KLOC = 1
```

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!
STEPS, FILE= BINARY, NSTEP=20
TIMES, FILE= ASCII,  VALUES= 0.0, 3.155693E09, 1.104493E10,&
                                  3.155693E10, 9.467079E10,&
                                  1.577847E11, 2.208985E11,&
                                  2.840124E11, 3.155693E11
PRIBIN,&
     PRESBRIN,  PRESGAS,   POROS,     DENGAS,    PERMBRX,  PERMGASX,&
     SATGAS,    FLOWGASX,  FLOWGASY,  FLOWBRX,   FLOWBRY,&
     FECONC,    CELLCONC, BRINRATE
!
PRIASC,&
     PRESBRIN,  PRESGAS,   POROS,    SATGAS,    FECONC,   CELLCONC
!
!HORIZONTAL BRINE FLOW ACROSS 2.4K SOUTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE=17,17, KRANGE=1,1
!HORIZONTAL BRINE FLOW ACROSS 2.4K SOUTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 6,6,   JRANGE=25,33, KRANGE=1,1
!HORIZONTAL BRINE FLOW ACROSS 2.4K NORTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE=17,17, KRANGE=1,1
!HORIZONTAL BRINE FLOW ACROSS 2.4K NORTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWBRX,  IRANGE= 63,63, JRANGE=25,33, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K SOUTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE=17,17, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K SOUTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 6,6,   JRANGE=25,33, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K NORTH BOUNDARY (MARKER BEDS)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE= 7, 7, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE=14,14, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE=17,17, KRANGE=1,1
!HORIZONTAL GAS FLOW ACROSS 2.4K NORTH BOUNDARY (ABOVE SALADO)
HISTORY, NAMES=   FLOWGASX,    IRANGE= 63,63, JRANGE=25,33, KRANGE=1,1
!BRINE FLOW ACROSS DRZ AND MARKER BEDS BOUNDARY
HISTORY, NAMES=   FLOWBRX,  IRANGE= 23,23,   JRANGE= 7,17, KRANGE=1,1
HISTORY, NAMES=   FLOWBRX,  IRANGE= 46,46, JRANGE= 7,17, KRANGE=1,1
!GAS FLOW ACROSS DRZ AND MARKER BEDS BOUNDARY
HISTORY, NAMES=   FLOWGASX,    IRANGE= 23,23,   JRANGE= 7,17, KRANGE=1,1
HISTORY, NAMES=   FLOWGASX,    IRANGE= 46,46, JRANGE= 7,17, KRANGE=1,1
!
!VERTICAL BRINE FLOW ACROSS BOTTOM OF UPPER DRZ
HISTORY, NAMES=   FLOWBRY,  IRANGE= 23,45,  JRANGE=13,13, KRANGE=1,1
!VERTICAL BRINE FLOW ACROSS TOP OF LOWER DRZ
HISTORY, NAMES=   FLOWBRY,  IRANGE= 23,45,  JRANGE=10,10, KRANGE=1,1
!
!VERTICAL GAS FLOW ACROSS BOTTOM OF UPPER DRZ
HISTORY, NAMES=   FLOWGASY,  IRANGE= 23,45,  JRANGE=13,13, KRANGE=1,1
!VERTICAL GAS FLOW ACROSS TOP OF LOWER DRZ
HISTORY, NAMES=   FLOWGASY,  IRANGE= 23,45,  JRANGE=10,10, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW SOUTH SIDE OF S_REPOSITORY
HISTORY, NAMES=   FLOWBRX,  IRANGE=32,32,   JRANGE= 10,12, KRANGE=1,1
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!HORIZONTAL GAS FLOW SOUTH SIDE OF S_REPOSITORY
HISTORY, NAMES=   FLOWGASX, IRANGE=32,32,   JRANGE= 10,12, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW NORTH SIDE OF N_REPOSITORY
HISTORY, NAMES=   FLOWBRX,  IRANGE=38,38,  JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW NORTH SIDE OF REPOSITORY
HISTORY, NAMES=   FLOWGASX, IRANGE=38,38,  JRANGE= 10,12, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW SOUTH SIDE OF PANEL
HISTORY, NAMES=   FLOWBRX,  IRANGE= 23,23, JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW SOUTH SIDE OF PANE0
HISTORY, NAMES=   FLOWGASX, IRANGE= 23,23, JRANGE= 10,12, KRANGE=1,1
!
!HORIZONTAL BRINE FLOW NORTH SIDE OF PANEL
HISTORY, NAMES=   FLOWBRX,  IRANGE=30,30,  JRANGE= 10,12, KRANGE=1,1
!HORIZONTAL GAS FLOW NORTH SIDE OF PANEL
HISTORY, NAMES=   FLOWGASX, IRANGE=30,30,  JRANGE= 10,12, KRANGE=1,1
!
!GAS SATURATION IN PANEL
HISTORY, NAMES=   SATGAS,   IRANGE=23,29, JRANGE= 10,12, KRANGE=1,1
!
!GAS SATURATION IN REPOSITORY
HISTORY, NAMES=   SATGAS,   IRANGE= 32,33, JRANGE= 10,12, KRANGE=1,1
HISTORY, NAMES=   SATGAS,   IRANGE= 36,37, JRANGE= 10,12, KRANGE=1,1
!
!BRINE PRESSURE IN PANEL
HISTORY, NAMES=   PRESBRIN, IRANGE=23,29,  JRANGE= 10,12,  KRANGE=1,1
!
!BRINE PRESSURE IN REPOSITORY
HISTORY, NAMES=   PRESBRIN, IRANGE= 32,33,  JRANGE= 10,12,  KRANGE=1,1
HISTORY, NAMES=   PRESBRIN, IRANGE= 36,37,  JRANGE= 10,12,  KRANGE=1,1
!
!BRINE PRESSURE IN BRINE POCKET
HISTORY, NAMES=   PRESBRIN, IRANGE= 26,26, JRANGE= 1,1,  KRANGE=1,1
!
!BRINE PRESSURE IN INTERSECTION OF BOREHOLE AND CULEBRA
HISTORY, NAMES=   PRESBRIN, IRANGE= 26,26, JRANGE= 26,26,  KRANGE=1,1
!**********************************************************************
!                 END OF HISTORY VARIABLES
!**********************************************************************
!
*REACTION_CHEMISTRY
!
WICKING, MAT= WAS_AREA, VALUE=SAT_WICK
NUMERICS, SMOOTH=ON,   ALPHARXN=-1000.0
RATES,   MAT=WAS_AREA, COR_IN=GRATCORI, COR_HUM=GRATCORH,&
                       MIC_IN=GRATMICI, MIC_HUM=GRATMICH,&
                       SCOR_GAS=STOICOR, SMIC_GAS=STOIMIC
!
VOLUME, MAT=WAS_AREA,  VOL_CHW  = VOLCHW, VOL_RHW = VOLRHW
!
DENSITY, MAT=WAS_AREA, METAL_RH= DRH_METL, BIO_RH= DRH_BIO,&
                       METAL_CH= DCH_METL, BIO_CH= DCH_BIO
!
SATURATION, MAT=WAS_AREA, VALUE= SAT_IBRN
!
MOLWTS, MAT= REFCON,  MW_FE  = MW_FE
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MOLWTS, MAT= REFCON,  MW_CEL = MW_CELL
!
MISC,   MAT= REFCON,  VREPOS  = VREPOS,&
                      VPANLEX = VPANLEX,&
                      VROOM   = VROOM,&
                      ASDRUM  = ASDRUM,&
                      DRROOM  = DRROOM
!
!
!============================================================================
*PROPERTIES
! GET SOLID properties from CAMDAT file
!Salado Halite
SOLID, MAT=S_HALITE,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_0,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_1,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_PCS,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT


!
SOLID, MAT=S_MB139,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
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```
                    PRM_Z       = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR       = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM       = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN      = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX      = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP     = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=S_ANH_AB,&
                    PRM_X       = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z       = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR       = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM       = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN      = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX      = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP     = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=S_MB138,&
                    PRM_X       = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z       = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR       = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM       = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN      = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX      = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP     = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CAVITY_1,&
                    PRM_X       = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z       = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR       = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM       = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN      = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX      = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP     = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CAVITY_2,&
                    PRM_X       = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z       = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR       = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM       = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN      = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX      = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP     = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CAVITY_3,&
                    PRM_X       = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z       = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR       = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM       = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN      = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX      = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A      = PCT_A,&
                    PCT_EXP     = PCT_EXP,      PCT_FLAG   = KPT
```

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!
SOLID, MAT=CAVITY_4,&
                   PRM_X      = PERM_X,       PRM_Y       = PERM_Y,&
                   PRM_Z      = PERM_Z,       POROSITY    = POROSITY,&
                   BCSOR      = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                   BCLAM      = PORE_DIS,     COMPRES     = POR_COMP,&
                   SB_MIN     = SB_MIN,       PB_MIN      = PO_MIN,&
                   PC_MAX     = PC_MAX,       CAP_MOD     = CAP_MOD,&
                   RELP_MODEL = RELP_MOD,     PCT_A       = PCT_A,&
                   PCT_EXP    = PCT_EXP,      PCT_FLAG    = KPT
!
SOLID, MAT=IMPERM_Z,&
                   PRM_X      = PERM_X,       PRM_Y       = PERM_Y,&
                   PRM_Z      = PERM_Z,       POROSITY    = POROSITY,&
                   BCSOR      = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                   BCLAM      = PORE_DIS,     COMPRES     = POR_COMP,&
                   SB_MIN     = SB_MIN,       PB_MIN      = PO_MIN,&
                   PC_MAX     = PC_MAX,       CAP_MOD     = CAP_MOD,&
                   RELP_MODEL = RELP_MOD,     PCT_A       = PCT_A,&
                   PCT_EXP    = PCT_EXP,      PCT_FLAG    = KPT
!
SOLID, MAT=CASTILER,&
                   PRM_X      = PERM_X,       PRM_Y       = PERM_Y,&
                   PRM_Z      = PERM_Z,       POROSITY    = POROSITY,&
                   BCSOR      = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                   BCLAM      = PORE_DIS,     COMPRES     = POR_COMP,&
                   SB_MIN     = SB_MIN,       PB_MIN      = PO_MIN,&
                   PC_MAX     = PC_MAX,       CAP_MOD     = CAP_MOD,&
                   RELP_MODEL = RELP_MOD,     PCT_A       = PCT_A,&
                   PCT_EXP    = PCT_EXP,      PCT_FLAG    = KPT
!
SOLID, MAT=WAS_AREA,&
                   PRM_X      = PERM_X,       PRM_Y       = PERM_Y,&
                   PRM_Z      = PERM_Z,       POROSITY    = POROSITY,&
                   BCSOR      = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                   BCLAM      = PORE_DIS,     COMPRES     = POR_COMP,&
                   SB_MIN     = SB_MIN,       PB_MIN      = PO_MIN,&
                   PC_MAX     = PC_MAX,       CAP_MOD     = CAP_MOD,&
                   RELP_MODEL = RELP_MOD,     PCT_A       = PCT_A,&
                   PCT_EXP    = PCT_EXP,      PCT_FLAG    = KPT
!
SOLID, MAT=REPOSIT,&
                   PRM_X      = PERM_X,       PRM_Y       = PERM_Y,&
                   PRM_Z      = PERM_Z,       POROSITY    = POROSITY,&
                   BCSOR      = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                   BCLAM      = PORE_DIS,     COMPRES     = POR_COMP,&
                   SB_MIN     = SB_MIN,       PB_MIN      = PO_MIN,&
                   PC_MAX     = PC_MAX,       CAP_MOD     = CAP_MOD,&
                   RELP_MODEL = RELP_MOD,     PCT_A       = PCT_A,&
                   PCT_EXP    = PCT_EXP,      PCT_FLAG    = KPT
!
SOLID, MAT=DRF_PCS,&
                   PRM_X      = PERM_X,       PRM_Y       = PERM_Y,&
                   PRM_Z      = PERM_Z,       POROSITY    = POROSITY,&
                   BCSOR      = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                   BCLAM      = PORE_DIS,     COMPRES     = POR_COMP,&
                   SB_MIN     = SB_MIN,       PB_MIN      = PO_MIN,&
```

```
                    PC_MAX     = PC_MAX,        CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG    = KPT
!
SOLID, MAT=CONC_PCS,&
                    PRM_X      = PERM_X,        PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG    = KPT
!
SOLID, MAT=UNNAMED,&
                    PRM_X      = PERM_X,        PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG    = KPT
!
SOLID, MAT=CULEBRA,&
                    PRM_X      = PERM_X,        PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG    = KPT
!
SOLID, MAT=TAMARISK,&
                    PRM_X      = PERM_X,        PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG    = KPT
!
SOLID, MAT=MAGENTA,&
                    PRM_X      = PERM_X,        PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,      BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,      COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,        PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,        CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,      PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,       PCT_FLAG    = KPT
!
SOLID, MAT=FORTYNIN,&
                    PRM_X      = PERM_X,        PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,        POROSITY    = POROSITY,&
```

```
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DEWYLAKE,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=SANTAROS,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=OPS_AREA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=EXP_AREA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CONC_MON,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
```

```
SOLID, MAT=SHFTU,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=SHFTL_T1,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=SHFTL_T2,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
! SOLID, MAT=CONC_PLG,&
!                     PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
!                     PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
!                     BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
!                     BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
!                     SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
!                     PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
!                     RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
!                     PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
SOLID, MAT=BH_OPEN,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
SOLID, MAT=BH_SAND,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
```

```
SOLID, MAT=BH_CREEP,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
! GET FRACTURE PROPERTIES
FRACTURE, MAT= S_MB139,  FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= S_ANH_AB, FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= S_MB138,  FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= DRZ_0,    FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
FRACTURE, MAT= DRZ_1,    FRAC_PI   = PI_DELTA, FRAC_PF  = PF_DELTA,&
                         FRAC_PHI  = PHIMAX,   FRAC_EXP = PERM_EXP,&
                         FRAC_PMX  = IFRX,     FRAC_PMY = IFRY,&
                         FRAC_PMZ  = IFRZ
!
! GET FLUID (brine and gas) properties from CAMDAT file
FLUID, MAT=BRINESAL, SALINITY=WTF, DEN_BR=DNSFLUID,&
                     COMPR_BR= COMP, REF_PRES=REF_PRES, REF_TEMP= REF_TEMP,&
                     INTERP = 1, VIS_BR=VISCO
FLUID, MAT=H2,       VIS_GAS=VISCO,DGAS = OFF,&
                     H2_MOLE =1.0, CO2_MOLE=0.0, CH4_MOLE=0.0,&
                     N2_MOLE= 0.0, H2S_MOLE=0.0, O2_MOLE=0.0
FLUID, MAT=S_MB139,  KLINK=ON, B_KLINK=BKLINK, EXP_KLINK=EXPKLINK
!
FLUID, MAT= REFCON,  R_GAS    = R
FLUID, MAT= REFCON,  MW_H2O   = MW_H2O
FLUID, MAT= REFCON,  MW_SALT  = MW_NACL
FLUID, MAT= REFCON,  MW_H2    = MW_H2,   TC_H2  = TC_H2,   PC_H2  = PC_H2,&
                     ACEN_H2  = ACF_H2,  H2_CO2 = BIP_12,  H2_CH4 = BIP_13,&
                     H2_N2    = BIP_14,  H2_H2S = BIP_15,  H2_O2  = BIP_16
FLUID, MAT= REFCON,  MW_CO2   = MW_CO2,  TC_CO2 = TC_CO2,  PC_CO2 = PC_CO2,&
                     ACEN_CO2 = ACF_CO2, CO2_CH4= BIP_23,  CO2_N2 = BIP_24,&
                     CO2_H2S  = BIP_25 , CO2_O2 = BIP_26
FLUID, MAT= REFCON,  MW_CH4   = MW_CH4,  TC_CH4 = TC_CH4,  PC_CH4 = PC_CH4,&
                     ACEN_CH4 = ACF_CH4, CH4_N2 = BIP_34,  CH4_H2S= BIP_35,&
                     CH4_O2   = BIP_36
```

```
FLUID, MAT= REFCON,  MW_N2    = MW_N2,   TC_N2  = TC_N2,   PC_N2  = PC_N2,&
                     ACEN_N2  = ACF_N2,  N2_H2S = BIP_45,  N2_O2  = BIP_46
FLUID, MAT= REFCON,  MW_H2S   = MW_H2S,  TC_H2S = TC_H2S,  PC_H2S = PC_H2S,&
                     ACEN_H2S = ACF_H2S, H2S_O2 = BIP_56
FLUID, MAT= REFCON,  MW_O2    = MW_O2,   TC_O2  = TC_O2,   PC_O2  = PC_O2,&
                     ACEN_O2  = ACF_O2
FLUID, MAT= REFCON,  OMEGA_A  = OMEGAA , OMEGA_B = OMEGAB
!
*DIRICHLET
DIRICHLET, MAT=CULEBRA, PRESSURE=PRESSURE,&
               IRANGE=1,1,   JRANGE=26,26, KRANGE=1,1
DIRICHLET, MAT=CULEBRA, PRESSURE=PRESSURE,&
               IRANGE=68,68, JRANGE=26,26, KRANGE=1,1
DIRICHLET, MAT=MAGENTA, PRESSURE=PRESSURE,&
               IRANGE=1,1,   JRANGE=28,28, KRANGE=1,1
DIRICHLET, MAT=MAGENTA, PRESSURE=PRESSURE,&
               IRANGE=68,68, JRANGE=28,28, KRANGE=1,1
DIRICHLET, MAT=SANTAROS, PRESSURE=PRESSURE,&
               IRANGE=1,68,  JRANGE=33,33, KRANGE=1,1
DIRICHLET, MAT=SANTAROS, SATURATION=SAT_IBRN,&
               IRANGE=1,68,  JRANGE=33,33, KRANGE=1,1
*END
ex
```

B.2 INPUT FILES FOR BRAGFLO: DIRECT BRINE RELEASE ANALYSES

B.2.1 GENMESH INPUT FILE: Establishes grid for BRAGFLO

```
$ type gm_dbr_cra1_dir_rel.inp
!============================================================================
!
! TITLE:     GENMESH Input.  FEP blowout calculations.
! ANALYST:   Daniel M. Stoelzel, SNL
! NOTES:     This is a new Blowout model. The waste region has been gridded
up
!            discretely, with the actual dimensions if the drifts, pillars,
!            and rooms.  This will be a 2-D areal model with dip (done in
!            ALGEBRA). A 3-D modification may follow. Grid size = 40x40x2
!            nodes.
!
! CREATED:   Nov 2, 1995
!
! MODIFIED:  Nov 20, 1995
!            Changed del_x and thickness dimensions to 2 meters to represent
!            actual crushed thickness.  Porosity will be doubled in algebra
!            to represent "real" porosities.
!
!            MARCH 20, 1996
!            FIRST DRAFT CCA MESH.... WILL BE THE SAME AS USED IN FEP CALCS
!            ACCEPT DRZ "THICKNESS IS BEING CHANGED TO CONTAIN SAME VOLUME
!            AS THE DRZ (BOTH ABOVE AND BELOW) IN THE 10,000 YR RUN.  THIS
!            CHANGE WILL BE MADE IN THE ALGEBRA STEP
!
!            May 14, 1996
!            Made salt pillars between rooms the DRZ region instead of
halite.
```

```
!
!            6/25/97  DMS
!               EPA VERIF. RUNS - WILL MAKE PILLARS EQUAL TO INITIAL DRZ,
!               DRZ AROUND ROOMS WILL HAVE FRACTURED PERM AT INTRUSION TIME:
!               WILL REQUIRE NEW MAT REGION.
!
!            5/31/02 T. HADGU
!            Changes were made for TBM calculations. The changes include
!            treating all pillars as Intact Salado Halite and addition of
!            Option D panel closure.
!
!==========================================================================
!
*SETUP
 DIM=  3
 ORIGIN= 0.0, 0.0, 380.49
 IJKMAX= 40, 40, 2
!
*GRID
 DEL, COORD = X, DEL = 5.12,INRANGE = 1,2,FACTOR = 1
 DEL, COORD = X, DEL = 10.00,INRANGE = 2,3,FACTOR = 1
 DEL, COORD = X, DEL = 30.50,INRANGE = 3,4,FACTOR = 1
 DEL, COORD = X, DEL = 10.00,INRANGE = 4,5,FACTOR = 1
 DEL, COORD = X, DEL = 30.50,INRANGE = 5,6,FACTOR = 1
 DEL, COORD = X, DEL = 10.00,INRANGE = 6,7,FACTOR = 1
 DEL, COORD = X, DEL = 30.50,INRANGE = 7,8,FACTOR = 1
 DEL, COORD = X, DEL = 10.00,INRANGE = 8,9,FACTOR = 1
 DEL, COORD = X, DEL = 30.50,INRANGE = 9,10,FACTOR = 1
 DEL, COORD = X, DEL = 10.00,INRANGE = 10,11,FACTOR = 1
 DEL, COORD = X, DEL = 30.50,INRANGE = 11,12,FACTOR = 1
 DEL, COORD = X, DEL = 10.00,INRANGE = 12,13,FACTOR = 1
 DEL, COORD = X, DEL = 30.50,INRANGE = 13,14,FACTOR = 1
 DEL, COORD = X, DEL = 10.00,INRANGE = 14,15,FACTOR = 1
 DEL, COORD = X, DEL = 21.00,INRANGE = 15,16,FACTOR = 1
 DEL, COORD = X, DEL = 40.00,INRANGE = 16,17,FACTOR = 1
 DEL, COORD = X, DEL = 4.30,INRANGE = 17,18,FACTOR = 1
 DEL, COORD = X, DEL = 42.20,INRANGE = 18,19,FACTOR = 1
 DEL, COORD = X, DEL = 4.30,INRANGE = 19,20,FACTOR = 1
 DEL, COORD = X, DEL = 46.50,INRANGE = 20,21,FACTOR = 1
 DEL, COORD = X, DEL = 7.60,INRANGE = 21,22,FACTOR = 1
 DEL, COORD = X, DEL = 38.00,INRANGE = 22,23,FACTOR = 1
 DEL, COORD = X, DEL = 4.30,INRANGE = 23,24,FACTOR = 1
 DEL, COORD = X, DEL = 40.00,INRANGE = 24,25,FACTOR = 1
 DEL, COORD = X, DEL = 21.00,INRANGE = 25,26,FACTOR = 1
 DEL, COORD = X, DEL = 10.00,INRANGE = 26,27,FACTOR = 1
 DEL, COORD = X, DEL = 30.50,INRANGE = 27,28,FACTOR = 1
 DEL, COORD = X, DEL = 10.00,INRANGE = 28,29,FACTOR = 1
 DEL, COORD = X, DEL = 30.50,INRANGE = 29,30,FACTOR = 1
 DEL, COORD = X, DEL = 10.00,INRANGE = 30,31,FACTOR = 1
 DEL, COORD = X, DEL = 30.50,INRANGE = 31,32,FACTOR = 1
 DEL, COORD = X, DEL = 10.00,INRANGE = 32,33,FACTOR = 1
 DEL, COORD = X, DEL = 30.50,INRANGE = 33,34,FACTOR = 1
 DEL, COORD = X, DEL = 10.00,INRANGE = 34,35,FACTOR = 1
 DEL, COORD = X, DEL = 30.50,INRANGE = 35,36,FACTOR = 1
 DEL, COORD = X, DEL = 10.00,INRANGE = 36,37,FACTOR = 1
 DEL, COORD = X, DEL = 30.50,INRANGE = 37,38,FACTOR = 1
 DEL, COORD = X, DEL = 10.00,INRANGE = 38,39,FACTOR = 1
```

```
 DEL, COORD = X, DEL = 5.12,INRANGE = 39,40,FACTOR = 1
!
 DEL, COORD = Y, DEL = 5.12,INRANGE = 1,2,FACTOR = 1
 DEL, COORD = Y, DEL = 3.60,INRANGE = 2,3,FACTOR = 1
 DEL, COORD = Y, DEL = 6.40,INRANGE = 3,4,FACTOR = 1
 DEL, COORD = Y, DEL = 32.70,INRANGE = 4,5,FACTOR = 1
 DEL, COORD = Y, DEL = 32.70,INRANGE = 5,6,FACTOR = 1
 DEL, COORD = Y, DEL = 32.70,INRANGE = 6,7,FACTOR = 1
 DEL, COORD = Y, DEL = 4.30,INRANGE = 7,8,FACTOR = 1
 DEL, COORD = Y, DEL = 5.70,INRANGE = 8,9,FACTOR = 1
 DEL, COORD = Y, DEL = 5.12,INRANGE = 9,10,FACTOR = 1
 DEL, COORD = Y, DEL = 45.96,INRANGE = 10,11,FACTOR = 1
 DEL, COORD = Y, DEL = 5.12,INRANGE = 11,12,FACTOR = 1
 DEL, COORD = Y, DEL = 3.60,INRANGE = 12,13,FACTOR = 1
 DEL, COORD = Y, DEL = 6.40,INRANGE = 13,14,FACTOR = 1
 DEL, COORD = Y, DEL = 30.50,INRANGE = 14,15,FACTOR = 1
 DEL, COORD = Y, DEL = 30.50,INRANGE = 15,16,FACTOR = 1
 DEL, COORD = Y, DEL = 30.50,INRANGE = 16,17,FACTOR = 1
 DEL, COORD = Y, DEL = 4.30,INRANGE = 17,18,FACTOR = 1
 DEL, COORD = Y, DEL = 5.70,INRANGE = 18,19,FACTOR = 1
 DEL, COORD = Y, DEL = 12.75,INRANGE = 19,20,FACTOR = 1
 DEL, COORD = Y, DEL = 40.00,INRANGE = 20,21,FACTOR = 1
 DEL, COORD = Y, DEL = 12.75,INRANGE = 21,22,FACTOR = 1
 DEL, COORD = Y, DEL = 3.60,INRANGE = 22,23,FACTOR = 1
 DEL, COORD = Y, DEL = 6.40,INRANGE = 23,24,FACTOR = 1
 DEL, COORD = Y, DEL = 30.50,INRANGE = 24,25,FACTOR = 1
 DEL, COORD = Y, DEL = 30.50,INRANGE = 25,26,FACTOR = 1
 DEL, COORD = Y, DEL = 30.50,INRANGE = 26,27,FACTOR = 1
 DEL, COORD = Y, DEL = 4.30,INRANGE = 27,28,FACTOR = 1
 DEL, COORD = Y, DEL = 5.70,INRANGE = 28,29,FACTOR = 1
 DEL, COORD = Y, DEL = 5.12,INRANGE = 29,30,FACTOR = 1
 DEL, COORD = Y, DEL = 45.96,INRANGE = 30,31,FACTOR = 1
 DEL, COORD = Y, DEL = 5.12,INRANGE = 31,32,FACTOR = 1
 DEL, COORD = Y, DEL = 3.60,INRANGE = 32,33,FACTOR = 1
 DEL, COORD = Y, DEL = 6.40,INRANGE = 33,34,FACTOR = 1
 DEL, COORD = Y, DEL = 30.50,INRANGE = 34,35,FACTOR = 1
 DEL, COORD = Y, DEL = 30.50,INRANGE = 35,36,FACTOR = 1
 DEL, COORD = Y, DEL = 30.50,INRANGE = 36,37,FACTOR = 1
 DEL, COORD = Y, DEL = 6.10,INRANGE = 37,38,FACTOR = 1
 DEL, COORD = Y, DEL = 3.90,INRANGE = 38,39,FACTOR = 1
 DEL, COORD = Y, DEL = 5.12,INRANGE = 39,40,FACTOR = 1
!
 DEL, COORD = Z, DEL = 2.00,INRANGE = 1,2,FACTOR = 1
!
!
*ELEVATION_ELEMENT, ADJUST_Z_COORD
LOCATION, THICK=2.00, ELEVAT=382.47,IRANGE=1,40,JRANGE=1,40,KRANGE=1,2
!
*REGIONS
! -- WASTE - FILLED EXCAVATED REGION - REPOSITORY
! -- PANEL 5
 REGION=1,  IRANGE=  2,3, JRANGE=  2,9, KRANGE=1,2
 REGION=1,  IRANGE=  3,4, JRANGE=  2,4, KRANGE=1,2
 REGION=1,  IRANGE=  3,4, JRANGE=  7,9, KRANGE=1,2
 REGION=1,  IRANGE=  4,5, JRANGE=  2,9, KRANGE=1,2
 REGION=1,  IRANGE=  5,6, JRANGE=  2,4, KRANGE=1,2
 REGION=1,  IRANGE=  5,6, JRANGE=  7,9, KRANGE=1,2
```

```
 REGION=1,  IRANGE=  6,7, JRANGE=  2,9, KRANGE=1,2
 REGION=1,  IRANGE=  7,8, JRANGE=  2,4, KRANGE=1,2
 REGION=1,  IRANGE=  7,8, JRANGE=  7,9, KRANGE=1,2
 REGION=1,  IRANGE=  8,9, JRANGE=  2,9, KRANGE=1,2
 REGION=1,  IRANGE=  9,10,JRANGE=  2,4, KRANGE=1,2
 REGION=1,  IRANGE=  9,10,JRANGE=  7,9, KRANGE=1,2
 REGION=1,  IRANGE= 10,11,JRANGE=  2,9, KRANGE=1,2
 REGION=1,  IRANGE= 11,12,JRANGE=  2,4, KRANGE=1,2
 REGION=1,  IRANGE= 11,12,JRANGE=  7,9, KRANGE=1,2
 REGION=1,  IRANGE= 12,13,JRANGE=  2,9, KRANGE=1,2
 REGION=1,  IRANGE= 13,14,JRANGE=  2,4, KRANGE=1,2
 REGION=1,  IRANGE= 13,14,JRANGE=  7,9, KRANGE=1,2
 REGION=1,  IRANGE= 14,15,JRANGE=  2,9, KRANGE=1,2
 REGION=1,  IRANGE= 15,16,JRANGE=  3,4, KRANGE=1,2
 REGION=1,  IRANGE= 15,16,JRANGE=  7,8, KRANGE=1,2
! -- PANEL 4
 REGION=1,  IRANGE= 38,39,JRANGE=  2,9, KRANGE=1,2
 REGION=1,  IRANGE= 37,38,JRANGE=  2,4, KRANGE=1,2
 REGION=1,  IRANGE= 37,38,JRANGE=  7,9, KRANGE=1,2
 REGION=1,  IRANGE= 36,37,JRANGE=  2,9, KRANGE=1,2
 REGION=1,  IRANGE= 35,36,JRANGE=  2,4, KRANGE=1,2
 REGION=1,  IRANGE= 35,36,JRANGE=  7,9, KRANGE=1,2
 REGION=1,  IRANGE= 34,35,JRANGE=  2,9, KRANGE=1,2
 REGION=1,  IRANGE= 33,34,JRANGE=  2,4, KRANGE=1,2
 REGION=1,  IRANGE= 33,34,JRANGE=  7,9, KRANGE=1,2
 REGION=1,  IRANGE= 32,33,JRANGE=  2,9, KRANGE=1,2
 REGION=1,  IRANGE= 31,32,JRANGE=  2,4, KRANGE=1,2
 REGION=1,  IRANGE= 31,32,JRANGE=  7,9, KRANGE=1,2
 REGION=1,  IRANGE= 30,31,JRANGE=  2,9, KRANGE=1,2
 REGION=1,  IRANGE= 29,30,JRANGE=  2,4, KRANGE=1,2
 REGION=1,  IRANGE= 29,30,JRANGE=  7,9, KRANGE=1,2
 REGION=1,  IRANGE= 28,29,JRANGE=  2,9, KRANGE=1,2
 REGION=1,  IRANGE= 27,28,JRANGE=  2,4, KRANGE=1,2
 REGION=1,  IRANGE= 27,28,JRANGE=  7,9, KRANGE=1,2
 REGION=1,  IRANGE= 26,27,JRANGE=  2,9, KRANGE=1,2
 REGION=1,  IRANGE= 25,26,JRANGE=  3,4, KRANGE=1,2
 REGION=1,  IRANGE= 25,26,JRANGE=  7,8, KRANGE=1,2
! -- PANEL 6
 REGION=1,  IRANGE=  2,3, JRANGE= 12,19,KRANGE=1,2
 REGION=1,  IRANGE=  3,4, JRANGE= 12,14,KRANGE=1,2
 REGION=1,  IRANGE=  3,4, JRANGE= 17,19,KRANGE=1,2
 REGION=1,  IRANGE=  4,5, JRANGE= 12,19,KRANGE=1,2
 REGION=1,  IRANGE=  5,6, JRANGE= 12,14,KRANGE=1,2
 REGION=1,  IRANGE=  5,6, JRANGE= 17,19,KRANGE=1,2
 REGION=1,  IRANGE=  6,7, JRANGE= 12,19,KRANGE=1,2
 REGION=1,  IRANGE=  7,8, JRANGE= 12,14,KRANGE=1,2
 REGION=1,  IRANGE=  7,8, JRANGE= 17,19,KRANGE=1,2
 REGION=1,  IRANGE=  8,9, JRANGE= 12,19,KRANGE=1,2
 REGION=1,  IRANGE=  9,10,JRANGE= 12,14,KRANGE=1,2
 REGION=1,  IRANGE=  9,10,JRANGE= 17,19,KRANGE=1,2
 REGION=1,  IRANGE= 10,11,JRANGE= 12,19,KRANGE=1,2
 REGION=1,  IRANGE= 11,12,JRANGE= 12,14,KRANGE=1,2
 REGION=1,  IRANGE= 11,12,JRANGE= 17,19,KRANGE=1,2
 REGION=1,  IRANGE= 12,13,JRANGE= 12,19,KRANGE=1,2
 REGION=1,  IRANGE= 13,14,JRANGE= 12,14,KRANGE=1,2
 REGION=1,  IRANGE= 13,14,JRANGE= 17,19,KRANGE=1,2
 REGION=1,  IRANGE= 14,15,JRANGE= 12,19,KRANGE=1,2
```

```
 REGION=1,  IRANGE= 15,16,JRANGE= 13,14,KRANGE=1,2
 REGION=1,  IRANGE= 15,16,JRANGE= 17,18,KRANGE=1,2
! -- PANEL 3
 REGION=1,  IRANGE= 38,39,JRANGE= 12,19,KRANGE=1,2
 REGION=1,  IRANGE= 37,38,JRANGE= 12,14,KRANGE=1,2
 REGION=1,  IRANGE= 37,38,JRANGE= 17,19,KRANGE=1,2
 REGION=1,  IRANGE= 36,37,JRANGE= 12,19,KRANGE=1,2
 REGION=1,  IRANGE= 35,36,JRANGE= 12,14,KRANGE=1,2
 REGION=1,  IRANGE= 35,36,JRANGE= 17,19,KRANGE=1,2
 REGION=1,  IRANGE= 34,35,JRANGE= 12,19,KRANGE=1,2
 REGION=1,  IRANGE= 33,34,JRANGE= 12,14,KRANGE=1,2
 REGION=1,  IRANGE= 33,34,JRANGE= 17,19,KRANGE=1,2
 REGION=1,  IRANGE= 32,33,JRANGE= 12,19,KRANGE=1,2
 REGION=1,  IRANGE= 31,32,JRANGE= 12,14,KRANGE=1,2
 REGION=1,  IRANGE= 31,32,JRANGE= 17,19,KRANGE=1,2
 REGION=1,  IRANGE= 30,31,JRANGE= 12,19,KRANGE=1,2
 REGION=1,  IRANGE= 29,30,JRANGE= 12,14,KRANGE=1,2
 REGION=1,  IRANGE= 29,30,JRANGE= 17,19,KRANGE=1,2
 REGION=1,  IRANGE= 28,29,JRANGE= 12,19,KRANGE=1,2
 REGION=1,  IRANGE= 27,28,JRANGE= 12,14,KRANGE=1,2
 REGION=1,  IRANGE= 27,28,JRANGE= 17,19,KRANGE=1,2
 REGION=1,  IRANGE= 26,27,JRANGE= 12,19,KRANGE=1,2
 REGION=1,  IRANGE= 25,26,JRANGE= 13,14,KRANGE=1,2
 REGION=1,  IRANGE= 25,26,JRANGE= 17,18,KRANGE=1,2
! -- PANEL 7
 REGION=1,  IRANGE=  2,3, JRANGE= 22,29,KRANGE=1,2
 REGION=1,  IRANGE=  3,4, JRANGE= 22,24,KRANGE=1,2
 REGION=1,  IRANGE=  3,4, JRANGE= 27,29,KRANGE=1,2
 REGION=1,  IRANGE=  4,5, JRANGE= 22,29,KRANGE=1,2
 REGION=1,  IRANGE=  5,6, JRANGE= 22,24,KRANGE=1,2
 REGION=1,  IRANGE=  5,6, JRANGE= 27,29,KRANGE=1,2
 REGION=1,  IRANGE=  6,7, JRANGE= 22,29,KRANGE=1,2
 REGION=1,  IRANGE=  7,8, JRANGE= 22,24,KRANGE=1,2
 REGION=1,  IRANGE=  7,8, JRANGE= 27,29,KRANGE=1,2
 REGION=1,  IRANGE=  8,9, JRANGE= 22,29,KRANGE=1,2
 REGION=1,  IRANGE=  9,10,JRANGE= 22,24,KRANGE=1,2
 REGION=1,  IRANGE=  9,10,JRANGE= 27,29,KRANGE=1,2
 REGION=1,  IRANGE= 10,11,JRANGE= 22,29,KRANGE=1,2
 REGION=1,  IRANGE= 11,12,JRANGE= 22,24,KRANGE=1,2
 REGION=1,  IRANGE= 11,12,JRANGE= 27,29,KRANGE=1,2
 REGION=1,  IRANGE= 12,13,JRANGE= 22,29,KRANGE=1,2
 REGION=1,  IRANGE= 13,14,JRANGE= 22,24,KRANGE=1,2
 REGION=1,  IRANGE= 13,14,JRANGE= 27,29,KRANGE=1,2
 REGION=1,  IRANGE= 14,15,JRANGE= 22,29,KRANGE=1,2
 REGION=1,  IRANGE= 15,16,JRANGE= 23,24,KRANGE=1,2
 REGION=1,  IRANGE= 15,16,JRANGE= 27,28,KRANGE=1,2
! -- PANEL 2
 REGION=1,  IRANGE= 38,39,JRANGE= 22,29,KRANGE=1,2
 REGION=1,  IRANGE= 37,38,JRANGE= 22,24,KRANGE=1,2
 REGION=1,  IRANGE= 37,38,JRANGE= 27,29,KRANGE=1,2
 REGION=1,  IRANGE= 36,37,JRANGE= 22,29,KRANGE=1,2
 REGION=1,  IRANGE= 35,36,JRANGE= 22,24,KRANGE=1,2
 REGION=1,  IRANGE= 35,36,JRANGE= 27,29,KRANGE=1,2
 REGION=1,  IRANGE= 34,35,JRANGE= 22,29,KRANGE=1,2
 REGION=1,  IRANGE= 33,34,JRANGE= 22,24,KRANGE=1,2
 REGION=1,  IRANGE= 33,34,JRANGE= 27,29,KRANGE=1,2
 REGION=1,  IRANGE= 32,33,JRANGE= 22,29,KRANGE=1,2
```

```
 REGION=1,  IRANGE= 31,32,JRANGE= 22,24,KRANGE=1,2
 REGION=1,  IRANGE= 31,32,JRANGE= 27,29,KRANGE=1,2
 REGION=1,  IRANGE= 30,31,JRANGE= 22,29,KRANGE=1,2
 REGION=1,  IRANGE= 29,30,JRANGE= 22,24,KRANGE=1,2
 REGION=1,  IRANGE= 29,30,JRANGE= 27,29,KRANGE=1,2
 REGION=1,  IRANGE= 28,29,JRANGE= 22,29,KRANGE=1,2
 REGION=1,  IRANGE= 27,28,JRANGE= 22,24,KRANGE=1,2
 REGION=1,  IRANGE= 27,28,JRANGE= 27,29,KRANGE=1,2
 REGION=1,  IRANGE= 26,27,JRANGE= 22,29,KRANGE=1,2
 REGION=1,  IRANGE= 25,26,JRANGE= 23,24,KRANGE=1,2
 REGION=1,  IRANGE= 25,26,JRANGE= 27,28,KRANGE=1,2
! -- PANEL 8
 REGION=1,  IRANGE=  2,3, JRANGE= 32,39,KRANGE=1,2
 REGION=1,  IRANGE=  3,4, JRANGE= 32,34,KRANGE=1,2
 REGION=1,  IRANGE=  3,4, JRANGE= 37,39,KRANGE=1,2
 REGION=1,  IRANGE=  4,5, JRANGE= 32,39,KRANGE=1,2
 REGION=1,  IRANGE=  5,6, JRANGE= 32,34,KRANGE=1,2
 REGION=1,  IRANGE=  5,6, JRANGE= 37,39,KRANGE=1,2
 REGION=1,  IRANGE=  6,7, JRANGE= 32,39,KRANGE=1,2
 REGION=1,  IRANGE=  7,8, JRANGE= 32,34,KRANGE=1,2
 REGION=1,  IRANGE=  7,8, JRANGE= 37,39,KRANGE=1,2
 REGION=1,  IRANGE=  8,9, JRANGE= 32,39,KRANGE=1,2
 REGION=1,  IRANGE=  9,10,JRANGE= 32,34,KRANGE=1,2
 REGION=1,  IRANGE=  9,10,JRANGE= 37,39,KRANGE=1,2
 REGION=1,  IRANGE= 10,11,JRANGE= 32,39,KRANGE=1,2
 REGION=1,  IRANGE= 11,12,JRANGE= 32,34,KRANGE=1,2
 REGION=1,  IRANGE= 11,12,JRANGE= 37,39,KRANGE=1,2
 REGION=1,  IRANGE= 12,13,JRANGE= 32,39,KRANGE=1,2
 REGION=1,  IRANGE= 13,14,JRANGE= 32,34,KRANGE=1,2
 REGION=1,  IRANGE= 13,14,JRANGE= 37,39,KRANGE=1,2
 REGION=1,  IRANGE= 14,15,JRANGE= 32,39,KRANGE=1,2
 REGION=1,  IRANGE= 15,16,JRANGE= 33,34,KRANGE=1,2
 REGION=1,  IRANGE= 15,16,JRANGE= 37,38,KRANGE=1,2
! -- PANEL 1
 REGION=1,  IRANGE= 38,39,JRANGE= 32,39,KRANGE=1,2
 REGION=1,  IRANGE= 37,38,JRANGE= 32,34,KRANGE=1,2
 REGION=1,  IRANGE= 37,38,JRANGE= 37,39,KRANGE=1,2
 REGION=1,  IRANGE= 36,37,JRANGE= 32,39,KRANGE=1,2
 REGION=1,  IRANGE= 35,36,JRANGE= 32,34,KRANGE=1,2
 REGION=1,  IRANGE= 35,36,JRANGE= 37,39,KRANGE=1,2
 REGION=1,  IRANGE= 34,35,JRANGE= 32,39,KRANGE=1,2
 REGION=1,  IRANGE= 33,34,JRANGE= 32,34,KRANGE=1,2
 REGION=1,  IRANGE= 33,34,JRANGE= 37,39,KRANGE=1,2
 REGION=1,  IRANGE= 32,33,JRANGE= 32,39,KRANGE=1,2
 REGION=1,  IRANGE= 31,32,JRANGE= 32,34,KRANGE=1,2
 REGION=1,  IRANGE= 31,32,JRANGE= 37,39,KRANGE=1,2
 REGION=1,  IRANGE= 30,31,JRANGE= 32,39,KRANGE=1,2
 REGION=1,  IRANGE= 29,30,JRANGE= 32,34,KRANGE=1,2
 REGION=1,  IRANGE= 29,30,JRANGE= 37,39,KRANGE=1,2
 REGION=1,  IRANGE= 28,29,JRANGE= 32,39,KRANGE=1,2
 REGION=1,  IRANGE= 27,28,JRANGE= 32,34,KRANGE=1,2
 REGION=1,  IRANGE= 27,28,JRANGE= 37,39,KRANGE=1,2
 REGION=1,  IRANGE= 26,27,JRANGE= 32,39,KRANGE=1,2
 REGION=1,  IRANGE= 25,26,JRANGE= 33,34,KRANGE=1,2
 REGION=1,  IRANGE= 25,26,JRANGE= 37,38,KRANGE=1,2
! PANEL 9 & 0 (DRIFTS AND CENTRAL ACCESS)
 REGION=1,  IRANGE= 17,18,JRANGE=  3,20,KRANGE=1,2
```

```
 REGION=1,  IRANGE= 17,18,JRANGE= 21,38,KRANGE=1,2
 REGION=1,  IRANGE= 18,19,JRANGE=  3, 4,KRANGE=1,2
 REGION=1,  IRANGE= 18,19,JRANGE=  7, 8,KRANGE=1,2
 REGION=1,  IRANGE= 18,19,JRANGE= 13,14,KRANGE=1,2
 REGION=1,  IRANGE= 18,19,JRANGE= 17,18,KRANGE=1,2
 REGION=1,  IRANGE= 18,19,JRANGE= 23,24,KRANGE=1,2
 REGION=1,  IRANGE= 18,19,JRANGE= 27,28,KRANGE=1,2
 REGION=1,  IRANGE= 18,19,JRANGE= 33,34,KRANGE=1,2
 REGION=1,  IRANGE= 18,19,JRANGE= 37,38,KRANGE=1,2
!
 REGION=1,  IRANGE= 19,20,JRANGE=  3,20,KRANGE=1,2
 REGION=1,  IRANGE= 19,20,JRANGE= 21,38,KRANGE=1,2
 REGION=1,  IRANGE= 20,21,JRANGE=  3, 4,KRANGE=1,2
 REGION=1,  IRANGE= 20,21,JRANGE=  7, 8,KRANGE=1,2
 REGION=1,  IRANGE= 20,21,JRANGE= 13,14,KRANGE=1,2
 REGION=1,  IRANGE= 20,21,JRANGE= 17,18,KRANGE=1,2
 REGION=1,  IRANGE= 20,21,JRANGE= 23,24,KRANGE=1,2
 REGION=1,  IRANGE= 20,21,JRANGE= 27,28,KRANGE=1,2
 REGION=1,  IRANGE= 20,21,JRANGE= 33,34,KRANGE=1,2
 REGION=1,  IRANGE= 20,21,JRANGE= 37,38,KRANGE=1,2
!
 REGION=1,  IRANGE= 21,22,JRANGE=  3,20,KRANGE=1,2
 REGION=1,  IRANGE= 21,22,JRANGE= 21,38,KRANGE=1,2
 REGION=1,  IRANGE= 22,23,JRANGE=  3, 4,KRANGE=1,2
 REGION=1,  IRANGE= 22,23,JRANGE=  7, 8,KRANGE=1,2
 REGION=1,  IRANGE= 22,23,JRANGE= 13,14,KRANGE=1,2
 REGION=1,  IRANGE= 22,23,JRANGE= 17,18,KRANGE=1,2
 REGION=1,  IRANGE= 22,23,JRANGE= 23,24,KRANGE=1,2
 REGION=1,  IRANGE= 22,23,JRANGE= 27,28,KRANGE=1,2
 REGION=1,  IRANGE= 22,23,JRANGE= 33,34,KRANGE=1,2
 REGION=1,  IRANGE= 22,23,JRANGE= 37,38,KRANGE=1,2
!
 REGION=1,  IRANGE= 23,24,JRANGE=  3,20,KRANGE=1,2
 REGION=1,  IRANGE= 23,24,JRANGE= 21,38,KRANGE=1,2
!
! DRZ
!
 REGION=2,  IRANGE=  1,16,JRANGE=  1, 2,KRANGE=1,2
 REGION=2,  IRANGE= 15,16,JRANGE=  2, 3,KRANGE=1,2
 REGION=2,  IRANGE= 17,24,JRANGE=  2, 3,KRANGE=1,2
 REGION=2,  IRANGE= 25,26,JRANGE=  2, 3,KRANGE=1,2
 REGION=2,  IRANGE= 25,40,JRANGE=  1, 2,KRANGE=1,2

 REGION=2,  IRANGE=  1,15,JRANGE=  9,10,KRANGE=1,2
 REGION=2,  IRANGE= 26,40,JRANGE=  9,10,KRANGE=1,2

 REGION=2,  IRANGE=  1,15,JRANGE= 11,12,KRANGE=1,2
 REGION=2,  IRANGE= 26,40,JRANGE= 11,12,KRANGE=1,2

 REGION=2,  IRANGE=  1,15,JRANGE= 19,20,KRANGE=1,2
 REGION=2,  IRANGE= 26,40,JRANGE= 19,20,KRANGE=1,2

 REGION=2,  IRANGE=  1,15,JRANGE= 21,22,KRANGE=1,2
 REGION=2,  IRANGE= 26,40,JRANGE= 21,22,KRANGE=1,2

 REGION=2,  IRANGE=  1,15,JRANGE= 29,30,KRANGE=1,2
 REGION=2,  IRANGE= 26,40,JRANGE= 29,30,KRANGE=1,2
```

```
 REGION=2,  IRANGE=  1,15,JRANGE= 31,32,KRANGE=1,2
 REGION=2,  IRANGE= 26,40,JRANGE= 31,32,KRANGE=1,2

 REGION=2,  IRANGE= 15,16,JRANGE= 38,39,KRANGE=1,2
 REGION=2,  IRANGE= 17,24,JRANGE= 38,39,KRANGE=1,2
 REGION=2,  IRANGE= 25,26,JRANGE= 38,39,KRANGE=1,2
 REGION=2,  IRANGE=  1,16,JRANGE= 39,40,KRANGE=1,2
 REGION=2,  IRANGE= 25,40,JRANGE= 39,40,KRANGE=1,2

 REGION=2,  IRANGE=  1, 2,JRANGE=  2, 9,KRANGE=1,2
 REGION=2,  IRANGE=  1, 2,JRANGE= 12,19,KRANGE=1,2
 REGION=2,  IRANGE=  1, 2,JRANGE= 22,29,KRANGE=1,2
 REGION=2,  IRANGE=  1, 2,JRANGE= 32,39,KRANGE=1,2

 REGION=2,  IRANGE= 39,40,JRANGE=  2, 9,KRANGE=1,2
 REGION=2,  IRANGE= 39,40,JRANGE= 12,19,KRANGE=1,2
 REGION=2,  IRANGE= 39,40,JRANGE= 22,29,KRANGE=1,2
 REGION=2,  IRANGE= 39,40,JRANGE= 32,39,KRANGE=1,2
!
!  INTACT SALADO HALITE
!   SALT BETWEEN PANELS
!
 REGION=3,  IRANGE= 16,25,JRANGE=  1, 2,KRANGE=1,2
 REGION=3,  IRANGE= 16,25,JRANGE= 39,40,KRANGE=1,2

 REGION=3,  IRANGE=  1,15,JRANGE= 10,11,KRANGE=1,2
 REGION=3,  IRANGE= 26,40,JRANGE= 10,11,KRANGE=1,2

 REGION=3,  IRANGE=  1,15,JRANGE= 20,21,KRANGE=1,2
 REGION=3,  IRANGE= 26,40,JRANGE= 20,21,KRANGE=1,2

 REGION=3,  IRANGE=  1,15,JRANGE= 30,31,KRANGE=1,2
 REGION=3,  IRANGE= 26,40,JRANGE= 30,31,KRANGE=1,2
!
!   PILLARS WITHIN AND BETWEEN PANELS
!   TREATED AS INTACT SALADO (T. HADGU - 5/31/02)
!
 REGION=3,  IRANGE=  3, 4,JRANGE=  4, 7,KRANGE=1,2
 REGION=3,  IRANGE=  3, 4,JRANGE= 14,17,KRANGE=1,2
 REGION=3,  IRANGE=  3, 4,JRANGE= 24,27,KRANGE=1,2
 REGION=3,  IRANGE=  3, 4,JRANGE= 34,37,KRANGE=1,2

 REGION=3,  IRANGE=  5, 6,JRANGE=  4, 7,KRANGE=1,2
 REGION=3,  IRANGE=  5, 6,JRANGE= 14,17,KRANGE=1,2
 REGION=3,  IRANGE=  5, 6,JRANGE= 24,27,KRANGE=1,2
 REGION=3,  IRANGE=  5, 6,JRANGE= 34,37,KRANGE=1,2

 REGION=3,  IRANGE=  7, 8,JRANGE=  4, 7,KRANGE=1,2
 REGION=3,  IRANGE=  7, 8,JRANGE= 14,17,KRANGE=1,2
 REGION=3,  IRANGE=  7, 8,JRANGE= 24,27,KRANGE=1,2
 REGION=3,  IRANGE=  7, 8,JRANGE= 34,37,KRANGE=1,2

 REGION=3,  IRANGE=  9,10,JRANGE=  4, 7,KRANGE=1,2
 REGION=3,  IRANGE=  9,10,JRANGE= 14,17,KRANGE=1,2
 REGION=3,  IRANGE=  9,10,JRANGE= 24,27,KRANGE=1,2
 REGION=3,  IRANGE=  9,10,JRANGE= 34,37,KRANGE=1,2
```

```
REGION=3,  IRANGE= 11,12,JRANGE=  4, 7,KRANGE=1,2
REGION=3,  IRANGE= 11,12,JRANGE= 14,17,KRANGE=1,2
REGION=3,  IRANGE= 11,12,JRANGE= 24,27,KRANGE=1,2
REGION=3,  IRANGE= 11,12,JRANGE= 34,37,KRANGE=1,2

REGION=3,  IRANGE= 13,14,JRANGE=  4, 7,KRANGE=1,2
REGION=3,  IRANGE= 13,14,JRANGE= 14,17,KRANGE=1,2
REGION=3,  IRANGE= 13,14,JRANGE= 24,27,KRANGE=1,2
REGION=3,  IRANGE= 13,14,JRANGE= 34,37,KRANGE=1,2

REGION=3,  IRANGE= 18,19,JRANGE=  4, 7,KRANGE=1,2
REGION=3,  IRANGE= 18,19,JRANGE=  8,13,KRANGE=1,2
REGION=3,  IRANGE= 18,19,JRANGE= 14,17,KRANGE=1,2
REGION=3,  IRANGE= 18,19,JRANGE= 18,23,KRANGE=1,2
REGION=3,  IRANGE= 18,19,JRANGE= 24,27,KRANGE=1,2
REGION=3,  IRANGE= 18,19,JRANGE= 28,33,KRANGE=1,2
REGION=3,  IRANGE= 18,19,JRANGE= 34,37,KRANGE=1,2

REGION=3,  IRANGE= 20,21,JRANGE=  4, 7,KRANGE=1,2
REGION=3,  IRANGE= 20,21,JRANGE=  8,13,KRANGE=1,2
REGION=3,  IRANGE= 20,21,JRANGE= 14,17,KRANGE=1,2
REGION=3,  IRANGE= 20,21,JRANGE= 18,23,KRANGE=1,2
REGION=3,  IRANGE= 20,21,JRANGE= 24,27,KRANGE=1,2
REGION=3,  IRANGE= 20,21,JRANGE= 28,33,KRANGE=1,2
REGION=3,  IRANGE= 20,21,JRANGE= 34,37,KRANGE=1,2

REGION=3,  IRANGE= 22,23,JRANGE=  4, 7,KRANGE=1,2
REGION=3,  IRANGE= 22,23,JRANGE=  8,13,KRANGE=1,2
REGION=3,  IRANGE= 22,23,JRANGE= 14,17,KRANGE=1,2
REGION=3,  IRANGE= 22,23,JRANGE= 18,23,KRANGE=1,2
REGION=3,  IRANGE= 22,23,JRANGE= 24,27,KRANGE=1,2
REGION=3,  IRANGE= 22,23,JRANGE= 28,33,KRANGE=1,2
REGION=3,  IRANGE= 22,23,JRANGE= 34,37,KRANGE=1,2

REGION=3,  IRANGE= 27,28,JRANGE=  4, 7,KRANGE=1,2
REGION=3,  IRANGE= 27,28,JRANGE= 14,17,KRANGE=1,2
REGION=3,  IRANGE= 27,28,JRANGE= 24,27,KRANGE=1,2
REGION=3,  IRANGE= 27,28,JRANGE= 34,37,KRANGE=1,2

REGION=3,  IRANGE= 29,30,JRANGE=  4, 7,KRANGE=1,2
REGION=3,  IRANGE= 29,30,JRANGE= 14,17,KRANGE=1,2
REGION=3,  IRANGE= 29,30,JRANGE= 24,27,KRANGE=1,2
REGION=3,  IRANGE= 29,30,JRANGE= 34,37,KRANGE=1,2

REGION=3,  IRANGE= 31,32,JRANGE=  4, 7,KRANGE=1,2
REGION=3,  IRANGE= 31,32,JRANGE= 14,17,KRANGE=1,2
REGION=3,  IRANGE= 31,32,JRANGE= 24,27,KRANGE=1,2
REGION=3,  IRANGE= 31,32,JRANGE= 34,37,KRANGE=1,2

REGION=3,  IRANGE= 33,34,JRANGE=  4, 7,KRANGE=1,2
REGION=3,  IRANGE= 33,34,JRANGE= 14,17,KRANGE=1,2
REGION=3,  IRANGE= 33,34,JRANGE= 24,27,KRANGE=1,2
REGION=3,  IRANGE= 33,34,JRANGE= 34,37,KRANGE=1,2

REGION=3,  IRANGE= 35,36,JRANGE=  4, 7,KRANGE=1,2
REGION=3,  IRANGE= 35,36,JRANGE= 14,17,KRANGE=1,2
```

```
 REGION=3,  IRANGE= 35,36,JRANGE= 24,27,KRANGE=1,2
 REGION=3,  IRANGE= 35,36,JRANGE= 34,37,KRANGE=1,2

 REGION=3,  IRANGE= 37,38,JRANGE=  4, 7,KRANGE=1,2
 REGION=3,  IRANGE= 37,38,JRANGE= 14,17,KRANGE=1,2
 REGION=3,  IRANGE= 37,38,JRANGE= 24,27,KRANGE=1,2
 REGION=3,  IRANGE= 37,38,JRANGE= 34,37,KRANGE=1,2

 REGION=3,  IRANGE= 15,17,JRANGE=  4, 7,KRANGE=1,2
 REGION=3,  IRANGE= 15,17,JRANGE=  8,13,KRANGE=1,2
 REGION=3,  IRANGE= 15,17,JRANGE= 14,17,KRANGE=1,2
 REGION=3,  IRANGE= 15,17,JRANGE= 18,23,KRANGE=1,2
 REGION=3,  IRANGE= 15,17,JRANGE= 24,27,KRANGE=1,2
 REGION=3,  IRANGE= 15,17,JRANGE= 28,33,KRANGE=1,2
 REGION=3,  IRANGE= 15,17,JRANGE= 34,37,KRANGE=1,2

 REGION=3,  IRANGE= 24,26,JRANGE=  4, 7,KRANGE=1,2
 REGION=3,  IRANGE= 24,26,JRANGE=  8,13,KRANGE=1,2
 REGION=3,  IRANGE= 24,26,JRANGE= 14,17,KRANGE=1,2
 REGION=3,  IRANGE= 24,26,JRANGE= 18,23,KRANGE=1,2
 REGION=3,  IRANGE= 24,26,JRANGE= 24,27,KRANGE=1,2
 REGION=3,  IRANGE= 24,26,JRANGE= 28,33,KRANGE=1,2
 REGION=3,  IRANGE= 24,26,JRANGE= 34,37,KRANGE=1,2
!
!  Equivalent PANEL SEALS FOR OPTION D PANEL CLOSURE (1)
!
 REGION=4,  IRANGE= 16,17,JRANGE=  3, 4,KRANGE=1,2
 REGION=4,  IRANGE= 16,17,JRANGE=  7, 8,KRANGE=1,2
 REGION=4,  IRANGE= 16,17,JRANGE= 13,14,KRANGE=1,2
 REGION=4,  IRANGE= 16,17,JRANGE= 17,18,KRANGE=1,2
 REGION=4,  IRANGE= 16,17,JRANGE= 23,24,KRANGE=1,2
 REGION=4,  IRANGE= 16,17,JRANGE= 27,28,KRANGE=1,2
 REGION=4,  IRANGE= 16,17,JRANGE= 33,34,KRANGE=1,2
 REGION=4,  IRANGE= 16,17,JRANGE= 37,38,KRANGE=1,2
 REGION=4,  IRANGE= 24,25,JRANGE=  3, 4,KRANGE=1,2
 REGION=4,  IRANGE= 24,25,JRANGE=  7, 8,KRANGE=1,2
 REGION=4,  IRANGE= 24,25,JRANGE= 13,14,KRANGE=1,2
 REGION=4,  IRANGE= 24,25,JRANGE= 17,18,KRANGE=1,2
 REGION=4,  IRANGE= 24,25,JRANGE= 23,24,KRANGE=1,2
 REGION=4,  IRANGE= 24,25,JRANGE= 27,28,KRANGE=1,2
 REGION=4,  IRANGE= 24,25,JRANGE= 33,34,KRANGE=1,2
 REGION=4,  IRANGE= 24,25,JRANGE= 37,38,KRANGE=1,2
!
!  EQUIVALENT DRZ/CONCRETE AT CONCRETE EXTENSION INTO DRZ (FOR OPTION D)
!
 REGION=5,  IRANGE= 16,17,JRANGE=  2, 3,KRANGE=1,2
 REGION=5,  IRANGE= 24,25,JRANGE=  2, 3,KRANGE=1,2
 REGION=5,  IRANGE= 16,17,JRANGE= 38,39,KRANGE=1,2
 REGION=5,  IRANGE= 24,25,JRANGE= 38,39,KRANGE=1,2
!
!  Equivalent PANEL SEALS FOR OPTION D PANEL CLOSURE (2 - Middle Panel Seals)
!
 REGION=6,  IRANGE= 17,18,JRANGE= 20,21,KRANGE=1,2
 REGION=6,  IRANGE= 19,20,JRANGE= 20,21,KRANGE=1,2
 REGION=6,  IRANGE= 21,22,JRANGE= 20,21,KRANGE=1,2
 REGION=6,  IRANGE= 23,24,JRANGE= 20,21,KRANGE=1,2
!
```

```
*END
$
```

B.2.2 MATSET INPUT FILE: Parameter callout/definitions

```
$ type ms_dbr_cra1_dir_rel.inp
!==========================================================================
!TITLE:    BRAGFLO DIRECT RELEASE MODEL (New repository scale grid)
! ANALYST:  Daniel M. Stoelzel ,SNL
!CREATED:  Nov. 2, 1995
! PURPOSE:  Define material and property names and selected values that
!          are not in the PROPERTY.SDB
!           May, 1996
!          Updated to add needed params for CCA analysis.
!
!MODIFIED 6/6/96
!       CHANGED SO BLOWOUT PARAMETERS CAN BE READ FROM DATABASE
!
!       6/25/97
!               CHANGES TO ALLOW FOR DRZ_INIT REGION
!
!       5/29/02  T. Hadgu
!       Removed any reference to Region 4, because the repository has now
been
!       subdivided into three instead of four for TBM calculations.
!
!       6/01/02 T. Hadgu
!       The materials DRZ_1 and DRZ_INIT have been changed for TBM
calculations.
!       DRZ_INIT has been removed. DRZ surrounding panels has been assigned
!       the property name DRZ_1. Pillars between rooms and between panels are
!       now treated as Salado Halite. DRZ next to concrete panel closure is
!       treated as an equivalent DRZ using the material name DRZ_CONC.
!
!       T. Hadgu 6/10/02:
!       Material CONC_PCS represents Option D panel closure (which comprises
!       of a drift and a concrete part). It's properties, with the exception
!       of permeability and porosity, will be that of WAS_AREA. This was done
!       with the assumption that the drift part will dominate for those
!       properties. Permeability and porosity are assigned in ALGEBRA. Note
!       that the name CONC_PCS was used to pull permeability and porosity of
the
!       concrete panel closure from the BRAGFLO 10,000-year calculations.
!
!       The center panel seals have been assigned Material PAN_SL2 to allow
!       different equivalent permeabilities because of their orientation.
!
!       J. Stein 4/30/2003
!       Changed the initial height of the DRZ from 8.98 m to 44 m.
!       This change is due to the area of the DRZ in the DBR grid
!       decreasing as a result of the material map changes made
!       for the 2003 Salado Flow Peer Review.  This change is necessary
!       in order to conserve pore volume between the BRAGFLO and DBR
!       grids.
!
!       J. Stein 7/31/2003
```

```
!       Changed the initial height of the panel closure materials to
!       be consistent with the dimensions of these features in the
!       10,000 year BRAGFLO grid.  These changes are in preparation for
!       the 2003 CRA PA Calculations.
!
!===========================================================================
*PRINT_ASSIGNED_VALUES

*HEADING
 TITLE, BRAGFLO: 2003 CRA1:DBR Model
 SCALE, LOCAL
 SCENARIO, DISTURBED

*UNITS=SI

*CREATE_IDS
 BLOCK_IDS=7
 BLOCK_IDS=8
 BLOCK_IDS=9
 BLOCK_IDS=10
 BLOCK_IDS=11

*RETRIEVE
 COORD, DIM=3, NAMES= X,Y,Z

!  ...Define region names
 MATERIAL, 1=WAS_AREA, 2=DRZ_1, 3=S_HALITE, 4=CONC_PCS:WAS_AREA, &
           5=DRZ_CONC:DRZ_1, 6=PAN_SL2:WAS_AREA, 7=BRINESAL, 8=H2, &
           9=WELLBORE, 10=REFCON, 11=BLOWOUT
!  1...Define WASTE property names
 PROPERTY, MAT=WAS_AREA, NAMES=      PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                     POROSITY,     PORE_DIS,   SAT_RGAS,&
                                     SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                     RELP_MOD,     PC_MAX,     PO_MIN,&
                                     PCT_A,        PCT_EXP,    KPT,&
                                     SAT_IBRN,     HEIGHT,&
                               PRESPAN1,   GPRSPAN1,   BSATPAN1,   GSATPAN1,&
                               PRESPAN2,   GPRSPAN2,   BSATPAN2,   GSATPAN2,&
                               PRESPAN3,   GPRSPAN3,   BSATPAN3,   GSATPAN3
!  2...Define DRZ (Time period 2 : 0-10000 yrs)
! property names
 PROPERTY, MAT=DRZ_1,    NAMES=      PERM_X,       PERM_Y,     PERM_Z,  &
                                     POROSITY,     PORE_DIS,   SAT_RGAS,&
                                     SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                     RELP_MOD,     PC_MAX,     PO_MIN,&
                                     PCT_A,        PCT_EXP,    KPT,&
                                     HEIGHT,       PERMBRX,    POR_INTR
! 3 ...Define  SALADO HALITE property names,
 PROPERTY, MAT=S_HALITE, NAMES=      PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                    POROSITY,     PORE_DIS,   SAT_RGAS,&
                                     SAT_RBRN,     COMP_RCK,   CAP_MOD,&
                                     RELP_MOD,     PC_MAX,     PO_MIN,&
                                     PCT_A,        PCT_EXP,    KPT,&
                                     PRESSURE,     HEIGHT
! 4...Define Panel Seal (Time period 1 : 0-10000 yrs) property names
 PROPERTY, MAT=CONC_PCS, NAMES=        PRMX_LOG,     PRMY_LOG,   PRMZ_LOG,&
                                     POROSITY,     PORE_DIS,   SAT_RGAS,&
```

```
                                     SAT_RBRN,     COMP_RCK,    CAP_MOD,&
                                     RELP_MOD,     PC_MAX,      PO_MIN,&
                                     PCT_A,        PCT_EXP,     KPT,&
                                     SAT_IBRN,     HEIGHT
! 5...Define Equivalent DRZ/Concrete (Time period 2 : 0-10000 yrs)
! property names
 PROPERTY, MAT=DRZ_CONC,    NAMES=   PERM_X,       PERM_Y,      PERM_Z,  &
                                     POROSITY,     PORE_DIS,    SAT_RGAS,&
                                     SAT_RBRN,     COMP_RCK,    CAP_MOD,&
                                     RELP_MOD,     PC_MAX,      PO_MIN,&
                                     PCT_A,        PCT_EXP,     KPT,&
                                     HEIGHT,       PERMBRX,     POR_INTR
! 6...Define Middle Panel Seal (Time period 1 : 0-10000 yrs) property names
 PROPERTY, MAT=PAN_SL2, NAMES=       PRMX_LOG,     PRMY_LOG,    PRMZ_LOG,&
                                     POROSITY,     PORE_DIS,    SAT_RGAS,&
                                     SAT_RBRN,     COMP_RCK,    CAP_MOD,&
                                     RELP_MOD,     PC_MAX,      PO_MIN,&
                                     PCT_A,        PCT_EXP,     KPT,&
                                     SAT_IBRN,     HEIGHT
! 7...Define brine props
 PROPERTY, MAT=BRINESAL, NAMES=      DNSFLUID,     WTF,         COMPRES,&
                                     VISCO,        REF_TEMP,    REF_PRES
! 8..Define GAS (H2) property names
 PROPERTY, MAT=H2,       NAMES=      VISCO
! 9..DEFINE WELLBORE PROP NAMES:  Some props will be changed or added in
ALGEBRA
!   & RELATE steps
PROPERTY,MAT=WELLBORE,NAMES = &
 INTR_TME,&
 BITSIZE,&
 SKIN,&
 WELLPI,&
 DRAINRAD,&
 PRM_OPEN,&
 PRM_SAND,&
 PRM_CREP,&
 AREA_TOT,&
 VOLU_TOT,&
 CAST_RE,&
 CAST_WB,&
 PRM_CAST,&
 WELL_PAN

! 10... Define Constants
PROPERTY,MAT=REFCON,NAMES = &
 PI,&
 GRAVACC,&
 PSIPA,&
 YRSEC,&
 DARM2,&
 DAYSEC,&
 FTM,&
 DIP_DEG,&
 MW_FE,      MW_CELL,&
 MW_NACL,      MW_CO2,     MW_CH4,&
 MW_N2,        MW_H2S,     MW_O2,&
 MW_H2O,       MW_H2,      R,&
```

```
 TC_H2,         TC_CO2,     TC_CH4,&
 TC_N2,         TC_H2S,     TC_O2,&
 PC_H2,         PC_CO2,     PC_CH4,&
 PC_N2,         PC_H2S,     PC_O2,&
 ACF_H2,        ACF_CO2,    ACF_CH4,&
 ACF_N2,        ACF_H2S,    ACF_O2,&
 OMEGAA,        OMEGAB,&
 BIP_11,        BIP_12,     BIP_13,&
 BIP_14,        BIP_15,     BIP_16,&
 BIP_21,        BIP_22,     BIP_23,&
 BIP_24,        BIP_25,     BIP_26,&
 BIP_31,        BIP_32,     BIP_33,&
 BIP_34,        BIP_35,     BIP_36,&
 BIP_41,        BIP_42,     BIP_43,&
 BIP_44,        BIP_45,     BIP_46,&
 BIP_51,        BIP_52,     BIP_53,&
 BIP_54,        BIP_55,     BIP_56,&
 BIP_61,        BIP_62,     BIP_63,&
 BIP_64,        BIP_65,     BIP_66


! 11.. Define flow durations of blowout
PROPERTY,MAT=BLOWOUT,NAMES = &
 MINFLOW,&
 MAXFLOW,&
 GAS_MIN,&
 THCK_CAS,&
 RE_CAST
*SET
PROPERTY,MAT=WAS_AREA,NAME*VALUE: &
 HEIGHT=1.5,&
 PRESPAN1=0.0,   GPRSPAN1=0.0,   BSATPAN1=0.0,   GSATPAN1=0.0,&
 PRESPAN2=0.0,   GPRSPAN2=0.0,   BSATPAN2=0.0,   GSATPAN2=0.0,&
 PRESPAN3=0.0,   GPRSPAN3=0.0,   BSATPAN3=0.0,   GSATPAN3=0.0
!
! JSS 43.60 = height of DRZ in DBR grid that results in the same volume of
!          DRZ in the the BF grid.
!   DRZAreaBF x porosity x DRZheightBF = DRZAreaDBR x porosity x DRZheightDBR
!   DRZAreaBF=110,641 m2, porosity=0.0129, DRZheightBF=14.23 m
!   DRZAreaDBR=36,107 m2, DRZheightDBR = 43.60
!
PROPERTY,MAT=DRZ_1,NAME*VALUE: &
 HEIGHT=43.6,  PERMBRX=0.0, PERM_X=0, PERM_Y=0, PERM_Z=0, POR_INTR=0

PROPERTY,MAT=S_HALITE,NAME*VALUE: &
 HEIGHT=8.98
!
! JSS 7.96 = height of CONC_PCS in BF grid {2(0.69)+3(1.3208)+2.6176}
!
PROPERTY,MAT=CONC_PCS,NAME*VALUE: &
 HEIGHT=7.96
!
! JSS 9.06 = height of DRZ_PCS in BF grid {2(4.53)}
!
PROPERTY,MAT=DRZ_CONC,NAME*VALUE: &
 HEIGHT=9.06,  PERMBRX=0.0, PERM_X=0, PERM_Y=0, PERM_Z=0, POR_INTR=0
!
```

```
! JSS 7.96 = height of CONC_PCS in BF grid {2(0.69)+3(1.3208)+2.6176}
!
PROPERTY,MAT=PAN_SL2,NAME*VALUE: &
 HEIGHT=7.96

PROPERTY,MAT=WELLBORE,NAME*VALUE: &
 INTR_TME=0.0,&
 BITSIZE=0.0,&
 SKIN=0.0,&
 WELLPI=0.0,&
 DRAINRAD=0.0,&
 PRM_OPEN=0.0,&
 PRM_SAND=0.0,&
 PRM_CREP=0.0,&
 AREA_TOT=0.0,&
 VOLU_TOT=0.0,&
 CAST_RE=17e6,&
 CAST_WB=17e6,&
 PRM_CAST=1E-12,&
 WELL_PAN=14e6
PROPERTY,MAT=REFCON,NAME*VALUE: &
 DIP_DEG=1.0
*END
```

B.2.3 LHS INPUT FILE: Callout of sampled parameters

NOT USED

B.2.4 IC INPUT FILE: Sets initial conditions

```
$ type ic_dbr_cra1_dir_rel_S1.inp
=======================================================================

TITLE:   INITIAL CONDITIONS FOR BRAGFLO 1995 SIDEBAR CALCS
ANALYST: D.M. STOELZEL
DATE:    NOV 2,1995

MODIFIED 11/30/95
      MADE STARTING TIME AT 0, RE-INITIALIZED EACH OF THE FOUR PANEL
      REGIONS TO MATCH PORE-VOLUME AVERAGED SAT, PRES FROM BASELINE RUN

       MAY 29, 1996
       RENAMED FILE ICSET_DIRECT_RELEASE_S1_WELL?.INP FOR ALL UNDISTURBED
       (FIRST INTRUSION) SCENARIOS

       MAY 29, 2002, T. Hadgu
      REDUCED THE NUMBER OF REGIONS FROM 4 TO 3. REORGANIZED GRID BLOCKS TO
      FIT TO THE THREE REGIONS.
=======================================================================

SET_NAMES
INITIAL_NAMES TYPE=ELEMENT, NUM=4, NAMES=SATBREL, PRESEL, FECONC,&
                                         CH2OCONC

SET_VALUES
Define start time = 0 DAYS
```

```
INITIAL_VALUE, TYPE=TIME, VALUE=0.0

Define initial Fe concentrations
INITIAL_VALUE, TYPE=ELEMENT, NAME=FECONC,   IRANGE=1,40, JRANGE=1,40,&
               KRANGE=1,2,   VALUE=0.0

Define initial CH2O concentrations
INITIAL_VALUE, TYPE=ELEMENT, NAME=CH2OCONC, IRANGE=1,40, JRANGE=1,40,&
               KRANGE=1,2,   VALUE=0.0

RE-DEFINE REGIONS FOR THE THREE PANELS (I.E. REGIONS)
PANEL 1
INITIAL_VALUE, TYPE=ELEMENT, NAME=SATBREL, IRANGE=1,40, JRANGE=21,40,&
               KRANGE=1,2,   VALUE=WAS_AREA:BSATPAN1

INITIAL_VALUE, TYPE=ELEMENT, NAME=PRESEL, IRANGE=1,40, JRANGE=21,40,&
               KRANGE=1,2,   VALUE=WAS_AREA:PRESPAN1
PANEL 2
INITIAL_VALUE, TYPE=ELEMENT, NAME=SATBREL, IRANGE=16,40, JRANGE=1,11,&
               KRANGE=1,2,   VALUE=WAS_AREA:BSATPAN2

INITIAL_VALUE, TYPE=ELEMENT, NAME=PRESEL, IRANGE=16,40, JRANGE=1,11,&
               KRANGE=1,2,   VALUE=WAS_AREA:PRESPAN2

INITIAL_VALUE, TYPE=ELEMENT, NAME=SATBREL, IRANGE=1,40, JRANGE=11,21,&
               KRANGE=1,2,   VALUE=WAS_AREA:BSATPAN2

INITIAL_VALUE, TYPE=ELEMENT, NAME=PRESEL, IRANGE=1,40, JRANGE=11,21,&
               KRANGE=1,2,   VALUE=WAS_AREA:PRESPAN2
PANEL 3
INITIAL_VALUE, TYPE=ELEMENT, NAME=SATBREL, IRANGE=1,16, JRANGE= 1,11,&
               KRANGE=1,2,   VALUE=WAS_AREA:BSATPAN3

INITIAL_VALUE, TYPE=ELEMENT, NAME=PRESEL, IRANGE=1,16, JRANGE= 1,11,&
               KRANGE=1,2,   VALUE=WAS_AREA:PRESPAN3

END
$
```

B.2.5 ALGEBRA INPUT FILES: Parameter definition and manipulation.

There are two ALGEBRA input files used in the DBR analyses, a PRECUSP input file and a DBR input file. The DBR input file varies with each of 5 scenarios.

ALBEGRA PRECUSP FILE:

```
$ type alg_dbr_cra1_precusp_dir_rel.inp
!   T. Hadgu: May 29/2002 Modified to account for new BRAGFLO TBM grid.
!   The repository is now subdivided into 3 regions instead of 4.

delete all
TIMEHIS  = TIME
DELETE TIMEHIS
limit block 1
tmin 4e11
INTR_TME = MAKEPROP(TIMEHIS[T:1])
```

```
area_tot = makeprop(area_t[t:1])
volu_tot = makeprop(vol_t[t:1])
bitsize  = makeprop(drildiam[t:1])
!
poro_1   = makeprop(poros1[t:1])
height1  = makeprop(hfinal_1[t:1])
brnpres1 = makeprop(presbri1[t:1])
gaspres1 = makeprop(presgas1[t:1])
brn_sat1 = makeprop(satbrin1[t:1])
gas_sat1 = makeprop(satgas1[t:1])
!
poro_2   = makeprop(poros2[t:1])
height2  = makeprop(hfinal_2[t:1])
brnpres2 = makeprop(presbri2[t:1])
gaspres2 = makeprop(presgas2[t:1])
brn_sat2 = makeprop(satbrin2[t:1])
gas_sat2 = makeprop(satgas2[t:1])
!
poro_3   = makeprop(poros0[t:1])
height3  = makeprop(hfinal_0[t:1])
brnpres3 = makeprop(presbri0[t:1])
gaspres3 = makeprop(presgas0[t:1])
brn_sat3 = makeprop(satbrin0[t:1])
gas_sat3 = makeprop(satgas0[t:1])
!
cast_wb  = makeprop(presbri3[t:1])
cast_re  = makeprop(presbri4[t:1])
well_pan = makeprop(presbri6[t:1])
!
porosity = (poro_1+poro_2+poro_3)/3
height   = (height1+height2+height3)/3
!
por_drz  = makeprop(poros7[t:1])
hght_drz = makeprop(hfinal_7[t:1])
bpresdrz = makeprop(presbri7[t:1])
gpresdrz = makeprop(presgas7[t:1])
bsatdrz  = makeprop(satbrin7[t:1])
gsatdrz  = makeprop(satgas7[t:1])
permdrz  = makeprop(permbrx7[t:1])
exit
$
```

ALGEBRA DBR FILES

Scenario: S1

```
$ type alg_dbr_cra1_pre_dir_rel_s1.inp
!=====================================================================
!
!TITLE:BRAGFLO 1996 CCA CALCULATIONS: REPOSITORY SCALE BLOWOUT
!ANAYLST: Dan Stoelzel, SNL
!CREATED: NOV 2, 1995
!PURPOSE: ALGEBRA file computes properties that can not be obtained
!         from CAMDAT and/or assigns properties to element blocks.
!         THIS FILE PREPARES A .CDB FILE FOR PREBRAG TO READ
!IMPORTANT: This file originates from J.E. Bean's algebra file for his FEP
!           model. The methodologies to calculate dip were copied from his
```

```
!            file, with minor changes
!            made to account for the differences in the meshes.
!            ALGEBRA TO CALC. DIP IN REPOSITORY - SCALE BLOWOUT MODEL.
!            new version of bragflo
!
!        MODIFIED:
!                MARCH 26, 1996
!                BLOWOUT MODEL STRUGGLING IN PANEL SEAL REGION: TURNED OFF
!                CAP PRESSURE IN PANEL SEAL AND HALITE BY SETTING EQUAL TO
!                CAP PRESSURE IN WASTE REGION
!
!                MAY 17, 1996
!                ADDED BOUNDARY CONDITION WELL CALCULATION FOR E1-E2 SCEN.
!                NEW CHANGES FOR LATEST CCA ANALYSIS
!
!                June 29/1999   T. Hadgu
!                Corrected productivity index of intrusion borehole by
!                multiplying WELLPI by 2*PI.
!
!                July 22/1999   T. Hadgu
!                Changed the curve fit equations for Flowing Bottomhole
Pressure.
!                The new curve fits reflect the addition of 2*PI to WELLPI,
!                and were based on actual data from the 96 CCA 10,000 year
runs.
!
!                May 15/2002  T. Hadgu
!                Used equivalent permeabilities and porosities for panel
closure
!                (materials CONC_PCS AND PAN_S2) and DRZ next to panel closure
!                (material DRZ_PCS), to deal with Option D panel closure
!                implementation in the TBM vertical BRAGFLO grid.
!
!                May 28/2002 T. Hadgu
!                Subdivided the repository into 3 regions instead of 4
!                to account for new BRAGFLO TBM grid and Option D.
!
!                June 10/2002 T. Hadgu
!                Removed waste area properties that have been assigned to
other
!                materials. Proper material properties are now transferred
from
!                the 10,000-year BRAGFLO runs.
!
!                July 31,2003 J. Stein
!                Fixed AREA_TOT to represent the maximum spall volume of
!                4.0 m^3.  Changed the way initial porosity is calculated
!                for the panel closure materials.
!========================================================================
!************************************************************************
!CHAPTER 0:  DEFINE NEW VARIABLE NAMES AND SOME NEEDED CONSTANTS
!************************************************************************
!========================================================================
!
!
!  SET CONSTANTS AND PUT IN WASTE REGION (WAS_AREA)
LIMIT BLOCK 1
```

```
THETA1   = MAKEPROP(DIP_DEG[ID:10]*2.0*PI[ID:10]/360.0)
THETA2   = MAKEPROP(0.0)
!
!
PERM_X   = 10**PRMX_LOG
PERM_Y   = 10**PRMY_LOG
PERM_Z   = 10**PRMZ_LOG
SB_MIN   = SAT_RBRN * 1.05
POR_COMP = COMP_RCK/POROSITY
!
! CALCULATE PROPERTIES FOR DRZ (DRZ_1)
LIMIT BLOCK 2
PERM_X   = PERMBRX
PERM_Y   = PERMBRX
PERM_Z   = PERMBRX
SB_MIN   = SAT_RBRN * 1.05
! NOW ADJUST POROSITY AND PORE COMPRESSIBILITY TO EQ. PORE VOL WITH CRUSHED
! ROOM HEIGHT
POROSITY = HEIGHT * POR_INTR / HEIGHT[ID:1]
POR_COMP = COMP_RCK/POROSITY
!
! CALCULATE PROPERTIES FOR SALADO HALITE (!S_HALITE)
LIMIT BLOCK 3
PERM_X   = 10**PRMX_LOG
PERM_Y   = 10**PRMY_LOG
PERM_Z   = 10**PRMZ_LOG
SB_MIN   = SAT_RBRN * 1.05
! NOW ADJUST POROSITY AND PORE COMPRESSIBILITY TO EQ. PORE VOL WITH CRUSHED
! ROOM HEIGHT
POROSITY = HEIGHT * POROSITY / HEIGHT[ID:1]
POR_COMP = COMP_RCK/POROSITY
!
! CALC PROPERTIES FOR PANEL SEALS (CONC_PCS)
LIMIT BLOCK 4
!PERM_X   = 10**PRMX_LOG
!PERM_Y   = 10**PRMY_LOG
!
D1 = 32.1
D2 = 7.9
DE = 40.
PERM1_X = 10**PRMX_LOG[ID:1]
PERM2_X = 10**PRMX_LOG
PERM_X  = DE*PERM1_X*PERM2_X/(D1*PERM2_X + D2*PERM1_X)
PERM_Y  = D1*PERM1_X/DE + D2*PERM2_X/DE
!
PERM_Z   = 10**PRMZ_LOG
!
! JSS Define porosity of panel closures as length weighted mean porosity
!     of CONC_PCS and WAS_AREA. First define PORO_CONC for DRZ_CONC material.
PORO_CONC = POROSITY
POROSITY = (PORO_CONC*D2+POROSITY[ID:1]*D1)/DE
!
SB_MIN   = SAT_RBRN * 1.05
POR_COMP = COMP_RCK/POROSITY
!
PORE_DIS = PORE_DIS[ID:1]
SAT_RGAS = SAT_RGAS[ID:1]
```

```
SAT_RBRN = SAT_RBRN[ID:1]
CAP_MOD  = CAP_MOD[ID:1]
RELP_MOD = RELP_MOD[ID:1]
PC_MAX   = PC_MAX[ID:1]
PO_MIN   = PO_MIN[ID:1]
SB_MIN   = SAT_RBRN[ID:1]* 1.05
PCT_A    = PCT_A[ID:1]
PCT_EXP  = PCT_EXP[ID:1]
KPT      = KPT[ID:1]
!
! CALC PROPERTIES FOR DRZ/EXTENDED CONCRETE (DRZ_CONC):
!
LIMIT BLOCK 5
!
D1 = 32.1
D2 = 7.9
DE = 40.
PERM1_X = PERMBRX[ID:2]
PERM2_X = 10**PRMX_LOG[ID:4]
PERM_X  = DE*PERM1_X*PERM2_X/(D1*PERM2_X + D2*PERM1_X)
PERM_Y  = D1*PERM1_X/DE + D2*PERM2_X/DE
!
PERM_Z   = PERM_Z[ID:2]
!
!JSS Define porosity as length weighted mean porosity of DRZ and CONC_PCS
!
POROSITY = (POR_INTR[ID:2]*D2+PORO_CONC[ID:4]*D1)/DE
!
PORE_DIS = PORE_DIS[ID:2]
SAT_RGAS = SAT_RGAS[ID:2]
SAT_RBRN = SAT_RBRN[ID:2]
CAP_MOD  = CAP_MOD[ID:2]
RELP_MOD = RELP_MOD[ID:2]
PC_MAX   = PC_MAX[ID:2]
PO_MIN   = PO_MIN[ID:2]
SB_MIN   = SAT_RBRN[ID:2]* 1.05
KPT      = KPT[ID:2]
POR_INTR = POR_INTR[ID:2]
!
POR_COMP = COMP_RCK[ID:2]/POROSITY
!
! CALC PROPERTIES FOR CENTER PANEL SEALS (PAN_SL2)
!
LIMIT BLOCK 6
!
PERM_X   = PERM_Y[ID:4]
PERM_Y   = PERM_X[ID:4]
PERM_Z   = PERM_Z[ID:4]
!
POROSITY = POROSITY[ID:4]
!
PORE_DIS = PORE_DIS[ID:4]
SAT_RGAS = SAT_RGAS[ID:4]
SAT_RBRN = SAT_RBRN[ID:4]
CAP_MOD =  CAP_MOD[ID:4]
RELP_MOD = RELP_MOD[ID:4]
PC_MAX   = PC_MAX[ID:4]
```

```
PO_MIN   = PO_MIN[ID:4]
PCT_A    = PCT_A[ID:4]
PCT_EXP  = PCT_EXP[ID:4]
KPT      = KPT[ID:4]
HEIGHT   = HEIGHT[ID:4]
!
SB_MIN   = SB_MIN[ID:4]
POR_COMP = POR_COMP[ID:4]
!
!========================================================================
! SET WELLBORE PROPS
LIMIT BLOCK 9
SEBRINE1 = MAKEPROP(0.0)
SEGAS1   = MAKEPROP(0.0)
KRW1     = MAKEPROP(0.0)
KRG1     = MAKEPROP(0.0)
SEBRINE2 = MAKEPROP(0.0)
SEGAS2   = MAKEPROP(0.0)
KRW2     = MAKEPROP(0.0)
KRG2     = MAKEPROP(0.0)
SEBRINE3 = MAKEPROP(0.0)
SEGAS3   = MAKEPROP(0.0)
KRW3     = MAKEPROP(0.0)
KRG3     = MAKEPROP(0.0)
!
! DEFINE CONSTANTS FOR THE THREE EQUATIONS TO BE USED TO CALCULATE FBHP
! EQUATION 1: (FOR BRINE FLOW ONLY, KRG = 0)
! FBHP = A + BX + CY + DX^2 + EY^2 + FXY + GX^3 + HY^3 + IXY^2 + JYX^2
!    X = LOG10(BRINE CONST) LOG M^3/pA-S
!    Y = PANEL PRESSURE (Pa)
!  8.00739E6 Pa < FBHP < 8.04391E6 Pa
EQ1_A  = MAKEPROP(3.2279346E+11)
EQ1_B  = MAKEPROP(9.4816648E+10)
EQ1_C  = MAKEPROP(-6200.2715)
EQ1_D  = MAKEPROP(9.2450601E+09)
EQ1_E  = MAKEPROP(4.1464475E-06)
EQ1_F  = MAKEPROP(-1288.6068)
EQ1_G  = MAKEPROP(2.9905582E+08)
EQ1_H  = MAKEPROP(1.0857041E-14)
EQ1_I  = MAKEPROP(4.7119798E-07)
EQ1_J  = MAKEPROP(-66.90712)
!
! EQUATION 2: (FOR LOG10(KRG/KRW) < 0  BRINE DOMINATED FLOW)
! FBHP = (A + BX + CX^2 + DY)/(1 + EX + FX^2 + GX^3 + HY)
!    X = LOG10(KRG/KRB)
!    Y = PANEL PRESSURE (Pa)
!   7.42886E5 Pa < FBHP < 8.04353E6 Pa
EQ2_A  = MAKEPROP(1606507.7)
EQ2_B  = MAKEPROP(2624339.7)
EQ2_C  = MAKEPROP(2476889.9)
EQ2_D  = MAKEPROP(-0.053635476)
EQ2_E  = MAKEPROP(0.70815693)
EQ2_F  = MAKEPROP(0.38012696)
EQ2_G  = MAKEPROP(0.0041916956)
EQ2_H  = MAKEPROP(-2.4887085E-08)
!
! EQUATION 3: (FOR LOG10(KRG/KRW) > 0  GAS DOMINATED FLOW)
```

```
! FBHP = A + B/X + CY + D/X^2 + EY^2 + FY/X + G/X^3 + HY^3 + IY^2/X + JY/X^2
!    X = LOG10(GAS CONST) LOG M^3/pA-S
!    Y = PANEL PRESSURE (Pa)
! 2.07363E5 Pa < FBHP < 1.66394E6 Pa
EQ3_A  = MAKEPROP(-1.0098405E+09)
EQ3_B  = MAKEPROP(-2.3044622E+10)
EQ3_C  = MAKEPROP(9.8039146)
EQ3_D  = MAKEPROP(-1.7426466E+11)
EQ3_E  = MAKEPROP(1.8309137E-07)
EQ3_F  = MAKEPROP(174.97064)
EQ3_G  = MAKEPROP(-4.3698224E+11)
EQ3_H  = MAKEPROP(-1.4891198E-16)
EQ3_I  = MAKEPROP(1.3006196E-06)
EQ3_J  = MAKEPROP(757.44833)
!
! CALCULATE SKIN FROM SPALL REMOVED, & WELL PRODUCTIVITY INDEX
! ELEMENT 26 IS LOCATION OF WELL1 (1ST INTRUSION DOWN DIP)
!
! JSS: Setting AREA_TOT to a constant.  AREA_TOT=MAX[SPALL VOL]/Initial
Height
! JSS: AREA_TOT=4.0/3.96 = 1.01
!
AREA_TOT = 1.01
WELLRAD  = BITSIZE/2
!
DRNRAD_L = SQRT(DEL_X[E:26]*DEL_Y[E:26]/PI[ID:10])
!DRNRAD_M = SQRT(DEL_X[E:240]*DEL_Y[E:240]/PI[ID:10])
!DRNRAD_U = SQRT(DEL_X[E:708]*DEL_Y[E:708]/PI[ID:10])
!
SKIN     = -1.0*LOG(SQRT(AREA_TOT/PI[ID:10])/WELLRAD)
SKIN     = IFLT0(SKIN,SKIN,0)
! CHECK TO BE SURE WELLPI IS NOT 0 OR NEG, & SET TO 1.0 IF IT IS
! WELLPI   = PERM_X[ID:1] * HEIGHT[ID:1] / (LOG(DRAINRAD/WELLRAD) + SKIN -
0.5)
!JSS
WELLPI_L   = IFGT0(LOG(DRNRAD_L/WELLRAD) + SKIN - 0.5,PERM_X[ID:1]* &
          HEIGHT[ID:1] &
          / (LOG(DRNRAD_L/WELLRAD) + SKIN - 0.5),1.0)
!WELLPI_M   = IFGT0(LOG(DRNRAD_M/WELLRAD) + SKIN - 0.5,PERM_X[ID:1]* &
!           HEIGHT[ID:1] &
!           / (LOG(DRNRAD_M/WELLRAD) + SKIN - 0.5),1.0)
!WELLPI_U   = IFGT0(LOG(DRNRAD_U/WELLRAD) + SKIN - 0.5,PERM_X[ID:1]* &
!           HEIGHT[ID:1] &
!           / (LOG(DRNRAD_U/WELLRAD) + SKIN - 0.5),1.0)
!JSS
! WELLPI has been modified by T. Hadgu on 06/29/99 as follows:
!JSS
WELLPI_L   = WELLPI_L*2.*PI[ID:10]
!WELLPI_M   = WELLPI_M*2.*PI[ID:10]
!WELLPI_U   = WELLPI_U*2.*PI[ID:10]
!JSS
! CALCULATE CONSTANTS NEEDED FOR WELLBORE MODEL:
! CALCULATE EFFECTIVE SATURATION USING KRP = 4 (BROOKS - COREY MODIFIED,
! WITH LAMBDA (PORE_DIS) = 2.89, NO CAP PRESSURE). DO FOR 3 COUPLED REGIONS
! REGION NO 1 (PANELS 1,2,7,8 & 9)
BRINE1   = IFLT0((BSATPAN1[ID:1]-
SAT_RBRN[ID:1]),SAT_RBRN[ID:1],BSATPAN1[ID:1])
```

```
SEBRINE1 = (BRINE1 - SAT_RBRN[ID:1])/(1.0 - SAT_RBRN[ID:1])
SEGAS1   = (BRINE1 - SAT_RBRN[ID:1])/(1.0-SAT_RBRN[ID:1]-SAT_RGAS[ID:1])
SEGAS1   = IFLT0((1.0 - SEGAS1),1.0,SEGAS1)
KRW1     = SEBRINE1**((2+3*PORE_DIS[ID:1])/PORE_DIS[ID:1])
KRG1     = (1.0-SEGAS1)**2*(1.0-SEGAS1**((2 +
PORE_DIS[ID:1])/PORE_DIS[ID:1]))
! NOW CALCULATE CONSTANT FOR BRINE AND GAS
!JSS
CONBR1_L   = WELLPI_L * KRW1 / VISCO[ID:7]
!CONBR1_M   = WELLPI_M * KRW1 / VISCO[ID:7]
!CONBR1_U   = WELLPI_U * KRW1 / VISCO[ID:7]
congs1_L  = WELLPI_L * KRG1 / VISCO[ID:8]
!congs1_M  = WELLPI_M * KRG1 / VISCO[ID:8]
!congs1_U  = WELLPI_U * KRG1 / VISCO[ID:8]
!JSS
! NOW TAKE LOG BASE 10 OF PARAMETERS NEEDED FOR FBHP EQUATIONS
!JSS
LOG_B1_L   = IFEQ0(KRW1,-10,LOG10(CONBR1_L+1E-24))
!LOG_B1_M   = IFEQ0(KRW1,-10,LOG10(CONBR1_M+1E-24))
!LOG_B1_U   = IFEQ0(KRW1,-10,LOG10(CONBR1_U+1E-24))
!JSS
LOG_KR1  = IFEQ0(KRW1,10,LOG10((KRG1+1E-24)/(KRW1+1E-24)))
! INTRODUCE A TERM FOR GAS DOMINATED FLOW
!JSS
LOG_G1_L   = IFEQ0(KRG1,-10,LOG10(congs1_L+1E-24))
!LOG_G1_M   = IFEQ0(KRG1,-10,LOG10(congs1_M+1E-24))
!LOG_G1_U   = IFEQ0(KRG1,-10,LOG10(congs1_U+1E-24))
!
! CALCULATE FBHP's AND SET WITHIN LIMITS
!
PR1_E1_L  = EQ1_A+EQ1_B*LOG_B1_L+EQ1_C*PRESPAN1[ID:1]+EQ1_D*LOG_B1_L**2+ &
          EQ1_E*PRESPAN1[ID:1]**2+EQ1_F*LOG_B1_L*PRESPAN1[ID:1]+ &
          EQ1_G*LOG_B1_L**3+EQ1_H*PRESPAN1[ID:1]**3+&
          EQ1_I*LOG_B1_L*PRESPAN1[ID:1]**2+EQ1_J*LOG_B1_L**2*PRESPAN1[ID:1]
PR1_E1_L  = IFLT0(8007390.0 - PR1_E1_L,IFLT0(8043910.0 - PR1_E1_L,8043910.0,
&
          PR1_E1_L),8007390.0)
!PR1_E1_M  = EQ1_A+EQ1_B*LOG_B1_M+EQ1_C*PRESPAN1[ID:1]+EQ1_D*LOG_B1_M**2+ &
!           EQ1_E*PRESPAN1[ID:1]**2+EQ1_F*LOG_B1_M*PRESPAN1[ID:1]+ &
!           EQ1_G*LOG_B1_M**3+EQ1_H*PRESPAN1[ID:1]**3+&
!           EQ1_I*LOG_B1_M*PRESPAN1[ID:1]**2+EQ1_J*LOG_B1_M**2*PRESPAN1[ID:1]
!PR1_E1_M  = IFLT0(8007390.0 - PR1_E1_M,IFLT0(8043910.0 - PR1_E1_M,8043910.0,
&
!                                            PR1_E1_M),8007390.0)
!PR1_E1_U  = EQ1_A+EQ1_B*LOG_B1_U+EQ1_C*PRESPAN1[ID:1]+EQ1_D*LOG_B1_U**2+ &
!           EQ1_E*PRESPAN1[ID:1]**2+EQ1_F*LOG_B1_U*PRESPAN1[ID:1]+ &
!           EQ1_G*LOG_B1_U**3+EQ1_H*PRESPAN1[ID:1]**3+&
!           EQ1_I*LOG_B1_U*PRESPAN1[ID:1]**2+EQ1_J*LOG_B1_U**2*PRESPAN1[ID:1]
!PR1_E1_U  = IFLT0(8007390.0 - PR1_E1_U,IFLT0(8043910.0 - PR1_E1_U,8043910.0,
&
!                                            PR1_E1_U),8007390.0)
!!JSS
!
PR1_E2  = (EQ2_A+EQ2_B*LOG_KR1+EQ2_C*LOG_KR1**2+EQ2_D*PRESPAN1[ID:1])/ &
          (1.0+EQ2_E*LOG_KR1+EQ2_F*LOG_KR1**2+EQ2_G*LOG_KR1**3+ &
          EQ2_H*PRESPAN1[ID:1])
PR1_E2  = IFLT0(742886.0 - PR1_E2,IFLT0(8043530.0 - PR1_E2,8043530.0, &
```

```
          PR1_E2),742886.0)
!JSS
PR1_E3_L  = EQ3_A+EQ3_B/LOG_G1_L+EQ3_C*PRESPAN1[ID:1]+EQ3_D/LOG_G1_L**2+ &
          EQ3_E*PRESPAN1[ID:1]**2+EQ3_F*PRESPAN1[ID:1]/LOG_G1_L+ &
          EQ3_G/LOG_G1_L**3+ EQ3_H*PRESPAN1[ID:1]**3+ &
          EQ3_I*PRESPAN1[ID:1]**2/LOG_G1_L+ &
          EQ3_J*PRESPAN1[ID:1]/LOG_G1_L**2
!PR1_E3_M  = EQ3_A+EQ3_B/LOG_G1_M+EQ3_C*PRESPAN1[ID:1]+EQ3_D/LOG_G1_M**2+ &
!           EQ3_E*PRESPAN1[ID:1]**2+EQ3_F*PRESPAN1[ID:1]/LOG_G1_M+ &
!           EQ3_G/LOG_G1_M**3+ EQ3_H*PRESPAN1[ID:1]**3+ &
!           EQ3_I*PRESPAN1[ID:1]**2/LOG_G1_M+ &
!           EQ3_J*PRESPAN1[ID:1]/LOG_G1_M**2
!PR1_E3_U  = EQ3_A+EQ3_B/LOG_G1_U+EQ3_C*PRESPAN1[ID:1]+EQ3_D/LOG_G1_U**2+ &
!           EQ3_E*PRESPAN1[ID:1]**2+EQ3_F*PRESPAN1[ID:1]/LOG_G1_U+ &
!           EQ3_G/LOG_G1_U**3+ EQ3_H*PRESPAN1[ID:1]**3+ &
!           EQ3_I*PRESPAN1[ID:1]**2/LOG_G1_U+ &
!           EQ3_J*PRESPAN1[ID:1]/LOG_G1_U**2
!
PR1_E3_L  = IFLT0(207363.0 - PR1_E3_L,IFLT0(1663940.0 - PR1_E3_L,1663940.0, &
          PR1_E3_L),207363.0)
!PR1_E3_M  = IFLT0(207363.0 - PR1_E3_M,IFLT0(1663940.0 - PR1_E3_M,1663940.0,
&
!           PR1_E3_M),207363.0)
!PR1_E3_U  = IFLT0(207363.0 - PR1_E3_U,IFLT0(1663940.0 - PR1_E3_U,1663940.0,
&
!           PR1_E3_U),207363.0)
!JSS
!
! RESET FBHP TO 0 IF NO BRINE BLOWOUT (KRW = 0 OR PRESSURE < 8 MPa)
!JSS
FBHP1_L    = IFEQ0(KRW1,0,IFLT0(PRESPAN1[ID:1]-8.0E6,0, &
          IFEQ0(KRG1,PR1_E1_L,IFLT0(LOG_KR1,PR1_E2,PR1_E3_L))))
!FBHP1_M    = IFEQ0(KRW1,0,IFLT0(PRESPAN1[ID:1]-8.0E6,0, &
!           IFEQ0(KRG1,PR1_E1_M,IFLT0(LOG_KR1,PR1_E2,PR1_E3_M))))
!FBHP1_U    = IFEQ0(KRW1,0,IFLT0(PRESPAN1[ID:1]-8.0E6,0, &
!           IFEQ0(KRG1,PR1_E1_U,IFLT0(LOG_KR1,PR1_E2,PR1_E3_U))))
!JSS
!
! IF NO BLOWOUT, SET NUMBER OF BRAGFLO STEPS TO 1, ELSE 1000
!JSS
nstep1_L = MAKEPROP(IFEQ0(FBHP1_L,1,1000))
!nstep1_M = MAKEPROP(IFEQ0(FBHP1_M,1,1000))
!nstep1_U = MAKEPROP(IFEQ0(FBHP1_U,1,1000))
!JSS
! REGION NO 2 (PANELS 3,4,6 &10)
BRINE2    = IFLT0((BSATPAN2[ID:1]-
SAT_RBRN[ID:1]),SAT_RBRN[ID:1],BSATPAN2[ID:1])
SEBRINE2 = (BRINE2 - SAT_RBRN[ID:1])/(1.0 - SAT_RBRN[ID:1])
SEGAS2    = (BRINE2 - SAT_RBRN[ID:1])/(1.0-SAT_RBRN[ID:1]-SAT_RGAS[ID:1])
SEGAS2    = IFLT0((1.0 - SEGAS2),1.0,SEGAS2)
KRW2      = SEBRINE2**((2+3*PORE_DIS[ID:1])/PORE_DIS[ID:1])
KRG2      = (1.0-SEGAS2)**2*(1.0-SEGAS2**((2 +
PORE_DIS[ID:1])/PORE_DIS[ID:1]))
! NOW CALCULATE CONSTANT FOR BRINE AND GAS
!JSS
CONBR2_L   = WELLPI_L * KRW2 / VISCO[ID:7]
!CONBR2_M   = WELLPI_M * KRW2 / VISCO[ID:7]
```

```
!CONBR2_U   = WELLPI_U * KRW2 / VISCO[ID:7]
congs2_L  = WELLPI_L * KRG2 / VISCO[ID:8]
!congs2_M  = WELLPI_M * KRG2 / VISCO[ID:8]
!congs2_U  = WELLPI_U * KRG2 / VISCO[ID:8]
!
! NOW TAKE LOG BASE 10 OF PARAMETERS NEEDED FOR FBHP EQUATIONS
!JSS
LOG_B2_L   = IFEQ0(KRW2,-10,LOG10(CONBR2_L+1E-24))
!LOG_B2_M   = IFEQ0(KRW2,-10,LOG10(CONBR2_M+1E-24))
!LOG_B2_U   = IFEQ0(KRW2,-10,LOG10(CONBR2_U+1E-24))
!
LOG_KR2  = IFEQ0(KRW2,10,LOG10((KRG2+1E-24)/(KRW2+1E-24)))
! INTRODUCE A TERM FOR GAS DOMINATED FLOW
!JSS
LOG_G2_L   = IFEQ0(KRG2,-10,LOG10(congs2_L+1E-24))
!LOG_G2_M   = IFEQ0(KRG2,-10,LOG10(congs2_M+1E-24))
!LOG_G2_U   = IFEQ0(KRG2,-10,LOG10(congs2_U+1E-24))
!
! CALCULATE FBHP's AND SET WITHIN LIMITS
!
PR2_E1_L  = EQ1_A+EQ1_B*LOG_B2_L+EQ1_C*PRESPAN2[ID:1]+EQ1_D*LOG_B2_L**2+ &
          EQ1_E*PRESPAN2[ID:1]**2+EQ1_F*LOG_B2_L*PRESPAN2[ID:1]+ &
          EQ1_G*LOG_B2_L**3+EQ1_H*PRESPAN2[ID:1]**3+&
          EQ1_I*LOG_B2_L*PRESPAN2[ID:1]**2+EQ1_J*LOG_B2_L**2*PRESPAN2[ID:1]
PR2_E1_L  = IFLT0(8007390.0 - PR2_E1_L,IFLT0(8043910.0 - PR2_E1_L,8043910.0,&
          PR2_E1_L),8007390.0)
!PR2_E1_M  = EQ1_A+EQ1_B*LOG_B2_M+EQ1_C*PRESPAN2[ID:1]+EQ1_D*LOG_B2_M**2+ &
!           EQ1_E*PRESPAN2[ID:1]**2+EQ1_F*LOG_B2_M*PRESPAN2[ID:1]+ &
!           EQ1_G*LOG_B2_M**3+EQ1_H*PRESPAN2[ID:1]**3+&
!           EQ1_I*LOG_B2_M*PRESPAN2[ID:1]**2+EQ1_J*LOG_B2_M**2*PRESPAN2[ID:1]
!PR2_E1_M  = IFLT0(8007390.0 - PR2_E1_M,IFLT0(8043910.0 -
PR2_E1_M,8043910.0,&
!           PR2_E1_M),8007390.0)
!PR2_E1_U  = EQ1_A+EQ1_B*LOG_B2_U+EQ1_C*PRESPAN2[ID:1]+EQ1_D*LOG_B2_U**2+ &
!           EQ1_E*PRESPAN2[ID:1]**2+EQ1_F*LOG_B2_U*PRESPAN2[ID:1]+ &
!           EQ1_G*LOG_B2_U**3+EQ1_H*PRESPAN2[ID:1]**3+&
!           EQ1_I*LOG_B2_U*PRESPAN2[ID:1]**2+EQ1_J*LOG_B2_U**2*PRESPAN2[ID:1]
!PR2_E1_U  = IFLT0(8007390.0 - PR2_E1_U,IFLT0(8043910.0 -
PR2_E1_U,8043910.0,&
!           PR2_E1_U),8007390.0)
!
PR2_E2  = (EQ2_A+EQ2_B*LOG_KR2+EQ2_C*LOG_KR2**2+EQ2_D*PRESPAN2[ID:1])/ &
          (1.0+EQ2_E*LOG_KR2+EQ2_F*LOG_KR2**2+EQ2_G*LOG_KR2**3+ &
          EQ2_H*PRESPAN2[ID:1])
PR2_E2  = IFLT0(742886.0 - PR2_E2,IFLT0(8043530.0 - PR2_E2,8043530.0, &
          PR2_E2),742886.0)
!
PR2_E3_L  = EQ3_A+EQ3_B/LOG_G2_L+EQ3_C*PRESPAN2[ID:1]+EQ3_D/LOG_G2_L**2+ &
          EQ3_E*PRESPAN2[ID:1]**2+EQ3_F*PRESPAN2[ID:1]/LOG_G2_L+ &
          EQ3_G/LOG_G2_L**3+ EQ3_H*PRESPAN2[ID:1]**3+ &
          EQ3_I*PRESPAN2[ID:1]**2/LOG_G2_L+ &
          EQ3_J*PRESPAN2[ID:1]/LOG_G2_L**2
!PR2_E3_M  = EQ3_A+EQ3_B/LOG_G2_M+EQ3_C*PRESPAN2[ID:1]+EQ3_D/LOG_G2_M**2+ &
!           EQ3_E*PRESPAN2[ID:1]**2+EQ3_F*PRESPAN2[ID:1]/LOG_G2_M+ &
!           EQ3_G/LOG_G2_M**3+ EQ3_H*PRESPAN2[ID:1]**3+ &
!           EQ3_I*PRESPAN2[ID:1]**2/LOG_G2_M+ &
!           EQ3_J*PRESPAN2[ID:1]/LOG_G2_M**2
```

```
!PR2_E3_U  = EQ3_A+EQ3_B/LOG_G2_U+EQ3_C*PRESPAN2[ID:1]+EQ3_D/LOG_G2_U**2+ &
!            EQ3_E*PRESPAN2[ID:1]**2+EQ3_F*PRESPAN2[ID:1]/LOG_G2_U+ &
!            EQ3_G/LOG_G2_U**3+ EQ3_H*PRESPAN2[ID:1]**3+ &
!            EQ3_I*PRESPAN2[ID:1]**2/LOG_G2_U+ &
!            EQ3_J*PRESPAN2[ID:1]/LOG_G2_U**2
!!
PR2_E3_L  = IFLT0(207363.0 - PR2_E3_L,IFLT0(1663940.0 - PR2_E3_L,1663940.0, &
          PR2_E3_L),207363.0)
!PR2_E3_M  = IFLT0(207363.0 - PR2_E3_M,IFLT0(1663940.0 - PR2_E3_M,1663940.0,
&
!            PR2_E3_M),207363.0)
!PR2_E3_U  = IFLT0(207363.0 - PR2_E3_U,IFLT0(1663940.0 - PR2_E3_U,1663940.0,
&
!            PR2_E3_U),207363.0)
!
! RESET FBHP TO 0 IF NO BRINE BLOWOUT (KRW = 0 OR PRESSURE < 8 MPa)
FBHP2_L    = IFEQ0(KRW2,0,IFLT0(PRESPAN2[ID:1]-8.0E6,0, &
          IFEQ0(KRG2,PR2_E1_L,IFLT0(LOG_KR2,PR2_E2,PR2_E3_L))))
!FBHP2_M    = IFEQ0(KRW2,0,IFLT0(PRESPAN2[ID:1]-8.0E6,0, &
!            IFEQ0(KRG2,PR2_E1_M,IFLT0(LOG_KR2,PR2_E2,PR2_E3_M))))
!FBHP2_U    = IFEQ0(KRW2,0,IFLT0(PRESPAN2[ID:1]-8.0E6,0, &
!            IFEQ0(KRG2,PR2_E1_U,IFLT0(LOG_KR2,PR2_E2,PR2_E3_U))))
!
!
! IF NO BLOWOUT, SET NUMBER OF BRAGFLO STEPS TO 1, ELSE 1000
NSTEP2_L = MAKEPROP(IFEQ0(FBHP2_L,1,1000))
!NSTEP2_M = MAKEPROP(IFEQ0(FBHP2_M,1,1000))
!NSTEP2_U = MAKEPROP(IFEQ0(FBHP2_U,1,1000))
!
! REGION NO 3 (PANEL 5)
BRINE3   = IFLT0((BSATPAN3[ID:1]-
SAT_RBRN[ID:1]),SAT_RBRN[ID:1],BSATPAN3[ID:1])
SEBRINE3 = (BRINE3 - SAT_RBRN[ID:1])/(1.0 - SAT_RBRN[ID:1])
SEGAS3   = (BRINE3 - SAT_RBRN[ID:1])/(1.0-SAT_RBRN[ID:1]-SAT_RGAS[ID:1])
SEGAS3   = IFLT0((1.0 - SEGAS3),1.0,SEGAS3)
KRW3     = SEBRINE3**((2+3*PORE_DIS[ID:1])/PORE_DIS[ID:1])
KRG3     = (1.0-SEGAS3)**2*(1.0-SEGAS3**((2 +
PORE_DIS[ID:1])/PORE_DIS[ID:1]))
! NOW CALCULATE CONSTANT FOR BRINE AND GAS
!JSS
CONBR3_L   = WELLPI_L * KRW3 / VISCO[ID:7]
!CONBR3_M   = WELLPI_M * KRW3 / VISCO[ID:7]
!CONBR3_U   = WELLPI_U * KRW3 / VISCO[ID:7]
congs3_L  = WELLPI_L * KRG3 / VISCO[ID:8]
!congs3_M  = WELLPI_M * KRG3 / VISCO[ID:8]
!congs3_U  = WELLPI_U * KRG3 / VISCO[ID:8]
!JSS
! NOW TAKE LOG BASE 10 OF PARAMETERS NEEDED FOR FBHP EQUATIONS
!JSS
LOG_B3_L   = IFEQ0(KRW3,-10,LOG10(CONBR3_L+1E-24))
!LOG_B3_M   = IFEQ0(KRW3,-10,LOG10(CONBR3_M+1E-24))
!LOG_B3_U   = IFEQ0(KRW3,-10,LOG10(CONBR3_U+1E-24))
!
LOG_KR3  = IFEQ0(KRW3,10,LOG10((KRG3+1E-24)/(KRW3+1E-24)))
! INTRODUCE A TERM FOR GAS DOMINATED FLOW
!JSS
LOG_G3_L   = IFEQ0(KRG3,-10,LOG10(congs3_L+1E-24))
```

```
!LOG_G3_M   = IFEQ0(KRG3,-10,LOG10(congs3_M+1E-24))
!LOG_G3_U   = IFEQ0(KRG3,-10,LOG10(congs3_U+1E-24))
!
!
! CALCULATE FBHP's AND SET WITHIN LIMITS
!
!
PR3_E1_L  = EQ1_A+EQ1_B*LOG_B3_L+EQ1_C*PRESPAN3[ID:1]+EQ1_D*LOG_B3_L**2+ &
          EQ1_E*PRESPAN3[ID:1]**2+EQ1_F*LOG_B3_L*PRESPAN3[ID:1]+ &
          EQ1_G*LOG_B3_L**3+EQ1_H*PRESPAN3[ID:1]**3+&
          EQ1_I*LOG_B3_L*PRESPAN3[ID:1]**2+EQ1_J*LOG_B3_L**2*PRESPAN3[ID:1]
PR3_E1_L  = IFLT0(8007390.0 - PR3_E1_L,IFLT0(8043910.0 - PR3_E1_L,8043910.0,&
          PR3_E1_L),8007390.0)
!PR3_E1_M  = EQ1_A+EQ1_B*LOG_B3_M+EQ1_C*PRESPAN3[ID:1]+EQ1_D*LOG_B3_M**2+ &
!           EQ1_E*PRESPAN3[ID:1]**2+EQ1_F*LOG_B3_M*PRESPAN3[ID:1]+ &
!           EQ1_G*LOG_B3_M**3+EQ1_H*PRESPAN3[ID:1]**3+&
!           EQ1_I*LOG_B3_M*PRESPAN3[ID:1]**2+EQ1_J*LOG_B3_M**2*PRESPAN3[ID:1]
!PR3_E1_M  = IFLT0(8007390.0 - PR3_E1_M,IFLT0(8043910.0 -
PR3_E1_M,8043910.0,&
!           PR3_E1_M),8007390.0)
!PR3_E1_U  = EQ1_A+EQ1_B*LOG_B3_U+EQ1_C*PRESPAN3[ID:1]+EQ1_D*LOG_B3_U**2+ &
!           EQ1_E*PRESPAN3[ID:1]**2+EQ1_F*LOG_B3_U*PRESPAN3[ID:1]+ &
!           EQ1_G*LOG_B3_U**3+EQ1_H*PRESPAN3[ID:1]**3+&
!           EQ1_I*LOG_B3_U*PRESPAN3[ID:1]**2+EQ1_J*LOG_B3_U**2*PRESPAN3[ID:1]
!PR3_E1_U  = IFLT0(8007390.0 - PR3_E1_U,IFLT0(8043910.0 -
PR3_E1_U,8043910.0,&
!           PR3_E1_U),8007390.0)
!!
PR3_E2  = (EQ2_A+EQ2_B*LOG_KR3+EQ2_C*LOG_KR3**2+EQ2_D*PRESPAN3[ID:1])/ &
          (1.0+EQ2_E*LOG_KR3+EQ2_F*LOG_KR3**2+EQ2_G*LOG_KR3**3+ &
          EQ2_H*PRESPAN3[ID:1])
PR3_E2  = IFLT0(742886.0 - PR3_E2,IFLT0(8043530.0 - PR3_E2,8043530.0, &
          PR3_E2),742886.0)
!
PR3_E3_L  = EQ3_A+EQ3_B/LOG_G3_L+EQ3_C*PRESPAN3[ID:1]+EQ3_D/LOG_G3_L**2+ &
          EQ3_E*PRESPAN3[ID:1]**2+EQ3_F*PRESPAN3[ID:1]/LOG_G3_L+ &
          EQ3_G/LOG_G3_L**3+ EQ3_H*PRESPAN3[ID:1]**3+ &
          EQ3_I*PRESPAN3[ID:1]**2/LOG_G3_L+ &
          EQ3_J*PRESPAN3[ID:1]/LOG_G3_L**2
!PR3_E3_M  = EQ3_A+EQ3_B/LOG_G3_M+EQ3_C*PRESPAN3[ID:1]+EQ3_D/LOG_G3_M**2+ &
!           EQ3_E*PRESPAN3[ID:1]**2+EQ3_F*PRESPAN3[ID:1]/LOG_G3_M+ &
!           EQ3_G/LOG_G3_M**3+ EQ3_H*PRESPAN3[ID:1]**3+ &
!           EQ3_I*PRESPAN3[ID:1]**2/LOG_G3_M+ &
!           EQ3_J*PRESPAN3[ID:1]/LOG_G3_M**2
!PR3_E3_U  = EQ3_A+EQ3_B/LOG_G3_U+EQ3_C*PRESPAN3[ID:1]+EQ3_D/LOG_G3_U**2+ &
!           EQ3_E*PRESPAN3[ID:1]**2+EQ3_F*PRESPAN3[ID:1]/LOG_G3_U+ &
!           EQ3_G/LOG_G3_U**3+ EQ3_H*PRESPAN3[ID:1]**3+ &
!           EQ3_I*PRESPAN3[ID:1]**2/LOG_G3_U+ &
!           EQ3_J*PRESPAN3[ID:1]/LOG_G3_U**2
!
PR3_E3_L  = IFLT0(207363.0 - PR3_E3_L,IFLT0(1663940.0 - PR3_E3_L,1663940.0, &
          PR3_E3_L),207363.0)
!PR3_E3_M  = IFLT0(207363.0 - PR3_E3_M,IFLT0(1663940.0 - PR3_E3_M,1663940.0,
&
!           PR3_E3_M),207363.0)
!PR3_E3_U  = IFLT0(207363.0 - PR3_E3_U,IFLT0(1663940.0 - PR3_E3_U,1663940.0,
&
```

```
!           PR3_E3_U),207363.0)
!
! RESET FBHP TO 0 IF NO BRINE BLOWOUT (KRW = 0 OR PRESSURE < 8 MPa)
FBHP3_L    = IFEQ0(KRW3,0,IFLT0(PRESPAN3[ID:1]-8.0E6,0, &
          IFEQ0(KRG3,PR3_E1_L,IFLT0(LOG_KR3,PR3_E2,PR3_E3_L))))
!FBHP3_M    = IFEQ0(KRW3,0,IFLT0(PRESPAN3[ID:1]-8.0E6,0, &
!           IFEQ0(KRG3,PR3_E1_M,IFLT0(LOG_KR3,PR3_E2,PR3_E3_L))))
!FBHP3_U    = IFEQ0(KRW3,0,IFLT0(PRESPAN3[ID:1]-8.0E6,0, &
!           IFEQ0(KRG3,PR3_E1_U,IFLT0(LOG_KR3,PR3_E2,PR3_E3_L))))

! IF NO BLOWOUT, SET NUMBER OF BRAGFLO STEPS TO 1, ELSE 1000
nstep3_L = MAKEPROP(IFEQ0(FBHP3_L,1,1000))
!nstep3_M = MAKEPROP(IFEQ0(FBHP3_M,1,1000))
!nstep3_U = MAKEPROP(IFEQ0(FBHP3_U,1,1000))
DELETE BRINE1, BRINE2, BRINE3
!=======================================================================
!**********************************************************************
!CHAPTER 3.  COMPUTE DIP IN REPOSITORY
!**********************************************************************
!**********************************************************************
!=================================================
!=================================================
LIMIT ELEMENT OFF
!COMPUTE THE GRID BLOCK ELEVATIONS ACCOUNTING FOR 1 DEGREE DIP IN SALADO
!DEFINE GRID BLOCK ELEVATIONS DUE TO DIP
! USE ELEVATION OF SHAFT AT MID-REPOSITORY
ZORIGIN   =  382.671
YORIGIN   =  1000.0
ELEVN     = MAKENODE(COS(THETA1[ID:1])*(Z-ZORIGIN) &
           + SIN(THETA1[ID:1])*(Y-YORIGIN))
ELEVE     = NOD2ELE(ELEVN) + ZORIGIN
!COMPUTE GRID BLOCK POTENTIAL ASSUMING BRINE IS INCOMPRESSIBLE
(APPROXIMATELY)
POTE      = PRESEL/(DNSFLUID[ID:7]*GRAVACC[ID:10]) + ELEVE
!
! NOW SET GRID THICKNESS FOR ALL ELEMENTS TO CRUSHED PANEL HEIGHT
THICK    = MAKEATTR(HEIGHT[ID:1])
!
DELETE ELEVN, YORIGIN, ZORIGIN
EXIT
$
```

SCENARIO: S2

```
$ type alg_dbr_cra1_pre_dir_rel_s2.inp
!=======================================================================
!
!TITLE:BRAGFLO 1996 CCA CALCULATIONS: REPOSITORY SCALE BLOWOUT
!ANAYLST: Dan Stoelzel, SNL
!CREATED: NOV 2, 1995
!PURPOSE: ALGEBRA file computes properties that can not be obtained
!         from CAMDAT and/or assigns properties to element blocks.
!         THIS FILE PREPARES A .CDB FILE FOR PREBRAG TO READ
!IMPORTANT: This file originates from J.E. Bean's algebra file for his FEP
!           model. The methodologies to calculate dip were copied from his
!           file, with minor changes
!           made to account for the differences in the meshes.
```

```
!           ALGEBRA TO CALC. DIP IN REPOSITORY - SCALE BLOWOUT MODEL.
!           new version of bragflo
!
!       MODIFIED:
!               MARCH 26, 1996
!               BLOWOUT MODEL STRUGGLING IN PANEL SEAL REGION: TURNED OFF
!               CAP PRESSURE IN PANEL SEAL AND HALITE BY SETTING EQUAL TO
!               CAP PRESSURE IN WASTE REGION
!
!               MAY 17, 1996
!               ADDED BOUNDARY CONDITION WELL CALCULATION FOR E1-E2 SCEN.
!               NEW CHANGES FOR LATEST CCA ANALYSIS
!
!               MAY 20.  1996
!               WELL 2 INPUT FILE TO ACCOUNT FOR E1-E2 SAME PANEL BOUNDARY
!               COND.
!
!               MAY 30,1996
!               ADDED LOGIC TO ACCOUNT FOR CHANGES IN ABANDONED WELLBORE PERM
!               FOR BOUNDARY CONDITION WELL:
!               SCENARIO 2 AND 4 FILE, FIRST INTRUSION AT 350 YEARS
!
!               June 29/1999   T. Hadgu
!               Corrected productivity index of intrusion borehole by
!               multiplying WELLPI by 2*PI.
!
!               July 22/1999   T. Hadgu
!               Changed the curve fit equations for Flowing Bottomhole
Pressure.
!               The new curve fits reflect the addition of 2*PI to WELLPI,
!               and were based on actual data from the 96 CCA 10,000 year
runs.
!
!               May 15/2002  T. Hadgu
!               Used equivalent permeabilities and porosities for panel
closure
!               (materials CONC_PCS AND PAN_S2) and DRZ next to panel closure
!               (material DRZ_PCS), to deal with Option D panel closure
!               implementation in the TBM vertical BRAGFLO grid.
!
!               May 28/2002 T. Hadgu
!               Subdivided the repository into 3 regions instead of 4
!               to account for new BRAGFLO TBM grid and Option D.
!
!               June 10/2002 T. Hadgu
!               Removed waste area properties that have been assigned to
other
!               materials. Proper material properties are now transferred
from
!               the 10,000-year BRAGFLO runs.
!
!               July 31,2003 J. Stein
!               Fixed AREA_TOT to represent the maximum spall volume of
!               4.0 m^3.  Changed the way initial porosity is calculated
!               for the panel closure materials.
!
!========================================================================
```

```
!*********************************************************************
!CHAPTER 0:  DEFINE NEW VARIABLE NAMES AND SOME NEEDED CONSTANTS
!*********************************************************************
!=====================================================================
!
!  SET CONSTANTS AND PUT IN WASTE REGION
LIMIT BLOCK 1
THETA1   = MAKEPROP(DIP_DEG[ID:10]*2.0*PI[ID:10]/360.0)
THETA2   = MAKEPROP(0.0)
!
!
PERM_X   = 10**PRMX_LOG
PERM_Y   = 10**PRMY_LOG
PERM_Z   = 10**PRMZ_LOG
SB_MIN   = SAT_RBRN * 1.05
POR_COMP = COMP_RCK/POROSITY
!
! CALCULATE PROPERTIES FOR DRZ (DRZ_1)
LIMIT BLOCK 2
PERM_X   = PERMBRX
PERM_Y   = PERMBRX
PERM_Z   = PERMBRX
SB_MIN   = SAT_RBRN * 1.05
! NOW ADJUST POROSITY AND PORE COMPRESSIBILITY TO EQ. PORE VOL WITH CRUSHED
! ROOM HEIGHT
POROSITY = HEIGHT * POR_INTR / HEIGHT[ID:1]
POR_COMP = COMP_RCK/POROSITY
!
! CALCULATE PROPERTIES FOR SALADO HALITE (S_HALITE)
LIMIT BLOCK 3
PERM_X   = 10**PRMX_LOG
PERM_Y   = 10**PRMY_LOG
PERM_Z   = 10**PRMZ_LOG
SB_MIN   = SAT_RBRN * 1.05
! NOW ADJUST POROSITY AND PORE COMPRESSIBILITY TO EQ. PORE VOL WITH CRUSHED
! ROOM HEIGHT
POROSITY = HEIGHT * POROSITY / HEIGHT[ID:1]
POR_COMP = COMP_RCK/POROSITY
!
! CALC PROPERTIES FOR PANEL SEALS (CONC_PCS)
LIMIT BLOCK 4
! Changes made by T. Hadgu to introduce equivalent permeabilities (4/23/02):
!PERM_X   = 10**PRMX_LOG
!PERM_Y   = 10**PRMY_LOG
!
! Additions by T. Hadgu (04/23/02)
D1 = 32.1
D2 = 7.9
DE = 40.
PERM1_X = 10**PRMX_LOG[ID:1]
PERM2_X = 10**PRMX_LOG
PERM_X = DE*PERM1_X*PERM2_X/(D1*PERM2_X + D2*PERM1_X)
PERM_Y = D1*PERM1_X/DE + D2*PERM2_X/DE
!
PERM_Z   = 10**PRMZ_LOG
!
! JSS Define porosity of panel closures as length weighted mean porosity
```

```
!     of CONC_PCS and WAS_AREA. First define PORO_CONC for DRZ_CONC material.
PORO_CONC = POROSITY
POROSITY = (PORO_CONC*D2+POROSITY[ID:1]*D1)/DE
!
SB_MIN   = SAT_RBRN * 1.05
POR_COMP = COMP_RCK/POROSITY
!
PORE_DIS = PORE_DIS[ID:1]
SAT_RGAS = SAT_RGAS[ID:1]
SAT_RBRN = SAT_RBRN[ID:1]
CAP_MOD  = CAP_MOD[ID:1]
RELP_MOD = RELP_MOD[ID:1]
PC_MAX   = PC_MAX[ID:1]
PO_MIN   = PO_MIN[ID:1]
SB_MIN   = SAT_RBRN[ID:1]* 1.05
PCT_A    = PCT_A[ID:1]
PCT_EXP  = PCT_EXP[ID:1]
KPT      = KPT[ID:1]
!
! CALC PROPERTIES FOR DRZ/EXTENDED CONCRETE (DRZ_CONC):
!
LIMIT BLOCK 5
!
D1 = 32.1
D2 = 7.9
DE = 40.
PERM1_X = PERMBRX[ID:2]
PERM2_X = 10**PRMX_LOG[ID:4]
PERM_X = DE*PERM1_X*PERM2_X/(D1*PERM2_X + D2*PERM1_X)
PERM_Y = D1*PERM1_X/DE + D2*PERM2_X/DE
!
PERM_Z   = PERM_Z[ID:2]
!
!JSS Define porosity as length weighted mean porosity of DRZ and CONC_PCS
!
POROSITY = (POR_INTR[ID:2]*D2+PORO_CONC[ID:4]*D1)/DE
!
PORE_DIS = PORE_DIS[ID:2]
SAT_RGAS = SAT_RGAS[ID:2]
SAT_RBRN = SAT_RBRN[ID:2]
CAP_MOD  = CAP_MOD[ID:2]
RELP_MOD = RELP_MOD[ID:2]
PC_MAX   = PC_MAX[ID:2]
PO_MIN   = PO_MIN[ID:2]
SB_MIN   = SAT_RBRN[ID:2]* 1.05
KPT      = KPT[ID:2]
POR_INTR = POR_INTR[ID:2]
!
POR_COMP = COMP_RCK[ID:2]/POROSITY
!
! CALC PROPERTIES FOR CENTER PANEL SEALS (PAN_SL2)
!
LIMIT BLOCK 6
!
PERM_X   = PERM_Y[ID:4]
PERM_Y   = PERM_X[ID:4]
PERM_Z   = PERM_Z[ID:4]
```

```
!
POROSITY = POROSITY[ID:4]
!
PORE_DIS = PORE_DIS[ID:4]
SAT_RGAS = SAT_RGAS[ID:4]
SAT_RBRN = SAT_RBRN[ID:4]
CAP_MOD =  CAP_MOD[ID:4]
RELP_MOD = RELP_MOD[ID:4]
PC_MAX   = PC_MAX[ID:4]
PO_MIN   = PO_MIN[ID:4]
PCT_A    = PCT_A[ID:4]
PCT_EXP  = PCT_EXP[ID:4]
KPT      = KPT[ID:4]
HEIGHT   = HEIGHT[ID:4]
!
SB_MIN   = SB_MIN[ID:4]
POR_COMP = POR_COMP[ID:4]
!
!=====================================================================
! SET WELLBORE PROPS
LIMIT BLOCK 9
SEBRINE1 = MAKEPROP(0.0)
SEGAS1   = MAKEPROP(0.0)
KRW1     = MAKEPROP(0.0)
KRG1     = MAKEPROP(0.0)
SEBRINE2 = MAKEPROP(0.0)
SEGAS2   = MAKEPROP(0.0)
KRW2     = MAKEPROP(0.0)
KRG2     = MAKEPROP(0.0)
SEBRINE3 = MAKEPROP(0.0)
SEGAS3   = MAKEPROP(0.0)
KRW3     = MAKEPROP(0.0)
KRG3     = MAKEPROP(0.0)
! EQUATION 1: (FOR BRINE FLOW ONLY, KRG = 0)
! FBHP = A + BX + CY + DX^2 + EY^2 + FXY + GX^3 + HY^3 + IXY^2 + JYX^2
!    X = LOG10(BRINE CONST) LOG M^3/pA-S
!    Y = PANEL PRESSURE (Pa)
!  8.00739E6 Pa < FBHP < 8.04391E6 Pa
EQ1_A  = MAKEPROP(3.2279346E+11)
EQ1_B  = MAKEPROP(9.4816648E+10)
EQ1_C  = MAKEPROP(-6200.2715)
EQ1_D  = MAKEPROP(9.2450601E+09)
EQ1_E  = MAKEPROP(4.1464475E-06)
EQ1_F  = MAKEPROP(-1288.6068)
EQ1_G  = MAKEPROP(2.9905582E+08)
EQ1_H  = MAKEPROP(1.0857041E-14)
EQ1_I  = MAKEPROP(4.7119798E-07)
EQ1_J  = MAKEPROP(-66.90712)
!
! EQUATION 2: (FOR LOG10(KRG/KRW) < 0  BRINE DOMINATED FLOW)
! FBHP = (A + BX + CX^2 + DY/(1 + EX + FX^2 + GX^3 + HY)
!    X = LOG10(KRG/KRB)
!    Y = PANEL PRESSURE (Pa)
!   7.42886E5 Pa < FBHP < 8.04353E6 Pa
EQ2_A  = MAKEPROP(1606507.7)
EQ2_B  = MAKEPROP(2624339.7)
EQ2_C  = MAKEPROP(2476889.9)
```

```
EQ2_D  = MAKEPROP(-0.053635476)
EQ2_E  = MAKEPROP(0.70815693)
EQ2_F  = MAKEPROP(0.38012696)
EQ2_G  = MAKEPROP(0.0041916956)
EQ2_H  = MAKEPROP(-2.4887085E-08)
!
! EQUATION 3: (FOR LOG10(KRG/KRW) > 0  GAS DOMINATED FLOW)
! FBHP = A + B/X + CY + D/X^2 + EY^2 + FY/X + G/X^3 + HY^3 + IY^2/X + JY/X^2
!    X = LOG10(GAS CONST) LOG M^3/pA-S
!    Y = PANEL PRESSURE (Pa)
! 2.07363E5 Pa < FBHP < 1.66394E6 Pa
EQ3_A  = MAKEPROP(-1.0098405E+09)
EQ3_B  = MAKEPROP(-2.3044622E+10)
EQ3_C  = MAKEPROP(9.8039146)
EQ3_D  = MAKEPROP(-1.7426466E+11)
EQ3_E  = MAKEPROP(1.8309137E-07)
EQ3_F  = MAKEPROP(174.97064)
EQ3_G  = MAKEPROP(-4.3698224E+11)
EQ3_H  = MAKEPROP(-1.4891198E-16)
EQ3_I  = MAKEPROP(1.3006196E-06)
EQ3_J  = MAKEPROP(757.44833)
!
! CALCULATE SKIN FROM SPALL REMOVED, & WELL PRODUCTIVITY INDEX
! ELEMENT 59 IS LOCATION OF WELL2 (2ND INTRUSION DOWN DIP)
!
! JSS: Setting AREA_TOT to a constant.  AREA_TOT=MAX[SPALL VOL]/Initial
Height
! JSS: AREA_TOT=4.0/3.96 = 1.01
!
AREA_TOT = 1.01
!
WELLRAD  = BITSIZE/2
!
DRNRAD_L = SQRT(DEL_X[E:59]*DEL_Y[E:59]/PI[ID:10])
!DRNRAD_M = SQRT(DEL_X[E:240]*DEL_Y[E:240]/PI[ID:10])
!DRNRAD_U = SQRT(DEL_X[E:708]*DEL_Y[E:708]/PI[ID:10])
!
SKIN     = -1.0*LOG(SQRT(AREA_TOT/PI[ID:10])/WELLRAD)
SKIN     = IFLT0(SKIN,SKIN,0)
! CHECK TO BE SURE WELLPI IS NOT 0 OR NEG, & SET TO 1.0 IF IT IS
! WELLPI   = PERM_X[ID:1] * HEIGHT[ID:1] / (LOG(DRNRAD/WELLRAD) + SKIN - 0.5)
!JSS
WELLPI_L   = IFGT0(LOG(DRNRAD_L/WELLRAD) + SKIN - 0.5,PERM_X[ID:1]* &
             HEIGHT[ID:1] &
           / (LOG(DRNRAD_L/WELLRAD) + SKIN - 0.5),1.0)
!WELLPI_M   = IFGT0(LOG(DRNRAD_M/WELLRAD) + SKIN - 0.5,PERM_X[ID:1]* &
!            HEIGHT[ID:1] &
!            / (LOG(DRNRAD_M/WELLRAD) + SKIN - 0.5),1.0)
!WELLPI_U   = IFGT0(LOG(DRNRAD_U/WELLRAD) + SKIN - 0.5,PERM_X[ID:1]* &
!            HEIGHT[ID:1] &
!            / (LOG(DRNRAD_U/WELLRAD) + SKIN - 0.5),1.0)
!JSS
! WELLPI has been modified by T. Hadgu on 06/29/99 as follows:
!JSS
WELLPI_L   = WELLPI_L*2.*PI[ID:10]
!WELLPI_M   = WELLPI_M*2.*PI[ID:10]
!WELLPI_U   = WELLPI_U*2.*PI[ID:10]
```

```
!JSS
! CALCULATE CONSTANTS NEEDED FOR WELLBORE MODEL:
! CALCULATE EFFECTIVE SATURATION USING KRP = 4 (BROOKS - COREY MODIFIED,
! WITH LAMBDA (PORE_DIS) = 2.89, NO CAP PRESSURE). DO FOR 3 COUPLED REGIONS
! REGION NO 1 (PANELS 1,2,7,8 & 9)
BRINE1   = IFLT0((BSATPAN1[ID:1]-
SAT_RBRN[ID:1]),SAT_RBRN[ID:1],BSATPAN1[ID:1])
SEBRINE1 = (BRINE1 - SAT_RBRN[ID:1])/(1.0 - SAT_RBRN[ID:1])
SEGAS1   = (BRINE1 - SAT_RBRN[ID:1])/(1.0-SAT_RBRN[ID:1]-SAT_RGAS[ID:1])
SEGAS1   = IFLT0((1.0 - SEGAS1),1.0,SEGAS1)
KRW1     = SEBRINE1**((2+3*PORE_DIS[ID:1])/PORE_DIS[ID:1])
KRG1     = (1.0-SEGAS1)**2*(1.0-SEGAS1**((2 +
PORE_DIS[ID:1])/PORE_DIS[ID:1]))
! NOW CALCULATE CONSTANT FOR BRINE AND GAS
!JSS
CONBR1_L   = WELLPI_L * KRW1 / VISCO[ID:7]
!CONBR1_M   = WELLPI_M * KRW1 / VISCO[ID:7]
!CONBR1_U   = WELLPI_U * KRW1 / VISCO[ID:7]
congs1_L  = WELLPI_L * KRG1 / VISCO[ID:8]
!congs1_M  = WELLPI_M * KRG1 / VISCO[ID:8]
!congs1_U  = WELLPI_U * KRG1 / VISCO[ID:8]
!JSS
! NOW TAKE LOG BASE 10 OF PARAMETERS NEEDED FOR FBHP EQUATIONS
!JSS
LOG_B1_L   = IFEQ0(KRW1,-10,LOG10(CONBR1_L+1E-24))
!LOG_B1_M   = IFEQ0(KRW1,-10,LOG10(CONBR1_M+1E-24))
!LOG_B1_U   = IFEQ0(KRW1,-10,LOG10(CONBR1_U+1E-24))
!JSS
LOG_KR1  = IFEQ0(KRW1,10,LOG10((KRG1+1E-24)/(KRW1+1E-24)))
! INTRODUCE A TERM FOR GAS DOMINATED FLOW
!JSS
LOG_G1_L   = IFEQ0(KRG1,-10,LOG10(congs1_L+1E-24))
!LOG_G1_M   = IFEQ0(KRG1,-10,LOG10(congs1_M+1E-24))
!LOG_G1_U   = IFEQ0(KRG1,-10,LOG10(congs1_U+1E-24))
!
! CALCULATE FBHP's AND SET WITHIN LIMITS
!
PR1_E1_L  = EQ1_A+EQ1_B*LOG_B1_L+EQ1_C*PRESPAN1[ID:1]+EQ1_D*LOG_B1_L**2+ &
          EQ1_E*PRESPAN1[ID:1]**2+EQ1_F*LOG_B1_L*PRESPAN1[ID:1]+ &
          EQ1_G*LOG_B1_L**3+EQ1_H*PRESPAN1[ID:1]**3+&
          EQ1_I*LOG_B1_L*PRESPAN1[ID:1]**2+EQ1_J*LOG_B1_L**2*PRESPAN1[ID:1]
PR1_E1_L  = IFLT0(8007390.0 - PR1_E1_L,IFLT0(8043910.0 - PR1_E1_L,8043910.0,
&
          PR1_E1_L),8007390.0)
!PR1_E1_M  = EQ1_A+EQ1_B*LOG_B1_M+EQ1_C*PRESPAN1[ID:1]+EQ1_D*LOG_B1_M**2+ &
!           EQ1_E*PRESPAN1[ID:1]**2+EQ1_F*LOG_B1_M*PRESPAN1[ID:1]+ &
!           EQ1_G*LOG_B1_M**3+EQ1_H*PRESPAN1[ID:1]**3+&
!           EQ1_I*LOG_B1_M*PRESPAN1[ID:1]**2+EQ1_J*LOG_B1_M**2*PRESPAN1[ID:1]
!PR1_E1_M  = IFLT0(8007390.0 - PR1_E1_M,IFLT0(8043910.0 - PR1_E1_M,8043910.0,
&
!           PR1_E1_M),8007390.0)
!PR1_E1_U  = EQ1_A+EQ1_B*LOG_B1_U+EQ1_C*PRESPAN1[ID:1]+EQ1_D*LOG_B1_U**2+ &
!           EQ1_E*PRESPAN1[ID:1]**2+EQ1_F*LOG_B1_U*PRESPAN1[ID:1]+ &
!           EQ1_G*LOG_B1_U**3+EQ1_H*PRESPAN1[ID:1]**3+&
!           EQ1_I*LOG_B1_U*PRESPAN1[ID:1]**2+EQ1_J*LOG_B1_U**2*PRESPAN1[ID:1]
!PR1_E1_U  = IFLT0(8007390.0 - PR1_E1_U,IFLT0(8043910.0 - PR1_E1_U,8043910.0,
&
```

```
!           PR1_E1_U),8007390.0)
!JSS
!
PR1_E2  = (EQ2_A+EQ2_B*LOG_KR1+EQ2_C*LOG_KR1**2+EQ2_D*PRESPAN1[ID:1])/ &
          (1.0+EQ2_E*LOG_KR1+EQ2_F*LOG_KR1**2+EQ2_G*LOG_KR1**3+ &
          EQ2_H*PRESPAN1[ID:1])
PR1_E2  = IFLT0(742886.0 - PR1_E2,IFLT0(8043530.0 - PR1_E2,8043530.0, &
          PR1_E2),742886.0)
!JSS
PR1_E3_L  = EQ3_A+EQ3_B/LOG_G1_L+EQ3_C*PRESPAN1[ID:1]+EQ3_D/LOG_G1_L**2+ &
          EQ3_E*PRESPAN1[ID:1]**2+EQ3_F*PRESPAN1[ID:1]/LOG_G1_L+ &
          EQ3_G/LOG_G1_L**3+ EQ3_H*PRESPAN1[ID:1]**3+ &
          EQ3_I*PRESPAN1[ID:1]**2/LOG_G1_L+ &
          EQ3_J*PRESPAN1[ID:1]/LOG_G1_L**2
!PR1_E3_M  = EQ3_A+EQ3_B/LOG_G1_M+EQ3_C*PRESPAN1[ID:1]+EQ3_D/LOG_G1_M**2+ &
!           EQ3_E*PRESPAN1[ID:1]**2+EQ3_F*PRESPAN1[ID:1]/LOG_G1_M+ &
!           EQ3_G/LOG_G1_M**3+ EQ3_H*PRESPAN1[ID:1]**3+ &
!           EQ3_I*PRESPAN1[ID:1]**2/LOG_G1_M+ &
!           EQ3_J*PRESPAN1[ID:1]/LOG_G1_M**2
!PR1_E3_U  = EQ3_A+EQ3_B/LOG_G1_U+EQ3_C*PRESPAN1[ID:1]+EQ3_D/LOG_G1_U**2+ &
!           EQ3_E*PRESPAN1[ID:1]**2+EQ3_F*PRESPAN1[ID:1]/LOG_G1_U+ &
!           EQ3_G/LOG_G1_U**3+ EQ3_H*PRESPAN1[ID:1]**3+ &
!           EQ3_I*PRESPAN1[ID:1]**2/LOG_G1_U+ &
!           EQ3_J*PRESPAN1[ID:1]/LOG_G1_U**2
!
PR1_E3_L  = IFLT0(207363.0 - PR1_E3_L,IFLT0(1663940.0 - PR1_E3_L,1663940.0, &
          PR1_E3_L),207363.0)
!PR1_E3_M  = IFLT0(207363.0 - PR1_E3_M,IFLT0(1663940.0 - PR1_E3_M,1663940.0,
&
!           PR1_E3_M),207363.0)
!PR1_E3_U  = IFLT0(207363.0 - PR1_E3_U,IFLT0(1663940.0 - PR1_E3_U,1663940.0,
&
!           PR1_E3_U),207363.0)
!JSS
!
! RESET FBHP TO 0 IF NO BRINE BLOWOUT (KRW = 0 OR PRESSURE < 8 MPa)
!JSS
FBHP1_L    = IFEQ0(KRW1,0,IFLT0(PRESPAN1[ID:1]-8.0E6,0, &
          IFEQ0(KRG1,PR1_E1_L,IFLT0(LOG_KR1,PR1_E2,PR1_E3_L))))
!FBHP1_M    = IFEQ0(KRW1,0,IFLT0(PRESPAN1[ID:1]-8.0E6,0, &
!           IFEQ0(KRG1,PR1_E1_M,IFLT0(LOG_KR1,PR1_E2,PR1_E3_M))))
!FBHP1_U    = IFEQ0(KRW1,0,IFLT0(PRESPAN1[ID:1]-8.0E6,0, &
!           IFEQ0(KRG1,PR1_E1_U,IFLT0(LOG_KR1,PR1_E2,PR1_E3_U))))
!JSS
!
! IF NO BLOWOUT, SET NUMBER OF BRAGFLO STEPS TO 1, ELSE 1000
!JSS
NSTEP1_L = MAKEPROP(IFEQ0(FBHP1_L,1,1000))
!NSTEP1_M = MAKEPROP(IFEQ0(FBHP1_M,1,1000))
!NSTEP1_U = MAKEPROP(IFEQ0(FBHP1_U,1,1000))
!JSS
! REGION NO 2 (PANELS 3,4,6 & 10)
BRINE2   = IFLT0((BSATPAN2[ID:1]-
SAT_RBRN[ID:1]),SAT_RBRN[ID:1],BSATPAN2[ID:1])
SEBRINE2 = (BRINE2 - SAT_RBRN[ID:1])/(1.0 - SAT_RBRN[ID:1])
SEGAS2   = (BRINE2 - SAT_RBRN[ID:1])/(1.0-SAT_RBRN[ID:1]-SAT_RGAS[ID:1])
SEGAS2   = IFLT0((1.0 - SEGAS2),1.0,SEGAS2)
```

```
KRW2      = SEBRINE2**((2+3*PORE_DIS[ID:1])/PORE_DIS[ID:1])
KRG2      = (1.0-SEGAS2)**2*(1.0-SEGAS2**((2 +
PORE_DIS[ID:1])/PORE_DIS[ID:1]))
! NOW CALCULATE CONSTANT FOR BRINE AND GAS
!JSS
CONBR2_L   = WELLPI_L * KRW2 / VISCO[ID:7]
!CONBR2_M   = WELLPI_M * KRW2 / VISCO[ID:7]
!CONBR2_U   = WELLPI_U * KRW2 / VISCO[ID:7]
congs2_L  = WELLPI_L * KRG2 / VISCO[ID:8]
!congs2_M  = WELLPI_M * KRG2 / VISCO[ID:8]
!congs2_U  = WELLPI_U * KRG2 / VISCO[ID:8]
!
! NOW TAKE LOG BASE 10 OF PARAMETERS NEEDED FOR FBHP EQUATIONS
!JSS
LOG_B2_L   = IFEQ0(KRW2,-10,LOG10(CONBR2_L+1E-24))
!LOG_B2_M   = IFEQ0(KRW2,-10,LOG10(CONBR2_M+1E-24))
!LOG_B2_U   = IFEQ0(KRW2,-10,LOG10(CONBR2_U+1E-24))
!
LOG_KR2  = IFEQ0(KRW2,10,LOG10((KRG2+1E-24)/(KRW2+1E-24)))
! INTRODUCE A TERM FOR GAS DOMINATED FLOW
!JSS
LOG_G2_L   = IFEQ0(KRG2,-10,LOG10(congs2_L+1E-24))
!LOG_G2_M   = IFEQ0(KRG2,-10,LOG10(congs2_M+1E-24))
!LOG_G2_U   = IFEQ0(KRG2,-10,LOG10(congs2_U+1E-24))
! CALCULATE FBHP's AND SET WITHIN LIMITS
!
PR2_E1_L  = EQ1_A+EQ1_B*LOG_B2_L+EQ1_C*PRESPAN2[ID:1]+EQ1_D*LOG_B2_L**2+ &
          EQ1_E*PRESPAN2[ID:1]**2+EQ1_F*LOG_B2_L*PRESPAN2[ID:1]+ &
          EQ1_G*LOG_B2_L**3+EQ1_H*PRESPAN2[ID:1]**3+&
          EQ1_I*LOG_B2_L*PRESPAN2[ID:1]**2+EQ1_J*LOG_B2_L**2*PRESPAN2[ID:1]
PR2_E1_L  = IFLT0(8007390.0 - PR2_E1_L,IFLT0(8043910.0 - PR2_E1_L,8043910.0,&
          PR2_E1_L),8007390.0)
!PR2_E1_M  = EQ1_A+EQ1_B*LOG_B2_M+EQ1_C*PRESPAN2[ID:1]+EQ1_D*LOG_B2_M**2+ &
!           EQ1_E*PRESPAN2[ID:1]**2+EQ1_F*LOG_B2_M*PRESPAN2[ID:1]+ &
!           EQ1_G*LOG_B2_M**3+EQ1_H*PRESPAN2[ID:1]**3+&
!           EQ1_I*LOG_B2_M*PRESPAN2[ID:1]**2+EQ1_J*LOG_B2_M**2*PRESPAN2[ID:1]
!PR2_E1_M  = IFLT0(8007390.0 - PR2_E1_M,IFLT0(8043910.0 -
PR2_E1_M,8043910.0,&
!           PR2_E1_M),8007390.0)
!PR2_E1_U  = EQ1_A+EQ1_B*LOG_B2_U+EQ1_C*PRESPAN2[ID:1]+EQ1_D*LOG_B2_U**2+ &
!           EQ1_E*PRESPAN2[ID:1]**2+EQ1_F*LOG_B2_U*PRESPAN2[ID:1]+ &
!           EQ1_G*LOG_B2_U**3+EQ1_H*PRESPAN2[ID:1]**3+&
!           EQ1_I*LOG_B2_U*PRESPAN2[ID:1]**2+EQ1_J*LOG_B2_U**2*PRESPAN2[ID:1]
!PR2_E1_U  = IFLT0(8007390.0 - PR2_E1_U,IFLT0(8043910.0 -
PR2_E1_U,8043910.0,&
!           PR2_E1_U),8007390.0)
!!
PR2_E2  = (EQ2_A+EQ2_B*LOG_KR2+EQ2_C*LOG_KR2**2+EQ2_D*PRESPAN2[ID:1])/ &
          (1.0+EQ2_E*LOG_KR2+EQ2_F*LOG_KR2**2+EQ2_G*LOG_KR2**3+ &
          EQ2_H*PRESPAN2[ID:1])
PR2_E2  = IFLT0(742886.0 - PR2_E2,IFLT0(8043530.0 - PR2_E2,8043530.0, &
          PR2_E2),742886.0)
!
PR2_E3_L  = EQ3_A+EQ3_B/LOG_G2_L+EQ3_C*PRESPAN2[ID:1]+EQ3_D/LOG_G2_L**2+ &
          EQ3_E*PRESPAN2[ID:1]**2+EQ3_F*PRESPAN2[ID:1]/LOG_G2_L+ &
          EQ3_G/LOG_G2_L**3+ EQ3_H*PRESPAN2[ID:1]**3+ &
          EQ3_I*PRESPAN2[ID:1]**2/LOG_G2_L+ &
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          EQ3_J*PRESPAN2[ID:1]/LOG_G2_L**2
!PR2_E3_M  = EQ3_A+EQ3_B/LOG_G2_M+EQ3_C*PRESPAN2[ID:1]+EQ3_D/LOG_G2_M**2+ &
!           EQ3_E*PRESPAN2[ID:1]**2+EQ3_F*PRESPAN2[ID:1]/LOG_G2_M+ &
!           EQ3_G/LOG_G2_M**3+ EQ3_H*PRESPAN2[ID:1]**3+ &
!           EQ3_I*PRESPAN2[ID:1]**2/LOG_G2_M+ &
!           EQ3_J*PRESPAN2[ID:1]/LOG_G2_M**2
!PR2_E3_U  = EQ3_A+EQ3_B/LOG_G2_U+EQ3_C*PRESPAN2[ID:1]+EQ3_D/LOG_G2_U**2+ &
!           EQ3_E*PRESPAN2[ID:1]**2+EQ3_F*PRESPAN2[ID:1]/LOG_G2_U+ &
!           EQ3_G/LOG_G2_U**3+ EQ3_H*PRESPAN2[ID:1]**3+ &
!           EQ3_I*PRESPAN2[ID:1]**2/LOG_G2_U+ &
!           EQ3_J*PRESPAN2[ID:1]/LOG_G2_U**2
!
PR2_E3_L  = IFLT0(207363.0 - PR2_E3_L,IFLT0(1663940.0 - PR2_E3_L,1663940.0, &
          PR2_E3_L),207363.0)
!PR2_E3_M  = IFLT0(207363.0 - PR2_E3_M,IFLT0(1663940.0 - PR2_E3_M,1663940.0,
&
!           PR2_E3_M),207363.0)
!PR2_E3_U  = IFLT0(207363.0 - PR2_E3_U,IFLT0(1663940.0 - PR2_E3_U,1663940.0,
&
!           PR2_E3_U),207363.0)
!
! RESET FBHP TO 0 IF NO BRINE BLOWOUT (KRW = 0 OR PRESSURE < 8 MPa)
FBHP2_L    = IFEQ0(KRW2,0,IFLT0(PRESPAN2[ID:1]-8.0E6,0, &
          IFEQ0(KRG2,PR2_E1_L,IFLT0(LOG_KR2,PR2_E2,PR2_E3_L))))
!FBHP2_M    = IFEQ0(KRW2,0,IFLT0(PRESPAN2[ID:1]-8.0E6,0, &
!           IFEQ0(KRG2,PR2_E1_M,IFLT0(LOG_KR2,PR2_E2,PR2_E3_M))))
!FBHP2_U    = IFEQ0(KRW2,0,IFLT0(PRESPAN2[ID:1]-8.0E6,0, &
!           IFEQ0(KRG2,PR2_E1_U,IFLT0(LOG_KR2,PR2_E2,PR2_E3_U))))


! IF NO BLOWOUT, SET NUMBER OF BRAGFLO STEPS TO 1, ELSE 1000
NSTEP2_L = MAKEPROP(IFEQ0(FBHP2_L,1,1000))
!NSTEP2_M = MAKEPROP(IFEQ0(FBHP2_M,1,1000))
!NSTEP2_U = MAKEPROP(IFEQ0(FBHP2_U,1,1000))
!
! REGION NO 3 (PANEL 5)
BRINE3   = IFLT0((BSATPAN3[ID:1]-
SAT_RBRN[ID:1]),SAT_RBRN[ID:1],BSATPAN3[ID:1])
SEBRINE3 = (BRINE3 - SAT_RBRN[ID:1])/(1.0 - SAT_RBRN[ID:1])
SEGAS3   = (BRINE3 - SAT_RBRN[ID:1])/(1.0-SAT_RBRN[ID:1]-SAT_RGAS[ID:1])
SEGAS3   = IFLT0((1.0 - SEGAS3),1.0,SEGAS3)
KRW3     = SEBRINE3**((2+3*PORE_DIS[ID:1])/PORE_DIS[ID:1])
KRG3     = (1.0-SEGAS3)**2*(1.0-SEGAS3**((2 +
PORE_DIS[ID:1])/PORE_DIS[ID:1]))
! NOW CALCULATE CONSTANT FOR BRINE AND GAS
!JSS
CONBR3_L   = WELLPI_L * KRW3 / VISCO[ID:7]
!CONBR3_M   = WELLPI_M * KRW3 / VISCO[ID:7]
!CONBR3_U   = WELLPI_U * KRW3 / VISCO[ID:7]
congs3_L  = WELLPI_L * KRG3 / VISCO[ID:8]
!congs3_M  = WELLPI_M * KRG3 / VISCO[ID:8]
!congs3_U  = WELLPI_U * KRG3 / VISCO[ID:8]
!JSS
! NOW TAKE LOG BASE 10 OF PARAMETERS NEEDED FOR FBHP EQUATIONS
!JSS
LOG_B3_L   = IFEQ0(KRW3,-10,LOG10(CONBR3_L+1E-24))
!LOG_B3_M   = IFEQ0(KRW3,-10,LOG10(CONBR3_M+1E-24))
```

```
!LOG_B3_U   = IFEQ0(KRW3,-10,LOG10(CONBR3_U+1E-24))
!
LOG_KR3  = IFEQ0(KRW3,10,LOG10((KRG3+1E-24)/(KRW3+1E-24)))
! INTRODUCE A TERM FOR GAS DOMINATED FLOW
!JSS
LOG_G3_L   = IFEQ0(KRG3,-10,LOG10(congs3_L+1E-24))
!LOG_G3_M   = IFEQ0(KRG3,-10,LOG10(congs3_M+1E-24))
!LOG_G3_U   = IFEQ0(KRG3,-10,LOG10(congs3_U+1E-24))
!
!
! CALCULATE FBHP's AND SET WITHIN LIMITS
!
!
PR3_E1_L  = EQ1_A+EQ1_B*LOG_B3_L+EQ1_C*PRESPAN3[ID:1]+EQ1_D*LOG_B3_L**2+ &
          EQ1_E*PRESPAN3[ID:1]**2+EQ1_F*LOG_B3_L*PRESPAN3[ID:1]+ &
          EQ1_G*LOG_B3_L**3+EQ1_H*PRESPAN3[ID:1]**3+&
          EQ1_I*LOG_B3_L*PRESPAN3[ID:1]**2+EQ1_J*LOG_B3_L**2*PRESPAN3[ID:1]
PR3_E1_L  = IFLT0(8007390.0 - PR3_E1_L,IFLT0(8043910.0 - PR3_E1_L,8043910.0,&
          PR3_E1_L),8007390.0)
!PR3_E1_M  = EQ1_A+EQ1_B*LOG_B3_M+EQ1_C*PRESPAN3[ID:1]+EQ1_D*LOG_B3_M**2+ &
!           EQ1_E*PRESPAN3[ID:1]**2+EQ1_F*LOG_B3_M*PRESPAN3[ID:1]+ &
!           EQ1_G*LOG_B3_M**3+EQ1_H*PRESPAN3[ID:1]**3+&
!           EQ1_I*LOG_B3_M*PRESPAN3[ID:1]**2+EQ1_J*LOG_B3_M**2*PRESPAN3[ID:1]
!PR3_E1_M  = IFLT0(8007390.0 - PR3_E1_M,IFLT0(8043910.0 -
PR3_E1_M,8043910.0,&
!           PR3_E1_M),8007390.0)
!PR3_E1_U  = EQ1_A+EQ1_B*LOG_B3_U+EQ1_C*PRESPAN3[ID:1]+EQ1_D*LOG_B3_U**2+ &
!           EQ1_E*PRESPAN3[ID:1]**2+EQ1_F*LOG_B3_U*PRESPAN3[ID:1]+ &
!           EQ1_G*LOG_B3_U**3+EQ1_H*PRESPAN3[ID:1]**3+&
!           EQ1_I*LOG_B3_U*PRESPAN3[ID:1]**2+EQ1_J*LOG_B3_U**2*PRESPAN3[ID:1]
!PR3_E1_U  = IFLT0(8007390.0 - PR3_E1_U,IFLT0(8043910.0 -
PR3_E1_U,8043910.0,&
!           PR3_E1_U),8007390.0)
!
PR3_E2  = (EQ2_A+EQ2_B*LOG_KR3+EQ2_C*LOG_KR3**2+EQ2_D*PRESPAN3[ID:1])/ &
          (1.0+EQ2_E*LOG_KR3+EQ2_F*LOG_KR3**2+EQ2_G*LOG_KR3**3+ &
          EQ2_H*PRESPAN3[ID:1])
PR3_E2  = IFLT0(742886.0 - PR3_E2,IFLT0(8043530.0 - PR3_E2,8043530.0, &
          PR3_E2),742886.0)
!
PR3_E3_L  = EQ3_A+EQ3_B/LOG_G3_L+EQ3_C*PRESPAN3[ID:1]+EQ3_D/LOG_G3_L**2+ &
          EQ3_E*PRESPAN3[ID:1]**2+EQ3_F*PRESPAN3[ID:1]/LOG_G3_L+ &
          EQ3_G/LOG_G3_L**3+ EQ3_H*PRESPAN3[ID:1]**3+ &
          EQ3_I*PRESPAN3[ID:1]**2/LOG_G3_L+ &
          EQ3_J*PRESPAN3[ID:1]/LOG_G3_L**2
!PR3_E3_M  = EQ3_A+EQ3_B/LOG_G3_M+EQ3_C*PRESPAN3[ID:1]+EQ3_D/LOG_G3_M**2+ &
!           EQ3_E*PRESPAN3[ID:1]**2+EQ3_F*PRESPAN3[ID:1]/LOG_G3_M+ &
!           EQ3_G/LOG_G3_M**3+ EQ3_H*PRESPAN3[ID:1]**3+ &
!           EQ3_I*PRESPAN3[ID:1]**2/LOG_G3_M+ &
!           EQ3_J*PRESPAN3[ID:1]/LOG_G3_M**2
!PR3_E3_U  = EQ3_A+EQ3_B/LOG_G3_U+EQ3_C*PRESPAN3[ID:1]+EQ3_D/LOG_G3_U**2+ &
!           EQ3_E*PRESPAN3[ID:1]**2+EQ3_F*PRESPAN3[ID:1]/LOG_G3_U+ &
!           EQ3_G/LOG_G3_U**3+ EQ3_H*PRESPAN3[ID:1]**3+ &
!           EQ3_I*PRESPAN3[ID:1]**2/LOG_G3_U+ &
!           EQ3_J*PRESPAN3[ID:1]/LOG_G3_U**2
!!
PR3_E3_L  = IFLT0(207363.0 - PR3_E3_L,IFLT0(1663940.0 - PR3_E3_L,1663940.0, &
```

```
          PR3_E3_L),207363.0)
!PR3_E3_M  = IFLT0(207363.0 - PR3_E3_M,IFLT0(1663940.0 - PR3_E3_M,1663940.0,
&
!           PR3_E3_M),207363.0)
!PR3_E3_U  = IFLT0(207363.0 - PR3_E3_U,IFLT0(1663940.0 - PR3_E3_U,1663940.0,
&
!           PR3_E3_U),207363.0)
!
! RESET FBHP TO 0 IF NO BRINE BLOWOUT (KRW = 0 OR PRESSURE < 8 MPa)
FBHP3_L     = IFEQ0(KRW3,0,IFLT0(PRESPAN3[ID:1]-8.0E6,0, &
          IFEQ0(KRG3,PR3_E1_L,IFLT0(LOG_KR3,PR3_E2,PR3_E3_L))))
!FBHP3_M     = IFEQ0(KRW3,0,IFLT0(PRESPAN3[ID:1]-8.0E6,0, &
!            IFEQ0(KRG3,PR3_E1_M,IFLT0(LOG_KR3,PR3_E2,PR3_E3_L))))
!FBHP3_U     = IFEQ0(KRW3,0,IFLT0(PRESPAN3[ID:1]-8.0E6,0, &
!            IFEQ0(KRG3,PR3_E1_U,IFLT0(LOG_KR3,PR3_E2,PR3_E3_L))))

! IF NO BLOWOUT, SET NUMBER OF BRAGFLO STEPS TO 1, ELSE 1000
NSTEP3_L = MAKEPROP(IFEQ0(FBHP3_L,1,1000))
!NSTEP3_M = MAKEPROP(IFEQ0(FBHP3_M,1,1000))
!NSTEP3_U = MAKEPROP(IFEQ0(FBHP3_U,1,1000))
DELETE BRINE1, BRINE2, BRINE3
!=====================================================================
!*********************************************************************
!SET UP BOUNDARY CONDITIONS FOR PREVIOUS INTRUSIONS HERE
!*********************************************************************
! SET UP NEEDED CONSTANTS (NOTE: BOREHOLE LENGTH FROM PANEL TO CASTILE B.P.
! IS 247 METERS -- USED IN CON_SAND & CON_CREP)
! MODIFICATIONS MADE 5/30/96
LEN_BC   = MAKEPROP(247.0)
DRAIN_BC = MAKEPROP(SQRT(DEL_X[E:26]*DEL_Y[E:26]/PI[ID:10]))
WELPI_BC = PERM_X[ID:1] * HEIGHT[ID:1] / (LOG(DRAIN_BC/WELLRAD) + 0.0 - 0.5)
! JSS Adding 2PI term
WELPI_BC = WELPI_BC * 2 * PI[ID:10]
RHO_G_H  = MAKEPROP(DNSFLUID[ID:7]*GRAVACC[ID:10]*LEN_BC)
CON_OPEN = MAKEPROP((PRM_CAST*THCK_CAS[ID:11]*(LOG(DRAIN_BC/WELLRAD)-0.5)) &
          / (PERM_X[ID:1]*HEIGHT[ID:1]*(LOG(RE_CAST[ID:11]/WELLRAD)-0.5)))
CON_SAND = MAKEPROP((PRM_SAND*PI[ID:10]*WELLRAD*WELLRAD* &
          (LOG(DRAIN_BC/WELLRAD)-0.5)) / (PERM_X[ID:1]*HEIGHT[ID:1]*LEN_BC))
! JSS Adding 2PI term to solution
CON_SAND = CON_SAND / (2 * PI[ID:10])
CON_CREP = MAKEPROP((PRM_CREP*PI[ID:10]*WELLRAD*WELLRAD* &
          (LOG(DRAIN_BC/WELLRAD)-0.5)) / (PERM_X[ID:1]*HEIGHT[ID:1]*LEN_BC))
! JSS Adding 2PI term to solution
CON_CREP = CON_CREP / (2 * PI[ID:10])
! SOLVE FOR OPEN BOREHOLE TO CASTILE B.C. (WITHIN 200 YEARS AFTER FIRST
INTR.)
! USE FBHP3 SINCE BOUNDARY CONDITION WELL IS ASSUMED TO BE IN PANEL 5 (DOWN-
! DIP) FOR ALL SUBSEQUENT INTRUSIONS
BHP_OPEN = (FBHP3_L+CON_OPEN*(CAST_RE-RHO_G_H))/(1.0+CON_OPEN)
! SOLVE FOR SAND-FILLED BH CONDITION (200 TO 1200 YEARS AFTER 1ST INTRUSION)
BHP_SAND = (FBHP3_L+CON_SAND*(CAST_WB-RHO_G_H))/(1.0+CON_SAND)
! SOLVE FOR CREEP-CLOSED BH CONDITION (1200 YEARS AFTER 1ST INTRUSION)
BHP_CREP = (FBHP3_L+CON_CREP*(CAST_WB-RHO_G_H))/(1.0+CON_CREP)
!ASSIGN ABANDONED BH PRESSURE BASED ON INTRUSION TIME
PREV_TME = MAKEPROP(350.0)
DELT_TME = INTR_TME/YRSEC[ID:10] - PREV_TME
BHP_ABAN = IFGT0(DELT_TME - 200.1,IFGT0(DELT_TME -
```

```
1200.1,BHP_CREP,BHP_SAND),&
          BHP_OPEN)
!*********************************************************************
!===============================================
!=========================================================================
!*********************************************************************
!CHAPTER 3.  COMPUTE DIP IN REPOSITORY
!*********************************************************************
!*********************************************************************
!===============================================
!===============================================
LIMIT ELEMENT OFF
!COMPUTE THE GRID BLOCK ELEVATIONS ACCOUNTING FOR 1 DEGREE DIP IN SALADO
!DEFINE GRID BLOCK ELEVATIONS DUE TO DIP
! USE ELEVATION OF SHAFT AT MID-REPOSITORY
ZORIGIN   =  382.671
YORIGIN   =  1000.0
ELEVN     = MAKENODE(COS(THETA1[ID:1])*(Z-ZORIGIN) &
           + SIN(THETA1[ID:1])*(Y-YORIGIN))
ELEVE     = NOD2ELE(ELEVN) + ZORIGIN
!COMPUTE GRID BLOCK POTENTIAL ASSUMING BRINE IS INCOMPRESSIBLE
(APPROXIMATELY)
POTE      = PRESEL/(DNSFLUID[ID:7]*GRAVACC[ID:10]) + ELEVE
!
! NOW SET GRID THICKNESS FOR ALL ELEMENTS TO CRUSHED PANEL HEIGHT
THICK    = MAKEATTR(HEIGHT[ID:1])
!
DELETE ELEVN, YORIGIN, ZORIGIN
EXIT
```

SCENARIO: S3

```
$ type alg_dbr_cra1_pre_dir_rel_s3.inp
!=========================================================================
!
!TITLE:BRAGFLO 1996 CCA CALCULATIONS: REPOSITORY SCALE BLOWOUT
!ANAYLST: Dan Stoelzel, SNL
!CREATED: NOV 2, 1995
!PURPOSE: ALGEBRA file computes properties that can not be obtained
!         from CAMDAT and/or assigns properties to element blocks.
!         THIS FILE PREPARES A .CDB FILE FOR PREBRAG TO READ
!IMPORTANT: This file originates from J.E. Bean's algebra file for his FEP
!           model. The methodologies to calculate dip were copied from his
!           file, with minor changes
!           made to account for the differences in the meshes.
!           ALGEBRA TO CALC. DIP IN REPOSITORY - SCALE BLOWOUT MODEL.
!           new version of bragflo
!
!       MODIFIED:
!               MARCH 26, 1996
!               BLOWOUT MODEL STRUGGLING IN PANEL SEAL REGION: TURNED OFF
!               CAP PRESSURE IN PANEL SEAL AND HALITE BY SETTING EQUAL TO
!               CAP PRESSURE IN WASTE REGION
!
!               MAY 17, 1996
!               ADDED BOUNDARY CONDITION WELL CALCULATION FOR E1-E2 SCEN.
!               NEW CHANGES FOR LATEST CCA ANALYSIS
```

```
!
!                MAY 20.  1996
!                WELL 2 INPUT FILE TO ACCOUNT FOR E1-E2 SAME PANEL BOUNDARY
!                COND.
!
!                MAY 30,1996
!                ADDED LOGIC TO ACCOUNT FOR CHANGES IN ABANDONED WELLBORE PERM
!                FOR BOUNDARY CONDITION WELL:
!                SCENARIO 2 AND 4 FILE, FIRST INTRUSION AT 350 YEARS
!
!                June 29/1999   T. Hadgu
!                Corrected productivity index of intrusion borehole by
!                multiplying WELLPI by 2*PI.
!
!                July 22/1999   T. Hadgu
!                Changed the curve fit equations for Flowing Bottomhole
Pressure.
!                The new curve fits reflect the addition of 2*PI to WELLPI,
!                and were based on actual data from the 96 CCA 10,000 year
runs.
!
!                May 15/2002  T. Hadgu
!                Used equivalent permeabilities and porosities for panel
closure
!                (materials CONC_PCS AND PAN_S2) and DRZ next to panel closure
!                (material DRZ_PCS), to deal with Option D panel closure
!                implementation in the TBM vertical BRAGFLO grid.
!
!                May 28/2002 T. Hadgu
!                Subdivided the repository into 3 regions instead of 4
!                to account for new BRAGFLO TBM grid and Option D.
!
!                June 10/2002 T. Hadgu
!                Removed waste area properties that have been assigned to
other
!                materials. Proper material properties are now transferred
from
!                the 10,000-year BRAGFLO runs.
!
!                July 31,2003 J. Stein
!                Fixed AREA_TOT to represent the maximum spall volume of
!                4.0 m^3.  Changed the way initial porosity is calculated
!                for the panel closure materials.
!
!========================================================================
!************************************************************************
!CHAPTER 0:  DEFINE NEW VARIABLE NAMES AND SOME NEEDED CONSTANTS
!************************************************************************
!========================================================================
!
!  SET CONSTANTS AND PUT IN WASTE REGION
LIMIT BLOCK 1
THETA1   = MAKEPROP(DIP_DEG[ID:10]*2.0*PI[ID:10]/360.0)
THETA2   = MAKEPROP(0.0)
!
!
PERM_X   = 10**PRMX_LOG
```

```
PERM_Y   = 10**PRMY_LOG
PERM_Z   = 10**PRMZ_LOG
SB_MIN   = SAT_RBRN * 1.05
POR_COMP = COMP_RCK/POROSITY
!
! CALCULATE PROPERTIES FOR DRZ (DRZ_1)
LIMIT BLOCK 2
PERM_X   = PERMBRX
PERM_Y   = PERMBRX
PERM_Z   = PERMBRX
SB_MIN   = SAT_RBRN * 1.05
! NOW ADJUST POROSITY AND PORE COMPRESSIBILITY TO EQ. PORE VOL WITH CRUSHED
! ROOM HEIGHT
POROSITY = HEIGHT * POR_INTR / HEIGHT[ID:1]
POR_COMP = COMP_RCK/POROSITY
!
! CALCULATE PROPERTIES FOR SALADO HALITE (S_HALITE)
LIMIT BLOCK 3
PERM_X   = 10**PRMX_LOG
PERM_Y   = 10**PRMY_LOG
PERM_Z   = 10**PRMZ_LOG
SB_MIN   = SAT_RBRN * 1.05
! NOW ADJUST POROSITY AND PORE COMPRESSIBILITY TO EQ. PORE VOL WITH CRUSHED
! ROOM HEIGHT
POROSITY = HEIGHT * POROSITY / HEIGHT[ID:1]
POR_COMP = COMP_RCK/POROSITY
!
! CALC PROPERTIES FOR PANEL SEALS (CONC_PCS)
LIMIT BLOCK 4
! Changes made by T. Hadgu to introduce equivalent permeabilities (4/23/02):
!PERM_X   = 10**PRMX_LOG
!PERM_Y   = 10**PRMY_LOG
!
! Additions by T. Hadgu (04/23/02)
D1 = 32.1
D2 = 7.9
DE = 40.
PERM1_X = 10**PRMX_LOG[ID:1]
PERM2_X = 10**PRMX_LOG
PERM_X = DE*PERM1_X*PERM2_X/(D1*PERM2_X + D2*PERM1_X)
PERM_Y = D1*PERM1_X/DE + D2*PERM2_X/DE
!
PERM_Z   = 10**PRMZ_LOG
!
! JSS Define porosity of panel closures as length weighted mean porosity
!     of CONC_PCS and WAS_AREA. First define PORO_CONC for DRZ_CONC material.
PORO_CONC = POROSITY
POROSITY = (PORO_CONC*D2+POROSITY[ID:1]*D1)/DE
!
SB_MIN   = SAT_RBRN * 1.05
POR_COMP = COMP_RCK/POROSITY
!
PORE_DIS = PORE_DIS[ID:1]
SAT_RGAS = SAT_RGAS[ID:1]
SAT_RBRN = SAT_RBRN[ID:1]
CAP_MOD  = CAP_MOD[ID:1]
RELP_MOD = RELP_MOD[ID:1]
```

```
PC_MAX   = PC_MAX[ID:1]
PO_MIN   = PO_MIN[ID:1]
SB_MIN   = SAT_RBRN[ID:1]* 1.05
PCT_A    = PCT_A[ID:1]
PCT_EXP  = PCT_EXP[ID:1]
KPT      = KPT[ID:1]
!
! CALC PROPERTIES FOR DRZ/EXTENDED CONCRETE (DRZ_CONC):
!
LIMIT BLOCK 5
!
D1 = 32.1
D2 = 7.9
DE = 40.
PERM1_X = PERMBRX[ID:2]
PERM2_X = 10**PRMX_LOG[ID:4]
PERM_X = DE*PERM1_X*PERM2_X/(D1*PERM2_X + D2*PERM1_X)
PERM_Y = D1*PERM1_X/DE + D2*PERM2_X/DE
!
PERM_Z   = PERM_Z[ID:2]
!
!JSS Define porosity as length weighted mean porosity of DRZ and CONC_PCS
!
POROSITY = (POR_INTR[ID:2]*D2+PORO_CONC[ID:4]*D1)/DE
!
PORE_DIS = PORE_DIS[ID:2]
SAT_RGAS = SAT_RGAS[ID:2]
SAT_RBRN = SAT_RBRN[ID:2]
CAP_MOD  = CAP_MOD[ID:2]
RELP_MOD = RELP_MOD[ID:2]
PC_MAX   = PC_MAX[ID:2]
PO_MIN   = PO_MIN[ID:2]
SB_MIN   = SAT_RBRN[ID:2]* 1.05
KPT      = KPT[ID:2]
POR_INTR = POR_INTR[ID:2]
!
POR_COMP = COMP_RCK[ID:2]/POROSITY
!
! CALC PROPERTIES FOR CENTER PANEL SEALS (PAN_SL2)
!
LIMIT BLOCK 6
!
PERM_X   = PERM_Y[ID:4]
PERM_Y   = PERM_X[ID:4]
PERM_Z   = PERM_Z[ID:4]
!
POROSITY = POROSITY[ID:4]
!
PORE_DIS = PORE_DIS[ID:4]
SAT_RGAS = SAT_RGAS[ID:4]
SAT_RBRN = SAT_RBRN[ID:4]
CAP_MOD =  CAP_MOD[ID:4]
RELP_MOD = RELP_MOD[ID:4]
PC_MAX   = PC_MAX[ID:4]
PO_MIN   = PO_MIN[ID:4]
PCT_A    = PCT_A[ID:4]
PCT_EXP  = PCT_EXP[ID:4]
```

```
KPT      = KPT[ID:4]
HEIGHT   = HEIGHT[ID:4]
!
SB_MIN   = SB_MIN[ID:4]
POR_COMP = POR_COMP[ID:4]
!
!=========================================================================
! SET WELLBORE PROPS
LIMIT BLOCK 9
SEBRINE1 = MAKEPROP(0.0)
SEGAS1   = MAKEPROP(0.0)
KRW1     = MAKEPROP(0.0)
KRG1     = MAKEPROP(0.0)
SEBRINE2 = MAKEPROP(0.0)
SEGAS2   = MAKEPROP(0.0)
KRW2     = MAKEPROP(0.0)
KRG2     = MAKEPROP(0.0)
SEBRINE3 = MAKEPROP(0.0)
SEGAS3   = MAKEPROP(0.0)
KRW3     = MAKEPROP(0.0)
KRG3     = MAKEPROP(0.0)
! EQUATION 1: (FOR BRINE FLOW ONLY, KRG = 0)
! FBHP = A + BX + CY + DX^2 + EY^2 + FXY + GX^3 + HY^3 + IXY^2 + JYX^2
!    X = LOG10(BRINE CONST) LOG M^3/pA-S
!    Y = PANEL PRESSURE (Pa)
!  8.00739E6 Pa < FBHP < 8.04391E6 Pa
EQ1_A  = MAKEPROP(3.2279346E+11)
EQ1_B  = MAKEPROP(9.4816648E+10)
EQ1_C  = MAKEPROP(-6200.2715)
EQ1_D  = MAKEPROP(9.2450601E+09)
EQ1_E  = MAKEPROP(4.1464475E-06)
EQ1_F  = MAKEPROP(-1288.6068)
EQ1_G  = MAKEPROP(2.9905582E+08)
EQ1_H  = MAKEPROP(1.0857041E-14)
EQ1_I  = MAKEPROP(4.7119798E-07)
EQ1_J  = MAKEPROP(-66.90712)
!
! EQUATION 2: (FOR LOG10(KRG/KRW) < 0  BRINE DOMINATED FLOW)
! FBHP = (A + BX + CX^2 + DY/(1 + EX + FX^2 + GX^3 + HY)
!    X = LOG10(KRG/KRB)
!    Y = PANEL PRESSURE (Pa)
!   7.42886E5 Pa < FBHP < 8.04353E6 Pa
EQ2_A  = MAKEPROP(1606507.7)
EQ2_B  = MAKEPROP(2624339.7)
EQ2_C  = MAKEPROP(2476889.9)
EQ2_D  = MAKEPROP(-0.053635476)
EQ2_E  = MAKEPROP(0.70815693)
EQ2_F  = MAKEPROP(0.38012696)
EQ2_G  = MAKEPROP(0.0041916956)
EQ2_H  = MAKEPROP(-2.4887085E-08)
!
! EQUATION 3: (FOR LOG10(KRG/KRW) > 0  GAS DOMINATED FLOW)
! FBHP = A + B/X + CY + D/X^2 + EY^2 + FY/X + G/X^3 + HY^3 + IY^2/X + JY/X^2
!    X = LOG10(GAS CONST) LOG M^3/pA-S
!    Y = PANEL PRESSURE (Pa)
! 2.07363E5 Pa < FBHP < 1.66394E6 Pa
EQ3_A  = MAKEPROP(-1.0098405E+09)
```

```
EQ3_B  = MAKEPROP(-2.3044622E+10)
EQ3_C  = MAKEPROP(9.8039146)
EQ3_D  = MAKEPROP(-1.7426466E+11)
EQ3_E  = MAKEPROP(1.8309137E-07)
EQ3_F  = MAKEPROP(174.97064)
EQ3_G  = MAKEPROP(-4.3698224E+11)
EQ3_H  = MAKEPROP(-1.4891198E-16)
EQ3_I  = MAKEPROP(1.3006196E-06)
EQ3_J  = MAKEPROP(757.44833)
!
! CALCULATE SKIN FROM SPALL REMOVED, & WELL PRODUCTIVITY INDEX
! ELEMENT 59 IS LOCATION OF WELL2 (2ND INTRUSION DOWN DIP)
!
! JSS: Setting AREA_TOT to a constant.  AREA_TOT=MAX[SPALL VOL]/Initial
Height
! JSS: AREA_TOT=4.0/3.96 = 1.01
!
AREA_TOT = 1.01
!
WELLRAD  = BITSIZE/2
!
DRNRAD_L = SQRT(DEL_X[E:59]*DEL_Y[E:59]/PI[ID:10])
!DRNRAD_M = SQRT(DEL_X[E:240]*DEL_Y[E:240]/PI[ID:10])
!DRNRAD_U = SQRT(DEL_X[E:708]*DEL_Y[E:708]/PI[ID:10])
!
SKIN     = -1.0*LOG(SQRT(AREA_TOT/PI[ID:10])/WELLRAD)
SKIN     = IFLT0(SKIN,SKIN,0)
! CHECK TO BE SURE WELLPI IS NOT 0 OR NEG, & SET TO 1.0 IF IT IS
! WELLPI   = PERM_X[ID:1] * HEIGHT[ID:1] / (LOG(DRNRAD/WELLRAD) + SKIN - 0.5)
!JSS
WELLPI_L   = IFGT0(LOG(DRNRAD_L/WELLRAD) + SKIN - 0.5,PERM_X[ID:1]* &
             HEIGHT[ID:1] &
           / (LOG(DRNRAD_L/WELLRAD) + SKIN - 0.5),1.0)
!WELLPI_M   = IFGT0(LOG(DRNRAD_M/WELLRAD) + SKIN - 0.5,PERM_X[ID:1]* &
!            HEIGHT[ID:1] &
!            / (LOG(DRNRAD_M/WELLRAD) + SKIN - 0.5),1.0)
!WELLPI_U   = IFGT0(LOG(DRNRAD_U/WELLRAD) + SKIN - 0.5,PERM_X[ID:1]* &
!            HEIGHT[ID:1] &
!            / (LOG(DRNRAD_U/WELLRAD) + SKIN - 0.5),1.0)
!JSS
! WELLPI has been modified by T. Hadgu on 06/29/99 as follows:
!JSS
WELLPI_L   = WELLPI_L*2.*PI[ID:10]
!WELLPI_M   = WELLPI_M*2.*PI[ID:10]
!WELLPI_U   = WELLPI_U*2.*PI[ID:10]
!JSS
! CALCULATE CONSTANTS NEEDED FOR WELLBORE MODEL:
! CALCULATE EFFECTIVE SATURATION USING KRP = 4 (BROOKS - COREY MODIFIED,
! WITH LAMBDA (PORE_DIS) = 2.89, NO CAP PRESSURE). DO FOR 3 COUPLED REGIONS
! REGION NO 1 (PANELS 1,2,7,8 & 9)
BRINE1   = IFLT0((BSATPAN1[ID:1]-
SAT_RBRN[ID:1]),SAT_RBRN[ID:1],BSATPAN1[ID:1])
SEBRINE1 = (BRINE1 - SAT_RBRN[ID:1])/(1.0 - SAT_RBRN[ID:1])
SEGAS1   = (BRINE1 - SAT_RBRN[ID:1])/(1.0-SAT_RBRN[ID:1]-SAT_RGAS[ID:1])
SEGAS1   = IFLT0((1.0 - SEGAS1),1.0,SEGAS1)
KRW1     = SEBRINE1**((2+3*PORE_DIS[ID:1])/PORE_DIS[ID:1])
KRG1     = (1.0-SEGAS1)**2*(1.0-SEGAS1**((2 +
```

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PORE_DIS[ID:1])/PORE_DIS[ID:1]))
! NOW CALCULATE CONSTANT FOR BRINE AND GAS
!JSS
CONBR1_L   = WELLPI_L * KRW1 / VISCO[ID:7]
!CONBR1_M   = WELLPI_M * KRW1 / VISCO[ID:7]
!CONBR1_U   = WELLPI_U * KRW1 / VISCO[ID:7]
congs1_L  = WELLPI_L * KRG1 / VISCO[ID:8]
!congs1_M  = WELLPI_M * KRG1 / VISCO[ID:8]
!congs1_U  = WELLPI_U * KRG1 / VISCO[ID:8]
!JSS
! NOW TAKE LOG BASE 10 OF PARAMETERS NEEDED FOR FBHP EQUATIONS
!JSS
LOG_B1_L   = IFEQ0(KRW1,-10,LOG10(CONBR1_L+1E-24))
!LOG_B1_M   = IFEQ0(KRW1,-10,LOG10(CONBR1_M+1E-24))
!LOG_B1_U   = IFEQ0(KRW1,-10,LOG10(CONBR1_U+1E-24))
!JSS
LOG_KR1  = IFEQ0(KRW1,10,LOG10((KRG1+1E-24)/(KRW1+1E-24)))
! INTRODUCE A TERM FOR GAS DOMINATED FLOW
!JSS
LOG_G1_L   = IFEQ0(KRG1,-10,LOG10(congs1_L+1E-24))
!LOG_G1_M   = IFEQ0(KRG1,-10,LOG10(congs1_M+1E-24))
!LOG_G1_U   = IFEQ0(KRG1,-10,LOG10(congs1_U+1E-24))
!
! CALCULATE FBHP's AND SET WITHIN LIMITS
!
PR1_E1_L  = EQ1_A+EQ1_B*LOG_B1_L+EQ1_C*PRESPAN1[ID:1]+EQ1_D*LOG_B1_L**2+ &
          EQ1_E*PRESPAN1[ID:1]**2+EQ1_F*LOG_B1_L*PRESPAN1[ID:1]+ &
          EQ1_G*LOG_B1_L**3+EQ1_H*PRESPAN1[ID:1]**3+&
          EQ1_I*LOG_B1_L*PRESPAN1[ID:1]**2+EQ1_J*LOG_B1_L**2*PRESPAN1[ID:1]
PR1_E1_L  = IFLT0(8007390.0 - PR1_E1_L,IFLT0(8043910.0 - PR1_E1_L,8043910.0,
&
          PR1_E1_L),8007390.0)
!PR1_E1_M  = EQ1_A+EQ1_B*LOG_B1_M+EQ1_C*PRESPAN1[ID:1]+EQ1_D*LOG_B1_M**2+ &
!           EQ1_E*PRESPAN1[ID:1]**2+EQ1_F*LOG_B1_M*PRESPAN1[ID:1]+ &
!           EQ1_G*LOG_B1_M**3+EQ1_H*PRESPAN1[ID:1]**3+&
!           EQ1_I*LOG_B1_M*PRESPAN1[ID:1]**2+EQ1_J*LOG_B1_M**2*PRESPAN1[ID:1]
!PR1_E1_M  = IFLT0(8007390.0 - PR1_E1_M,IFLT0(8043910.0 - PR1_E1_M,8043910.0,
&
!           PR1_E1_M),8007390.0)
!PR1_E1_U  = EQ1_A+EQ1_B*LOG_B1_U+EQ1_C*PRESPAN1[ID:1]+EQ1_D*LOG_B1_U**2+ &
!           EQ1_E*PRESPAN1[ID:1]**2+EQ1_F*LOG_B1_U*PRESPAN1[ID:1]+ &
!           EQ1_G*LOG_B1_U**3+EQ1_H*PRESPAN1[ID:1]**3+&
!           EQ1_I*LOG_B1_U*PRESPAN1[ID:1]**2+EQ1_J*LOG_B1_U**2*PRESPAN1[ID:1]
!PR1_E1_U  = IFLT0(8007390.0 - PR1_E1_U,IFLT0(8043910.0 - PR1_E1_U,8043910.0,
&
!           PR1_E1_U),8007390.0)
!JSS
!
PR1_E2  = (EQ2_A+EQ2_B*LOG_KR1+EQ2_C*LOG_KR1**2+EQ2_D*PRESPAN1[ID:1])/ &
          (1.0+EQ2_E*LOG_KR1+EQ2_F*LOG_KR1**2+EQ2_G*LOG_KR1**3+ &
          EQ2_H*PRESPAN1[ID:1])
PR1_E2  = IFLT0(742886.0 - PR1_E2,IFLT0(8043530.0 - PR1_E2,8043530.0, &
          PR1_E2),742886.0)
!JSS
PR1_E3_L  = EQ3_A+EQ3_B/LOG_G1_L+EQ3_C*PRESPAN1[ID:1]+EQ3_D/LOG_G1_L**2+ &
          EQ3_E*PRESPAN1[ID:1]**2+EQ3_F*PRESPAN1[ID:1]/LOG_G1_L+ &
          EQ3_G/LOG_G1_L**3+ EQ3_H*PRESPAN1[ID:1]**3+ &
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          EQ3_I*PRESPAN1[ID:1]**2/LOG_G1_L+ &
          EQ3_J*PRESPAN1[ID:1]/LOG_G1_L**2
!PR1_E3_M  = EQ3_A+EQ3_B/LOG_G1_M+EQ3_C*PRESPAN1[ID:1]+EQ3_D/LOG_G1_M**2+ &
!           EQ3_E*PRESPAN1[ID:1]**2+EQ3_F*PRESPAN1[ID:1]/LOG_G1_M+ &
!           EQ3_G/LOG_G1_M**3+ EQ3_H*PRESPAN1[ID:1]**3+ &
!           EQ3_I*PRESPAN1[ID:1]**2/LOG_G1_M+ &
!           EQ3_J*PRESPAN1[ID:1]/LOG_G1_M**2
!PR1_E3_U  = EQ3_A+EQ3_B/LOG_G1_U+EQ3_C*PRESPAN1[ID:1]+EQ3_D/LOG_G1_U**2+ &
!           EQ3_E*PRESPAN1[ID:1]**2+EQ3_F*PRESPAN1[ID:1]/LOG_G1_U+ &
!           EQ3_G/LOG_G1_U**3+ EQ3_H*PRESPAN1[ID:1]**3+ &
!           EQ3_I*PRESPAN1[ID:1]**2/LOG_G1_U+ &
!           EQ3_J*PRESPAN1[ID:1]/LOG_G1_U**2
!
PR1_E3_L  = IFLT0(207363.0 - PR1_E3_L,IFLT0(1663940.0 - PR1_E3_L,1663940.0, &
          PR1_E3_L),207363.0)
!PR1_E3_M  = IFLT0(207363.0 - PR1_E3_M,IFLT0(1663940.0 - PR1_E3_M,1663940.0,
&
!           PR1_E3_M),207363.0)
!PR1_E3_U  = IFLT0(207363.0 - PR1_E3_U,IFLT0(1663940.0 - PR1_E3_U,1663940.0,
&
!           PR1_E3_U),207363.0)
!JSS
!
! RESET FBHP TO 0 IF NO BRINE BLOWOUT (KRW = 0 OR PRESSURE < 8 MPa)
!JSS
FBHP1_L    = IFEQ0(KRW1,0,IFLT0(PRESPAN1[ID:1]-8.0E6,0, &
          IFEQ0(KRG1,PR1_E1_L,IFLT0(LOG_KR1,PR1_E2,PR1_E3_L))))
!FBHP1_M    = IFEQ0(KRW1,0,IFLT0(PRESPAN1[ID:1]-8.0E6,0, &
!           IFEQ0(KRG1,PR1_E1_M,IFLT0(LOG_KR1,PR1_E2,PR1_E3_M))))
!FBHP1_U    = IFEQ0(KRW1,0,IFLT0(PRESPAN1[ID:1]-8.0E6,0, &
!           IFEQ0(KRG1,PR1_E1_U,IFLT0(LOG_KR1,PR1_E2,PR1_E3_U))))
!JSS
!
! IF NO BLOWOUT, SET NUMBER OF BRAGFLO STEPS TO 1, ELSE 1000
!JSS
NSTEP1_L = MAKEPROP(IFEQ0(FBHP1_L,1,1000))
!NSTEP1_M = MAKEPROP(IFEQ0(FBHP1_M,1,1000))
!NSTEP1_U = MAKEPROP(IFEQ0(FBHP1_U,1,1000))
!JSS
! REGION NO 2 (PANELS 3,4,6 & 10)
BRINE2   = IFLT0((BSATPAN2[ID:1]-
SAT_RBRN[ID:1]),SAT_RBRN[ID:1],BSATPAN2[ID:1])
SEBRINE2 = (BRINE2 - SAT_RBRN[ID:1])/(1.0 - SAT_RBRN[ID:1])
SEGAS2   = (BRINE2 - SAT_RBRN[ID:1])/(1.0-SAT_RBRN[ID:1]-SAT_RGAS[ID:1])
SEGAS2   = IFLT0((1.0 - SEGAS2),1.0,SEGAS2)
KRW2     = SEBRINE2**((2+3*PORE_DIS[ID:1])/PORE_DIS[ID:1])
KRG2     = (1.0-SEGAS2)**2*(1.0-SEGAS2**((2 +
PORE_DIS[ID:1])/PORE_DIS[ID:1]))
! NOW CALCULATE CONSTANT FOR BRINE AND GAS
!JSS
CONBR2_L   = WELLPI_L * KRW2 / VISCO[ID:7]
!CONBR2_M   = WELLPI_M * KRW2 / VISCO[ID:7]
!CONBR2_U   = WELLPI_U * KRW2 / VISCO[ID:7]
congs2_L  = WELLPI_L * KRG2 / VISCO[ID:8]
!congs2_M  = WELLPI_M * KRG2 / VISCO[ID:8]
!congs2_U  = WELLPI_U * KRG2 / VISCO[ID:8]
!
```

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! NOW TAKE LOG BASE 10 OF PARAMETERS NEEDED FOR FBHP EQUATIONS
!JSS
LOG_B2_L   = IFEQ0(KRW2,-10,LOG10(CONBR2_L+1E-24))
!LOG_B2_M   = IFEQ0(KRW2,-10,LOG10(CONBR2_M+1E-24))
!LOG_B2_U   = IFEQ0(KRW2,-10,LOG10(CONBR2_U+1E-24))
!
LOG_KR2  = IFEQ0(KRW2,10,LOG10((KRG2+1E-24)/(KRW2+1E-24)))
! INTRODUCE A TERM FOR GAS DOMINATED FLOW
!JSS
LOG_G2_L   = IFEQ0(KRG2,-10,LOG10(congs2_L+1E-24))
!LOG_G2_M   = IFEQ0(KRG2,-10,LOG10(congs2_M+1E-24))
!LOG_G2_U   = IFEQ0(KRG2,-10,LOG10(congs2_U+1E-24))
! CALCULATE FBHP's AND SET WITHIN LIMITS
!
PR2_E1_L  = EQ1_A+EQ1_B*LOG_B2_L+EQ1_C*PRESPAN2[ID:1]+EQ1_D*LOG_B2_L**2+ &
          EQ1_E*PRESPAN2[ID:1]**2+EQ1_F*LOG_B2_L*PRESPAN2[ID:1]+ &
          EQ1_G*LOG_B2_L**3+EQ1_H*PRESPAN2[ID:1]**3+&
          EQ1_I*LOG_B2_L*PRESPAN2[ID:1]**2+EQ1_J*LOG_B2_L**2*PRESPAN2[ID:1]
PR2_E1_L  = IFLT0(8007390.0 - PR2_E1_L,IFLT0(8043910.0 - PR2_E1_L,8043910.0,&
          PR2_E1_L),8007390.0)
!PR2_E1_M  = EQ1_A+EQ1_B*LOG_B2_M+EQ1_C*PRESPAN2[ID:1]+EQ1_D*LOG_B2_M**2+ &
!           EQ1_E*PRESPAN2[ID:1]**2+EQ1_F*LOG_B2_M*PRESPAN2[ID:1]+ &
!           EQ1_G*LOG_B2_M**3+EQ1_H*PRESPAN2[ID:1]**3+&
!           EQ1_I*LOG_B2_M*PRESPAN2[ID:1]**2+EQ1_J*LOG_B2_M**2*PRESPAN2[ID:1]
!PR2_E1_M  = IFLT0(8007390.0 - PR2_E1_M,IFLT0(8043910.0 -
PR2_E1_M,8043910.0,&
!           PR2_E1_M),8007390.0)
!PR2_E1_U  = EQ1_A+EQ1_B*LOG_B2_U+EQ1_C*PRESPAN2[ID:1]+EQ1_D*LOG_B2_U**2+ &
!           EQ1_E*PRESPAN2[ID:1]**2+EQ1_F*LOG_B2_U*PRESPAN2[ID:1]+ &
!           EQ1_G*LOG_B2_U**3+EQ1_H*PRESPAN2[ID:1]**3+&
!           EQ1_I*LOG_B2_U*PRESPAN2[ID:1]**2+EQ1_J*LOG_B2_U**2*PRESPAN2[ID:1]
!PR2_E1_U  = IFLT0(8007390.0 - PR2_E1_U,IFLT0(8043910.0 -
PR2_E1_U,8043910.0,&
!           PR2_E1_U),8007390.0)
!!
PR2_E2  = (EQ2_A+EQ2_B*LOG_KR2+EQ2_C*LOG_KR2**2+EQ2_D*PRESPAN2[ID:1])/ &
          (1.0+EQ2_E*LOG_KR2+EQ2_F*LOG_KR2**2+EQ2_G*LOG_KR2**3+ &
          EQ2_H*PRESPAN2[ID:1])
PR2_E2  = IFLT0(742886.0 - PR2_E2,IFLT0(8043530.0 - PR2_E2,8043530.0, &
          PR2_E2),742886.0)
!
PR2_E3_L  = EQ3_A+EQ3_B/LOG_G2_L+EQ3_C*PRESPAN2[ID:1]+EQ3_D/LOG_G2_L**2+ &
          EQ3_E*PRESPAN2[ID:1]**2+EQ3_F*PRESPAN2[ID:1]/LOG_G2_L+ &
          EQ3_G/LOG_G2_L**3+ EQ3_H*PRESPAN2[ID:1]**3+ &
          EQ3_I*PRESPAN2[ID:1]**2/LOG_G2_L+ &
          EQ3_J*PRESPAN2[ID:1]/LOG_G2_L**2
!PR2_E3_M  = EQ3_A+EQ3_B/LOG_G2_M+EQ3_C*PRESPAN2[ID:1]+EQ3_D/LOG_G2_M**2+ &
!           EQ3_E*PRESPAN2[ID:1]**2+EQ3_F*PRESPAN2[ID:1]/LOG_G2_M+ &
!           EQ3_G/LOG_G2_M**3+ EQ3_H*PRESPAN2[ID:1]**3+ &
!           EQ3_I*PRESPAN2[ID:1]**2/LOG_G2_M+ &
!           EQ3_J*PRESPAN2[ID:1]/LOG_G2_M**2
!PR2_E3_U  = EQ3_A+EQ3_B/LOG_G2_U+EQ3_C*PRESPAN2[ID:1]+EQ3_D/LOG_G2_U**2+ &
!           EQ3_E*PRESPAN2[ID:1]**2+EQ3_F*PRESPAN2[ID:1]/LOG_G2_U+ &
!           EQ3_G/LOG_G2_U**3+ EQ3_H*PRESPAN2[ID:1]**3+ &
!           EQ3_I*PRESPAN2[ID:1]**2/LOG_G2_U+ &
!           EQ3_J*PRESPAN2[ID:1]/LOG_G2_U**2
!
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```
PR2_E3_L  = IFLT0(207363.0 - PR2_E3_L,IFLT0(1663940.0 - PR2_E3_L,1663940.0, &
          PR2_E3_L),207363.0)
!PR2_E3_M  = IFLT0(207363.0 - PR2_E3_M,IFLT0(1663940.0 - PR2_E3_M,1663940.0,
&
!           PR2_E3_M),207363.0)
!PR2_E3_U  = IFLT0(207363.0 - PR2_E3_U,IFLT0(1663940.0 - PR2_E3_U,1663940.0,
&
!           PR2_E3_U),207363.0)
!
! RESET FBHP TO 0 IF NO BRINE BLOWOUT (KRW = 0 OR PRESSURE < 8 MPa)
FBHP2_L    = IFEQ0(KRW2,0,IFLT0(PRESPAN2[ID:1]-8.0E6,0, &
          IFEQ0(KRG2,PR2_E1_L,IFLT0(LOG_KR2,PR2_E2,PR2_E3_L))))
!FBHP2_M    = IFEQ0(KRW2,0,IFLT0(PRESPAN2[ID:1]-8.0E6,0, &
!           IFEQ0(KRG2,PR2_E1_M,IFLT0(LOG_KR2,PR2_E2,PR2_E3_M))))
!FBHP2_U    = IFEQ0(KRW2,0,IFLT0(PRESPAN2[ID:1]-8.0E6,0, &
!           IFEQ0(KRG2,PR2_E1_U,IFLT0(LOG_KR2,PR2_E2,PR2_E3_U))))


! IF NO BLOWOUT, SET NUMBER OF BRAGFLO STEPS TO 1, ELSE 1000
NSTEP2_L = MAKEPROP(IFEQ0(FBHP2_L,1,1000))
!NSTEP2_M = MAKEPROP(IFEQ0(FBHP2_M,1,1000))
!NSTEP2_U = MAKEPROP(IFEQ0(FBHP2_U,1,1000))
!
! REGION NO 3 (PANEL 5)
BRINE3   = IFLT0((BSATPAN3[ID:1]-
SAT_RBRN[ID:1]),SAT_RBRN[ID:1],BSATPAN3[ID:1])
SEBRINE3 = (BRINE3 - SAT_RBRN[ID:1])/(1.0 - SAT_RBRN[ID:1])
SEGAS3   = (BRINE3 - SAT_RBRN[ID:1])/(1.0-SAT_RBRN[ID:1]-SAT_RGAS[ID:1])
SEGAS3   = IFLT0((1.0 - SEGAS3),1.0,SEGAS3)
KRW3     = SEBRINE3**((2+3*PORE_DIS[ID:1])/PORE_DIS[ID:1])
KRG3     = (1.0-SEGAS3)**2*(1.0-SEGAS3**((2 +
PORE_DIS[ID:1])/PORE_DIS[ID:1]))
! NOW CALCULATE CONSTANT FOR BRINE AND GAS
!JSS
CONBR3_L   = WELLPI_L * KRW3 / VISCO[ID:7]
!CONBR3_M   = WELLPI_M * KRW3 / VISCO[ID:7]
!CONBR3_U   = WELLPI_U * KRW3 / VISCO[ID:7]
congs3_L  = WELLPI_L * KRG3 / VISCO[ID:8]
!congs3_M  = WELLPI_M * KRG3 / VISCO[ID:8]
!congs3_U  = WELLPI_U * KRG3 / VISCO[ID:8]
!JSS
! NOW TAKE LOG BASE 10 OF PARAMETERS NEEDED FOR FBHP EQUATIONS
!JSS
LOG_B3_L   = IFEQ0(KRW3,-10,LOG10(CONBR3_L+1E-24))
!LOG_B3_M   = IFEQ0(KRW3,-10,LOG10(CONBR3_M+1E-24))
!LOG_B3_U   = IFEQ0(KRW3,-10,LOG10(CONBR3_U+1E-24))
!
LOG_KR3  = IFEQ0(KRW3,10,LOG10((KRG3+1E-24)/(KRW3+1E-24)))
! INTRODUCE A TERM FOR GAS DOMINATED FLOW
!JSS
LOG_G3_L   = IFEQ0(KRG3,-10,LOG10(congs3_L+1E-24))
!LOG_G3_M   = IFEQ0(KRG3,-10,LOG10(congs3_M+1E-24))
!LOG_G3_U   = IFEQ0(KRG3,-10,LOG10(congs3_U+1E-24))
!
!
! CALCULATE FBHP's AND SET WITHIN LIMITS
!
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!
PR3_E1_L  = EQ1_A+EQ1_B*LOG_B3_L+EQ1_C*PRESPAN3[ID:1]+EQ1_D*LOG_B3_L**2+ &
          EQ1_E*PRESPAN3[ID:1]**2+EQ1_F*LOG_B3_L*PRESPAN3[ID:1]+ &
          EQ1_G*LOG_B3_L**3+EQ1_H*PRESPAN3[ID:1]**3+&
          EQ1_I*LOG_B3_L*PRESPAN3[ID:1]**2+EQ1_J*LOG_B3_L**2*PRESPAN3[ID:1]
PR3_E1_L  = IFLT0(8007390.0 - PR3_E1_L,IFLT0(8043910.0 - PR3_E1_L,8043910.0,&
          PR3_E1_L),8007390.0)
!PR3_E1_M  = EQ1_A+EQ1_B*LOG_B3_M+EQ1_C*PRESPAN3[ID:1]+EQ1_D*LOG_B3_M**2+ &
!           EQ1_E*PRESPAN3[ID:1]**2+EQ1_F*LOG_B3_M*PRESPAN3[ID:1]+ &
!           EQ1_G*LOG_B3_M**3+EQ1_H*PRESPAN3[ID:1]**3+&
!           EQ1_I*LOG_B3_M*PRESPAN3[ID:1]**2+EQ1_J*LOG_B3_M**2*PRESPAN3[ID:1]
!PR3_E1_M  = IFLT0(8007390.0 - PR3_E1_M,IFLT0(8043910.0 -
PR3_E1_M,8043910.0,&
!           PR3_E1_M),8007390.0)
!PR3_E1_U  = EQ1_A+EQ1_B*LOG_B3_U+EQ1_C*PRESPAN3[ID:1]+EQ1_D*LOG_B3_U**2+ &
!           EQ1_E*PRESPAN3[ID:1]**2+EQ1_F*LOG_B3_U*PRESPAN3[ID:1]+ &
!           EQ1_G*LOG_B3_U**3+EQ1_H*PRESPAN3[ID:1]**3+&
!           EQ1_I*LOG_B3_U*PRESPAN3[ID:1]**2+EQ1_J*LOG_B3_U**2*PRESPAN3[ID:1]
!PR3_E1_U  = IFLT0(8007390.0 - PR3_E1_U,IFLT0(8043910.0 -
PR3_E1_U,8043910.0,&
!           PR3_E1_U),8007390.0)
!
PR3_E2  = (EQ2_A+EQ2_B*LOG_KR3+EQ2_C*LOG_KR3**2+EQ2_D*PRESPAN3[ID:1])/ &
          (1.0+EQ2_E*LOG_KR3+EQ2_F*LOG_KR3**2+EQ2_G*LOG_KR3**3+ &
          EQ2_H*PRESPAN3[ID:1])
PR3_E2  = IFLT0(742886.0 - PR3_E2,IFLT0(8043530.0 - PR3_E2,8043530.0, &
          PR3_E2),742886.0)
!
PR3_E3_L  = EQ3_A+EQ3_B/LOG_G3_L+EQ3_C*PRESPAN3[ID:1]+EQ3_D/LOG_G3_L**2+ &
          EQ3_E*PRESPAN3[ID:1]**2+EQ3_F*PRESPAN3[ID:1]/LOG_G3_L+ &
          EQ3_G/LOG_G3_L**3+ EQ3_H*PRESPAN3[ID:1]**3+ &
          EQ3_I*PRESPAN3[ID:1]**2/LOG_G3_L+ &
          EQ3_J*PRESPAN3[ID:1]/LOG_G3_L**2
!PR3_E3_M  = EQ3_A+EQ3_B/LOG_G3_M+EQ3_C*PRESPAN3[ID:1]+EQ3_D/LOG_G3_M**2+ &
!           EQ3_E*PRESPAN3[ID:1]**2+EQ3_F*PRESPAN3[ID:1]/LOG_G3_M+ &
!           EQ3_G/LOG_G3_M**3+ EQ3_H*PRESPAN3[ID:1]**3+ &
!           EQ3_I*PRESPAN3[ID:1]**2/LOG_G3_M+ &
!           EQ3_J*PRESPAN3[ID:1]/LOG_G3_M**2
!PR3_E3_U  = EQ3_A+EQ3_B/LOG_G3_U+EQ3_C*PRESPAN3[ID:1]+EQ3_D/LOG_G3_U**2+ &
!           EQ3_E*PRESPAN3[ID:1]**2+EQ3_F*PRESPAN3[ID:1]/LOG_G3_U+ &
!           EQ3_G/LOG_G3_U**3+ EQ3_H*PRESPAN3[ID:1]**3+ &
!           EQ3_I*PRESPAN3[ID:1]**2/LOG_G3_U+ &
!           EQ3_J*PRESPAN3[ID:1]/LOG_G3_U**2
!!
PR3_E3_L  = IFLT0(207363.0 - PR3_E3_L,IFLT0(1663940.0 - PR3_E3_L,1663940.0, &
          PR3_E3_L),207363.0)
!PR3_E3_M  = IFLT0(207363.0 - PR3_E3_M,IFLT0(1663940.0 - PR3_E3_M,1663940.0,
&
!           PR3_E3_M),207363.0)
!PR3_E3_U  = IFLT0(207363.0 - PR3_E3_U,IFLT0(1663940.0 - PR3_E3_U,1663940.0,
&
!           PR3_E3_U),207363.0)
!
! RESET FBHP TO 0 IF NO BRINE BLOWOUT (KRW = 0 OR PRESSURE < 8 MPa)
FBHP3_L    = IFEQ0(KRW3,0,IFLT0(PRESPAN3[ID:1]-8.0E6,0, &
          IFEQ0(KRG3,PR3_E1_L,IFLT0(LOG_KR3,PR3_E2,PR3_E3_L))))
!FBHP3_M    = IFEQ0(KRW3,0,IFLT0(PRESPAN3[ID:1]-8.0E6,0, &
```

```
!           IFEQ0(KRG3,PR3_E1_M,IFLT0(LOG_KR3,PR3_E2,PR3_E3_L))))
!FBHP3_U     = IFEQ0(KRW3,0,IFLT0(PRESPAN3[ID:1]-8.0E6,0, &
!           IFEQ0(KRG3,PR3_E1_U,IFLT0(LOG_KR3,PR3_E2,PR3_E3_L))))

! IF NO BLOWOUT, SET NUMBER OF BRAGFLO STEPS TO 1, ELSE 1000
NSTEP3_L = MAKEPROP(IFEQ0(FBHP3_L,1,1000))
!NSTEP3_M = MAKEPROP(IFEQ0(FBHP3_M,1,1000))
!NSTEP3_U = MAKEPROP(IFEQ0(FBHP3_U,1,1000))
DELETE BRINE1, BRINE2, BRINE3
!==========================================================================
!**********************************************************************
!SET UP BOUNDARY CONDITIONS FOR PREVIOUS INTRUSIONS HERE
!**********************************************************************
! SET UP NEEDED CONSTANTS (NOTE: BOREHOLE LENGTH FROM PANEL TO CASTILE B.P.
! IS 247 METERS -- USED IN CON_SAND & CON_CREP)
! MODIFICATIONS MADE 5/30/96
LEN_BC   = MAKEPROP(247.0)
DRAIN_BC = MAKEPROP(SQRT(DEL_X[E:26]*DEL_Y[E:26]/PI[ID:10]))
WELPI_BC = PERM_X[ID:1] * HEIGHT[ID:1] / (LOG(DRAIN_BC/WELLRAD) + 0.0 - 0.5)
! JSS Adding 2PI term
WELPI_BC = WELPI_BC * 2 * PI[ID:10]
RHO_G_H  = MAKEPROP(DNSFLUID[ID:7]*GRAVACC[ID:10]*LEN_BC)
CON_OPEN = MAKEPROP((PRM_CAST*THCK_CAS[ID:11]*(LOG(DRAIN_BC/WELLRAD)-0.5)) &
          / (PERM_X[ID:1]*HEIGHT[ID:1]*(LOG(RE_CAST[ID:11]/WELLRAD)-0.5)))
CON_SAND = MAKEPROP((PRM_SAND*PI[ID:10]*WELLRAD*WELLRAD* &
          (LOG(DRAIN_BC/WELLRAD)-0.5)) / (PERM_X[ID:1]*HEIGHT[ID:1]*LEN_BC))
! JSS Adding 2PI term to solution
CON_SAND = CON_SAND / (2 * PI[ID:10])
CON_CREP = MAKEPROP((PRM_CREP*PI[ID:10]*WELLRAD*WELLRAD* &
          (LOG(DRAIN_BC/WELLRAD)-0.5)) / (PERM_X[ID:1]*HEIGHT[ID:1]*LEN_BC))
! JSS Adding 2PI term to solution
CON_CREP = CON_CREP / (2 * PI[ID:10])
! SOLVE FOR OPEN BOREHOLE TO CASTILE B.C. (WITHIN 200 YEARS AFTER FIRST
INTR.)
! USE FBHP3 SINCE BOUNDARY CONDITION WELL IS ASSUMED TO BE IN PANEL 5 (DOWN-
! DIP) FOR ALL SUBSEQUENT INTRUSIONS
BHP_OPEN = (FBHP3_L+CON_OPEN*(CAST_RE-RHO_G_H))/(1.0+CON_OPEN)
! SOLVE FOR SAND-FILLED BH CONDITION (200 TO 1200 YEARS AFTER 1ST INTRUSION)
BHP_SAND = (FBHP3_L+CON_SAND*(CAST_WB-RHO_G_H))/(1.0+CON_SAND)
! SOLVE FOR CREEP-CLOSED BH CONDITION (1200 YEARS AFTER 1ST INTRUSION)
BHP_CREP = (FBHP3_L+CON_CREP*(CAST_WB-RHO_G_H))/(1.0+CON_CREP)
!ASSIGN ABANDONED BH PRESSURE BASED ON INTRUSION TIME
PREV_TME = MAKEPROP(350.0)
DELT_TME = INTR_TME/YRSEC[ID:10] - PREV_TME
BHP_ABAN = IFGT0(DELT_TME - 200.1,IFGT0(DELT_TME -
1200.1,BHP_CREP,BHP_SAND),&
          BHP_OPEN)
!**********************************************************************
!==============================================
!==========================================================================
!**********************************************************************
!CHAPTER 3.  COMPUTE DIP IN REPOSITORY
!**********************************************************************
!**********************************************************************
!==============================================
!==============================================
LIMIT ELEMENT OFF
```

```
!COMPUTE THE GRID BLOCK ELEVATIONS ACCOUNTING FOR 1 DEGREE DIP IN SALADO
!DEFINE GRID BLOCK ELEVATIONS DUE TO DIP
! USE ELEVATION OF SHAFT AT MID-REPOSITORY
ZORIGIN   =  382.671
YORIGIN   =  1000.0
ELEVN     = MAKENODE(COS(THETA1[ID:1])*(Z-ZORIGIN) &
            + SIN(THETA1[ID:1])*(Y-YORIGIN))
ELEVE     = NOD2ELE(ELEVN) + ZORIGIN
!COMPUTE GRID BLOCK POTENTIAL ASSUMING BRINE IS INCOMPRESSIBLE
(APPROXIMATELY)
POTE      = PRESEL/(DNSFLUID[ID:7]*GRAVACC[ID:10]) + ELEVE
!
! NOW SET GRID THICKNESS FOR ALL ELEMENTS TO CRUSHED PANEL HEIGHT
THICK    = MAKEATTR(HEIGHT[ID:1])
!
DELETE ELEVN, YORIGIN, ZORIGIN
EXIT
```

SCENARIO: S4

```
$ type alg_dbr_cra1_pre_dir_rel_s4.inp
!=========================================================================
!
!TITLE:BRAGFLO 1996 CCA CALCULATIONS: REPOSITORY SCALE BLOWOUT
!ANAYLST: Dan Stoelzel, SNL
!CREATED: NOV 2, 1995
!PURPOSE: ALGEBRA file computes properties that can not be obtained
!         from CAMDAT and/or assigns properties to element blocks.
!         THIS FILE PREPARES A .CDB FILE FOR PREBRAG TO READ
!IMPORTANT: This file originates from J.E. Bean's algebra file for his FEP
!           model. The methodologies to calculate dip were copied from his
!           file, with minor changes
!           made to account for the differences in the meshes.
!           ALGEBRA TO CALC. DIP IN REPOSITORY - SCALE BLOWOUT MODEL.
!           new version of bragflo
!
!       MODIFIED:
!               MARCH 26, 1996
!               BLOWOUT MODEL STRUGGLING IN PANEL SEAL REGION: TURNED OFF
!               CAP PRESSURE IN PANEL SEAL AND HALITE BY SETTING EQUAL TO
!               CAP PRESSURE IN WASTE REGION
!
!               MAY 17, 1996
!               ADDED BOUNDARY CONDITION WELL CALCULATION FOR E1-E2 SCEN.
!               NEW CHANGES FOR LATEST CCA ANALYSIS
!
!               June 29/1999   T. Hadgu
!               Corrected productivity index of intrusion borehole by
!               multiplying WELLPI by 2*PI.
!
!               July 22/1999   T. Hadgu
!               Changed the curve fit equations for Flowing Bottomhole
Pressure.
!               The new curve fits reflect the addition of 2*PI to WELLPI,
!               and were based on actual data from the 96 CCA 10,000 year
runs.
!
```

```
!               May 15/2002  T. Hadgu
!               Used equivalent permeabilities and porosities for panel
closure
!               (materials CONC_PCS AND PAN_S2) and DRZ next to panel closure
!               (material DRZ_PCS), to deal with Option D panel closure
!               implementation in the TBM vertical BRAGFLO grid.
!
!               May 28/2002 T. Hadgu
!               Subdivided the repository into 3 regions instead of 4
!               to account for new BRAGFLO TBM grid and Option D.
!
!               June 10/2002 T. Hadgu
!               Removed waste area properties that have been assigned to
other
!               materials. Proper material properties are now transferred
from
!               the 10,000-year BRAGFLO runs.
!
!               July 31,2003 J. Stein
!               Fixed AREA_TOT to represent the maximum spall volume of
!               4.0 m^3.  Changed the way initial porosity is calculated
!               for the panel closure materials.
!
!========================================================================
!************************************************************************
!CHAPTER 0:  DEFINE NEW VARIABLE NAMES AND SOME NEEDED CONSTANTS
!************************************************************************
!========================================================================
!
!
!  SET CONSTANTS AND PUT IN WASTE REGION
LIMIT BLOCK 1
THETA1   = MAKEPROP(DIP_DEG[ID:10]*2.0*PI[ID:10]/360.0)
THETA2   = MAKEPROP(0.0)
!
!
PERM_X   = 10**PRMX_LOG
PERM_Y   = 10**PRMY_LOG
PERM_Z   = 10**PRMZ_LOG
SB_MIN   = SAT_RBRN * 1.05
POR_COMP = COMP_RCK/POROSITY
!
! CALCULATE PROPERTIES FOR DRZ (DRZ_1)
LIMIT BLOCK 2
PERM_X   = PERMBRX
PERM_Y   = PERMBRX
PERM_Z   = PERMBRX
SB_MIN   = SAT_RBRN * 1.05
! NOW ADJUST POROSITY AND PORE COMPRESSIBILITY TO EQ. PORE VOL WITH CRUSHED
! ROOM HEIGHT
POROSITY = HEIGHT * POR_INTR / HEIGHT[ID:1]
POR_COMP = COMP_RCK/POROSITY
!
! CALCULATE PROPERTIES FOR SALADO HALITE (S_HALITE)
LIMIT BLOCK 3
PERM_X   = 10**PRMX_LOG
PERM_Y   = 10**PRMY_LOG
```

```
PERM_Z   = 10**PRMZ_LOG
SB_MIN   = SAT_RBRN * 1.05
! NOW ADJUST POROSITY AND PORE COMPRESSIBILITY TO EQ. PORE VOL WITH CRUSHED
! ROOM HEIGHT
POROSITY = HEIGHT * POROSITY / HEIGHT[ID:1]
POR_COMP = COMP_RCK/POROSITY
!
! CALC PROPERTIES FOR PANEL SEALS (CONC_PCS)
LIMIT BLOCK 4
! Changes made by T. Hadgu to introduce equivalent permeabilities:
!PERM_X   = 10**PRMX_LOG
!PERM_Y   = 10**PRMY_LOG
!
! Additions by T. Hadgu (04/23/02)
D1 = 32.1
D2 = 7.9
DE = 40.
PERM1_X = 10**PRMX_LOG[ID:1]
PERM2_X = 10**PRMX_LOG
PERM_X = DE*PERM1_X*PERM2_X/(D1*PERM2_X + D2*PERM1_X)
PERM_Y = D1*PERM1_X/DE + D2*PERM2_X/DE
!
PERM_Z   = 10**PRMZ_LOG
!
! JSS Define porosity of panel closures as length weighted mean porosity
!     of CONC_PCS and WAS_AREA. First define PORO_CONC for DRZ_CONC material.
PORO_CONC = POROSITY
POROSITY = (PORO_CONC*D2+POROSITY[ID:1]*D1)/DE
!
SB_MIN   = SAT_RBRN * 1.05
POR_COMP = COMP_RCK/POROSITY
!
PORE_DIS = PORE_DIS[ID:1]
SAT_RGAS = SAT_RGAS[ID:1]
SAT_RBRN = SAT_RBRN[ID:1]
CAP_MOD  = CAP_MOD[ID:1]
RELP_MOD = RELP_MOD[ID:1]
PC_MAX   = PC_MAX[ID:1]
PO_MIN   = PO_MIN[ID:1]
SB_MIN   = SAT_RBRN[ID:1]* 1.05
PCT_A    = PCT_A[ID:1]
PCT_EXP  = PCT_EXP[ID:1]
KPT      = KPT[ID:1]
!
! CALC PROPERTIES FOR DRZ/EXTENDED CONCRETE (DRZ_CONC):
!
LIMIT BLOCK 5
!
D1 = 32.1
D2 = 7.9
DE = 40.
PERM1_X = PERMBRX[ID:2]
PERM2_X = 10**PRMX_LOG[ID:4]
PERM_X = DE*PERM1_X*PERM2_X/(D1*PERM2_X + D2*PERM1_X)
PERM_Y = D1*PERM1_X/DE + D2*PERM2_X/DE
!
PERM_Z   = PERM_Z[ID:2]
```

```
!
!JSS Define porosity as length weighted mean porosity of DRZ and CONC_PCS
!
POROSITY = (POR_INTR[ID:2]*D2+PORO_CONC[ID:4]*D1)/DE
!
PORE_DIS = PORE_DIS[ID:2]
SAT_RGAS = SAT_RGAS[ID:2]
SAT_RBRN = SAT_RBRN[ID:2]
CAP_MOD  = CAP_MOD[ID:2]
RELP_MOD = RELP_MOD[ID:2]
PC_MAX   = PC_MAX[ID:2]
PO_MIN   = PO_MIN[ID:2]
SB_MIN   = SAT_RBRN[ID:2]* 1.05
KPT      = KPT[ID:2]
POR_INTR = POR_INTR[ID:2]
!
POR_COMP = COMP_RCK[ID:2]/POROSITY
!
! CALC PROPERTIES FOR CENTER PANEL SEALS (PAN_SL2):
!
LIMIT BLOCK 6
!
PERM_X   = PERM_Y[ID:4]
PERM_Y   = PERM_X[ID:4]
PERM_Z   = PERM_Z[ID:4]
!
POROSITY = POROSITY[ID:4]
!
PORE_DIS = PORE_DIS[ID:4]
SAT_RGAS = SAT_RGAS[ID:4]
SAT_RBRN = SAT_RBRN[ID:4]
CAP_MOD =  CAP_MOD[ID:4]
RELP_MOD = RELP_MOD[ID:4]
PC_MAX   = PC_MAX[ID:4]
PO_MIN   = PO_MIN[ID:4]
PCT_A    = PCT_A[ID:4]
PCT_EXP  = PCT_EXP[ID:4]
KPT      = KPT[ID:4]
HEIGHT   = HEIGHT[ID:4]
!
SB_MIN   = SB_MIN[ID:4]
POR_COMP = POR_COMP[ID:4]
!
!========================================================================
! SET WELLBORE PROPS
LIMIT BLOCK 9
SEBRINE1 = MAKEPROP(0.0)
SEGAS1   = MAKEPROP(0.0)
KRW1     = MAKEPROP(0.0)
KRG1     = MAKEPROP(0.0)
SEBRINE2 = MAKEPROP(0.0)
SEGAS2   = MAKEPROP(0.0)
KRW2     = MAKEPROP(0.0)
KRG2     = MAKEPROP(0.0)
SEBRINE3 = MAKEPROP(0.0)
SEGAS3   = MAKEPROP(0.0)
KRW3     = MAKEPROP(0.0)
```

```
KRG3     = MAKEPROP(0.0)
! DEFINE CONSTANTS FOR THE THREE EQUATIONS TO BE USED TO CALCULATE FBHP
! EQUATION 1: (FOR BRINE FLOW ONLY, KRG = 0)
! FBHP = A + BX + CY + DX^2 + EY^2 + FXY + GX^3 + HY^3 + IXY^2 + JYX^2
!    X = LOG10(BRINE CONST) LOG M^3/pA-S
!    Y = PANEL PRESSURE (Pa)
!  8.00739E6 Pa < FBHP < 8.04391E6 Pa
EQ1_A  = MAKEPROP(3.2279346E+11)
EQ1_B  = MAKEPROP(9.4816648E+10)
EQ1_C  = MAKEPROP(-6200.2715)
EQ1_D  = MAKEPROP(9.2450601E+09)
EQ1_E  = MAKEPROP(4.1464475E-06)
EQ1_F  = MAKEPROP(-1288.6068)
EQ1_G  = MAKEPROP(2.9905582E+08)
EQ1_H  = MAKEPROP(1.0857041E-14)
EQ1_I  = MAKEPROP(4.7119798E-07)
EQ1_J  = MAKEPROP(-66.90712)
!
! EQUATION 2: (FOR LOG10(KRG/KRW) < 0  BRINE DOMINATED FLOW)
! FBHP = (A + BX + CX^2 + DY/(1 + EX + FX^2 + GX^3 + HY)
!    X = LOG10(KRG/KRB)
!    Y = PANEL PRESSURE (Pa)
!   7.42886E5 Pa < FBHP < 8.04353E6 Pa
EQ2_A  = MAKEPROP(1606507.7)
EQ2_B  = MAKEPROP(2624339.7)
EQ2_C  = MAKEPROP(2476889.9)
EQ2_D  = MAKEPROP(-0.053635476)
EQ2_E  = MAKEPROP(0.70815693)
EQ2_F  = MAKEPROP(0.38012696)
EQ2_G  = MAKEPROP(0.0041916956)
EQ2_H  = MAKEPROP(-2.4887085E-08)
!
! EQUATION 3: (FOR LOG10(KRG/KRW) > 0  GAS DOMINATED FLOW)
! FBHP = A + B/X + CY + D/X^2 + EY^2 + FY/X + G/X^3 + HY^3 + IY^2/X + JY/X^2
!    X = LOG10(GAS CONST) LOG M^3/pA-S
!    Y = PANEL PRESSURE (Pa)
! 2.07363E5 Pa < FBHP < 1.66394E6 Pa
EQ3_A  = MAKEPROP(-1.0098405E+09)
EQ3_B  = MAKEPROP(-2.3044622E+10)
EQ3_C  = MAKEPROP(9.8039146)
EQ3_D  = MAKEPROP(-1.7426466E+11)
EQ3_E  = MAKEPROP(1.8309137E-07)
EQ3_F  = MAKEPROP(174.97064)
EQ3_G  = MAKEPROP(-4.3698224E+11)
EQ3_H  = MAKEPROP(-1.4891198E-16)
EQ3_I  = MAKEPROP(1.3006196E-06)
EQ3_J  = MAKEPROP(757.44833)
!
! CALCULATE SKIN FROM SPALL REMOVED, & WELL PRODUCTIVITY INDEX
! ELEMENT 59 IS LOCATION OF WELL2 (2ND INTRUSION DOWN DIP)
!
! JSS: Setting AREA_TOT to a constant.  AREA_TOT=MAX[SPALL VOL]/Initial
Height
! JSS: AREA_TOT=4.0/3.96 = 1.01
!
AREA_TOT = 1.01
!
```

```
WELLRAD  = BITSIZE/2
!
DRNRAD_L = SQRT(DEL_X[E:59]*DEL_Y[E:59]/PI[ID:10])
!DRNRAD_M = SQRT(DEL_X[E:240]*DEL_Y[E:240]/PI[ID:10])
!DRNRAD_U = SQRT(DEL_X[E:708]*DEL_Y[E:708]/PI[ID:10])
!
SKIN     = -1.0*LOG(SQRT(AREA_TOT/PI[ID:10])/WELLRAD)
SKIN     = IFLT0(SKIN,SKIN,0)
! CHECK TO BE SURE WELLPI IS NOT 0 OR NEG, & SET TO 1.0 IF IT IS
! WELLPI   = PERM_X[ID:1] * HEIGHT[ID:1] / (LOG(DRNRAD/WELLRAD) + SKIN - 0.5)
!JSS
WELLPI_L   = IFGT0(LOG(DRNRAD_L/WELLRAD) + SKIN - 0.5,PERM_X[ID:1]* &
          HEIGHT[ID:1] &
          / (LOG(DRNRAD_L/WELLRAD) + SKIN - 0.5),1.0)
!WELLPI_M   = IFGT0(LOG(DRNRAD_M/WELLRAD) + SKIN - 0.5,PERM_X[ID:1]* &
!           HEIGHT[ID:1] &
!           / (LOG(DRNRAD_M/WELLRAD) + SKIN - 0.5),1.0)
!WELLPI_U   = IFGT0(LOG(DRNRAD_U/WELLRAD) + SKIN - 0.5,PERM_X[ID:1]* &
!           HEIGHT[ID:1] &
!           / (LOG(DRNRAD_U/WELLRAD) + SKIN - 0.5),1.0)
!!JSS
! WELLPI has been modified by T. Hadgu on 06/29/99 as follows:
!JSS
WELLPI_L   = WELLPI_L*2.*PI[ID:10]
!WELLPI_M   = WELLPI_M*2.*PI[ID:10]
!WELLPI_U   = WELLPI_U*2.*PI[ID:10]
!JSS
! CALCULATE CONSTANTS NEEDED FOR WELLBORE MODEL:
! CALCULATE EFFECTIVE SATURATION USING KRP = 4 (BROOKS - COREY MODIFIED,
! WITH LAMBDA (PORE_DIS) = 2.89, NO CAP PRESSURE). DO FOR 3 COUPLED REGIONS
! REGION NO 1 (PANELS 1,2,7,8 & 9)
BRINE1   = IFLT0((BSATPAN1[ID:1]-
SAT_RBRN[ID:1]),SAT_RBRN[ID:1],BSATPAN1[ID:1])
SEBRINE1 = (BRINE1 - SAT_RBRN[ID:1])/(1.0 - SAT_RBRN[ID:1])
SEGAS1   = (BRINE1 - SAT_RBRN[ID:1])/(1.0-SAT_RBRN[ID:1]-SAT_RGAS[ID:1])
SEGAS1   = IFLT0((1.0 - SEGAS1),1.0,SEGAS1)
KRW1     = SEBRINE1**((2+3*PORE_DIS[ID:1])/PORE_DIS[ID:1])
KRG1     = (1.0-SEGAS1)**2*(1.0-SEGAS1**((2 +
PORE_DIS[ID:1])/PORE_DIS[ID:1]))
! NOW CALCULATE CONSTANT FOR BRINE AND GAS
!JSS
CONBR1_L   = WELLPI_L * KRW1 / VISCO[ID:7]
!CONBR1_M   = WELLPI_M * KRW1 / VISCO[ID:7]
!CONBR1_U   = WELLPI_U * KRW1 / VISCO[ID:7]
CONGS1_L  = WELLPI_L * KRG1 / VISCO[ID:8]
!CONGS1_M  = WELLPI_M * KRG1 / VISCO[ID:8]
!CONGS1_U  = WELLPI_U * KRG1 / VISCO[ID:8]
!JSS
! NOW TAKE LOG BASE 10 OF PARAMETERS NEEDED FOR FBHP EQUATIONS
!JSS
LOG_B1_L   = IFEQ0(KRW1,-10,LOG10(CONBR1_L+1E-24))
!LOG_B1_M   = IFEQ0(KRW1,-10,LOG10(CONBR1_M+1E-24))
!LOG_B1_U   = IFEQ0(KRW1,-10,LOG10(CONBR1_U+1E-24))
!JSS
LOG_KR1  = IFEQ0(KRW1,10,LOG10((KRG1+1E-24)/(KRW1+1E-24)))
! INTRODUCE A TERM FOR GAS DOMINATED FLOW
!JSS
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LOG_G1_L   = IFEQ0(KRG1,-10,LOG10(CONGS1_L+1E-24))
!LOG_G1_M   = IFEQ0(KRG1,-10,LOG10(CONGS1_M+1E-24))
!LOG_G1_U   = IFEQ0(KRG1,-10,LOG10(CONGS1_U+1E-24))
!
! CALCULATE FBHP's AND SET WITHIN LIMITS
!
PR1_E1_L  = EQ1_A+EQ1_B*LOG_B1_L+EQ1_C*PRESPAN1[ID:1]+EQ1_D*LOG_B1_L**2+ &
          EQ1_E*PRESPAN1[ID:1]**2+EQ1_F*LOG_B1_L*PRESPAN1[ID:1]+ &
          EQ1_G*LOG_B1_L**3+EQ1_H*PRESPAN1[ID:1]**3+&
          EQ1_I*LOG_B1_L*PRESPAN1[ID:1]**2+EQ1_J*LOG_B1_L**2*PRESPAN1[ID:1]
PR1_E1_L  = IFLT0(8007390.0 - PR1_E1_L,IFLT0(8043910.0 - PR1_E1_L,8043910.0,
&
          PR1_E1_L),8007390.0)
!PR1_E1_M  = EQ1_A+EQ1_B*LOG_B1_M+EQ1_C*PRESPAN1[ID:1]+EQ1_D*LOG_B1_M**2+ &
!           EQ1_E*PRESPAN1[ID:1]**2+EQ1_F*LOG_B1_M*PRESPAN1[ID:1]+ &
!           EQ1_G*LOG_B1_M**3+EQ1_H*PRESPAN1[ID:1]**3+&
!           EQ1_I*LOG_B1_M*PRESPAN1[ID:1]**2+EQ1_J*LOG_B1_M**2*PRESPAN1[ID:1]
!PR1_E1_M  = IFLT0(8007390.0 - PR1_E1_M,IFLT0(8043910.0 - PR1_E1_M,8043910.0,
&
!           PR1_E1_M),8007390.0)
!PR1_E1_U  = EQ1_A+EQ1_B*LOG_B1_U+EQ1_C*PRESPAN1[ID:1]+EQ1_D*LOG_B1_U**2+ &
!           EQ1_E*PRESPAN1[ID:1]**2+EQ1_F*LOG_B1_U*PRESPAN1[ID:1]+ &
!           EQ1_G*LOG_B1_U**3+EQ1_H*PRESPAN1[ID:1]**3+&
!           EQ1_I*LOG_B1_U*PRESPAN1[ID:1]**2+EQ1_J*LOG_B1_U**2*PRESPAN1[ID:1]
!PR1_E1_U  = IFLT0(8007390.0 - PR1_E1_U,IFLT0(8043910.0 - PR1_E1_U,8043910.0,
&
!           PR1_E1_U),8007390.0)
!!JSS
!
PR1_E2  = (EQ2_A+EQ2_B*LOG_KR1+EQ2_C*LOG_KR1**2+EQ2_D*PRESPAN1[ID:1])/ &
          (1.0+EQ2_E*LOG_KR1+EQ2_F*LOG_KR1**2+EQ2_G*LOG_KR1**3+ &
          EQ2_H*PRESPAN1[ID:1])
PR1_E2  = IFLT0(742886.0 - PR1_E2,IFLT0(8043530.0 - PR1_E2,8043530.0, &
          PR1_E2),742886.0)
!JSS
PR1_E3_L  = EQ3_A+EQ3_B/LOG_G1_L+EQ3_C*PRESPAN1[ID:1]+EQ3_D/LOG_G1_L**2+ &
          EQ3_E*PRESPAN1[ID:1]**2+EQ3_F*PRESPAN1[ID:1]/LOG_G1_L+ &
          EQ3_G/LOG_G1_L**3+ EQ3_H*PRESPAN1[ID:1]**3+ &
          EQ3_I*PRESPAN1[ID:1]**2/LOG_G1_L+ &
          EQ3_J*PRESPAN1[ID:1]/LOG_G1_L**2
!PR1_E3_M  = EQ3_A+EQ3_B/LOG_G1_M+EQ3_C*PRESPAN1[ID:1]+EQ3_D/LOG_G1_M**2+ &
!           EQ3_E*PRESPAN1[ID:1]**2+EQ3_F*PRESPAN1[ID:1]/LOG_G1_M+ &
!           EQ3_G/LOG_G1_M**3+ EQ3_H*PRESPAN1[ID:1]**3+ &
!           EQ3_I*PRESPAN1[ID:1]**2/LOG_G1_M+ &
!           EQ3_J*PRESPAN1[ID:1]/LOG_G1_M**2
!PR1_E3_U  = EQ3_A+EQ3_B/LOG_G1_U+EQ3_C*PRESPAN1[ID:1]+EQ3_D/LOG_G1_U**2+ &
!           EQ3_E*PRESPAN1[ID:1]**2+EQ3_F*PRESPAN1[ID:1]/LOG_G1_U+ &
!           EQ3_G/LOG_G1_U**3+ EQ3_H*PRESPAN1[ID:1]**3+ &
!           EQ3_I*PRESPAN1[ID:1]**2/LOG_G1_U+ &
!           EQ3_J*PRESPAN1[ID:1]/LOG_G1_U**2
!
PR1_E3_L  = IFLT0(207363.0 - PR1_E3_L,IFLT0(1663940.0 - PR1_E3_L,1663940.0, &
          PR1_E3_L),207363.0)
!PR1_E3_M  = IFLT0(207363.0 - PR1_E3_M,IFLT0(1663940.0 - PR1_E3_M,1663940.0,
&
!           PR1_E3_M),207363.0)
!PR1_E3_U  = IFLT0(207363.0 - PR1_E3_U,IFLT0(1663940.0 - PR1_E3_U,1663940.0,
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&
!            PR1_E3_U),207363.0)
!JSS
!
! RESET FBHP TO 0 IF NO BRINE BLOWOUT (KRW = 0 OR PRESSURE < 8 MPa)
!JSS
FBHP1_L    = IFEQ0(KRW1,0,IFLT0(PRESPAN1[ID:1]-8.0E6,0, &
          IFEQ0(KRG1,PR1_E1_L,IFLT0(LOG_KR1,PR1_E2,PR1_E3_L))))
!FBHP1_M    = IFEQ0(KRW1,0,IFLT0(PRESPAN1[ID:1]-8.0E6,0, &
!            IFEQ0(KRG1,PR1_E1_M,IFLT0(LOG_KR1,PR1_E2,PR1_E3_M))))
!FBHP1_U    = IFEQ0(KRW1,0,IFLT0(PRESPAN1[ID:1]-8.0E6,0, &
!            IFEQ0(KRG1,PR1_E1_U,IFLT0(LOG_KR1,PR1_E2,PR1_E3_U))))
!JSS
!
! IF NO BLOWOUT, SET NUMBER OF BRAGFLO STEPS TO 1, ELSE 1000
!JSS
NSTEP1_L = MAKEPROP(IFEQ0(FBHP1_L,1,1000))
!NSTEP1_M = MAKEPROP(IFEQ0(FBHP1_M,1,1000))
!NSTEP1_U = MAKEPROP(IFEQ0(FBHP1_U,1,1000))
!JSS
! REGION NO 2 (PANELS 3,4,6 & 10)
BRINE2   = IFLT0((BSATPAN2[ID:1]-
SAT_RBRN[ID:1]),SAT_RBRN[ID:1],BSATPAN2[ID:1])
SEBRINE2 = (BRINE2 - SAT_RBRN[ID:1])/(1.0 - SAT_RBRN[ID:1])
SEGAS2   = (BRINE2 - SAT_RBRN[ID:1])/(1.0-SAT_RBRN[ID:1]-SAT_RGAS[ID:1])
SEGAS2   = IFLT0((1.0 - SEGAS2),1.0,SEGAS2)
KRW2     = SEBRINE2**((2+3*PORE_DIS[ID:1])/PORE_DIS[ID:1])
KRG2     = (1.0-SEGAS2)**2*(1.0-SEGAS2**((2 +
PORE_DIS[ID:1])/PORE_DIS[ID:1]))
! NOW CALCULATE CONSTANT FOR BRINE AND GAS
!JSS
CONBR2_L   = WELLPI_L * KRW2 / VISCO[ID:7]
!CONBR2_M   = WELLPI_M * KRW2 / VISCO[ID:7]
!CONBR2_U   = WELLPI_U * KRW2 / VISCO[ID:7]
CONGS2_L  = WELLPI_L * KRG2 / VISCO[ID:8]
!CONGS2_M  = WELLPI_M * KRG2 / VISCO[ID:8]
!CONGS2_U  = WELLPI_U * KRG2 / VISCO[ID:8]
!
! NOW TAKE LOG BASE 10 OF PARAMETERS NEEDED FOR FBHP EQUATIONS
!JSS
LOG_B2_L   = IFEQ0(KRW2,-10,LOG10(CONBR2_L+1E-24))
!LOG_B2_M   = IFEQ0(KRW2,-10,LOG10(CONBR2_M+1E-24))
!LOG_B2_U   = IFEQ0(KRW2,-10,LOG10(CONBR2_U+1E-24))
!
LOG_KR2  = IFEQ0(KRW2,10,LOG10((KRG2+1E-24)/(KRW2+1E-24)))
! INTRODUCE A TERM FOR GAS DOMINATED FLOW
!JSS
LOG_G2_L   = IFEQ0(KRG2,-10,LOG10(CONGS2_L+1E-24))
!LOG_G2_M   = IFEQ0(KRG2,-10,LOG10(CONGS2_M+1E-24))
!LOG_G2_U   = IFEQ0(KRG2,-10,LOG10(CONGS2_U+1E-24))
! CALCULATE FBHP's AND SET WITHIN LIMITS
!
PR2_E1_L  = EQ1_A+EQ1_B*LOG_B2_L+EQ1_C*PRESPAN2[ID:1]+EQ1_D*LOG_B2_L**2+ &
          EQ1_E*PRESPAN2[ID:1]**2+EQ1_F*LOG_B2_L*PRESPAN2[ID:1]+ &
          EQ1_G*LOG_B2_L**3+EQ1_H*PRESPAN2[ID:1]**3+&
          EQ1_I*LOG_B2_L*PRESPAN2[ID:1]**2+EQ1_J*LOG_B2_L**2*PRESPAN2[ID:1]
PR2_E1_L  = IFLT0(8007390.0 - PR2_E1_L,IFLT0(8043910.0 - PR2_E1_L,8043910.0,&
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          PR2_E1_L),8007390.0)
!PR2_E1_M  = EQ1_A+EQ1_B*LOG_B2_M+EQ1_C*PRESPAN2[ID:1]+EQ1_D*LOG_B2_M**2+ &
!            EQ1_E*PRESPAN2[ID:1]**2+EQ1_F*LOG_B2_M*PRESPAN2[ID:1]+ &
!            EQ1_G*LOG_B2_M**3+EQ1_H*PRESPAN2[ID:1]**3+&
!            EQ1_I*LOG_B2_M*PRESPAN2[ID:1]**2+EQ1_J*LOG_B2_M**2*PRESPAN2[ID:1]
!PR2_E1_M  = IFLT0(8007390.0 - PR2_E1_M,IFLT0(8043910.0 -
PR2_E1_M,8043910.0,&
!            PR2_E1_M),8007390.0)
!PR2_E1_U  = EQ1_A+EQ1_B*LOG_B2_U+EQ1_C*PRESPAN2[ID:1]+EQ1_D*LOG_B2_U**2+ &
!            EQ1_E*PRESPAN2[ID:1]**2+EQ1_F*LOG_B2_U*PRESPAN2[ID:1]+ &
!            EQ1_G*LOG_B2_U**3+EQ1_H*PRESPAN2[ID:1]**3+&
!            EQ1_I*LOG_B2_U*PRESPAN2[ID:1]**2+EQ1_J*LOG_B2_U**2*PRESPAN2[ID:1]
!PR2_E1_U  = IFLT0(8007390.0 - PR2_E1_U,IFLT0(8043910.0 -
PR2_E1_U,8043910.0,&
!            PR2_E1_U),8007390.0)
!
PR2_E2   = (EQ2_A+EQ2_B*LOG_KR2+EQ2_C*LOG_KR2**2+EQ2_D*PRESPAN2[ID:1])/ &
          (1.0+EQ2_E*LOG_KR2+EQ2_F*LOG_KR2**2+EQ2_G*LOG_KR2**3+ &
          EQ2_H*PRESPAN2[ID:1])
PR2_E2   = IFLT0(742886.0 - PR2_E2,IFLT0(8043530.0 - PR2_E2,8043530.0, &
          PR2_E2),742886.0)
!
PR2_E3_L  = EQ3_A+EQ3_B/LOG_G2_L+EQ3_C*PRESPAN2[ID:1]+EQ3_D/LOG_G2_L**2+ &
          EQ3_E*PRESPAN2[ID:1]**2+EQ3_F*PRESPAN2[ID:1]/LOG_G2_L+ &
          EQ3_G/LOG_G2_L**3+ EQ3_H*PRESPAN2[ID:1]**3+ &
          EQ3_I*PRESPAN2[ID:1]**2/LOG_G2_L+ &
          EQ3_J*PRESPAN2[ID:1]/LOG_G2_L**2
!PR2_E3_M  = EQ3_A+EQ3_B/LOG_G2_M+EQ3_C*PRESPAN2[ID:1]+EQ3_D/LOG_G2_M**2+ &
!            EQ3_E*PRESPAN2[ID:1]**2+EQ3_F*PRESPAN2[ID:1]/LOG_G2_M+ &
!            EQ3_G/LOG_G2_M**3+ EQ3_H*PRESPAN2[ID:1]**3+ &
!            EQ3_I*PRESPAN2[ID:1]**2/LOG_G2_M+ &
!            EQ3_J*PRESPAN2[ID:1]/LOG_G2_M**2
!PR2_E3_U  = EQ3_A+EQ3_B/LOG_G2_U+EQ3_C*PRESPAN2[ID:1]+EQ3_D/LOG_G2_U**2+ &
!            EQ3_E*PRESPAN2[ID:1]**2+EQ3_F*PRESPAN2[ID:1]/LOG_G2_U+ &
!            EQ3_G/LOG_G2_U**3+ EQ3_H*PRESPAN2[ID:1]**3+ &
!            EQ3_I*PRESPAN2[ID:1]**2/LOG_G2_U+ &
!            EQ3_J*PRESPAN2[ID:1]/LOG_G2_U**2
!
PR2_E3_L  = IFLT0(207363.0 - PR2_E3_L,IFLT0(1663940.0 - PR2_E3_L,1663940.0, &
          PR2_E3_L),207363.0)
!PR2_E3_M  = IFLT0(207363.0 - PR2_E3_M,IFLT0(1663940.0 - PR2_E3_M,1663940.0,
&
!            PR2_E3_M),207363.0)
!PR2_E3_U  = IFLT0(207363.0 - PR2_E3_U,IFLT0(1663940.0 - PR2_E3_U,1663940.0,
&
!            PR2_E3_U),207363.0)
!
! RESET FBHP TO 0 IF NO BRINE BLOWOUT (KRW = 0 OR PRESSURE < 8 MPa)
FBHP2_L    = IFEQ0(KRW2,0,IFLT0(PRESPAN2[ID:1]-8.0E6,0, &
          IFEQ0(KRG2,PR2_E1_L,IFLT0(LOG_KR2,PR2_E2,PR2_E3_L))))
!FBHP2_M    = IFEQ0(KRW2,0,IFLT0(PRESPAN2[ID:1]-8.0E6,0, &
!            IFEQ0(KRG2,PR2_E1_M,IFLT0(LOG_KR2,PR2_E2,PR2_E3_M))))
!FBHP2_U    = IFEQ0(KRW2,0,IFLT0(PRESPAN2[ID:1]-8.0E6,0, &
!            IFEQ0(KRG2,PR2_E1_U,IFLT0(LOG_KR2,PR2_E2,PR2_E3_U))))
!
! IF NO BLOWOUT, SET NUMBER OF BRAGFLO STEPS TO 1, ELSE 1000
NSTEP2_L = MAKEPROP(IFEQ0(FBHP2_L,1,1000))
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!NSTEP2_M = MAKEPROP(IFEQ0(FBHP2_M,1,1000))
!NSTEP2_U = MAKEPROP(IFEQ0(FBHP2_U,1,1000))
!!
! REGION NO 3 (PANEL 5)
BRINE3   = IFLT0((BSATPAN3[ID:1]-
SAT_RBRN[ID:1]),SAT_RBRN[ID:1],BSATPAN3[ID:1])
SEBRINE3 = (BRINE3 - SAT_RBRN[ID:1])/(1.0 - SAT_RBRN[ID:1])
SEGAS3   = (BRINE3 - SAT_RBRN[ID:1])/(1.0-SAT_RBRN[ID:1]-SAT_RGAS[ID:1])
SEGAS3   = IFLT0((1.0 - SEGAS3),1.0,SEGAS3)
KRW3     = SEBRINE3**((2+3*PORE_DIS[ID:1])/PORE_DIS[ID:1])
KRG3     = (1.0-SEGAS3)**2*(1.0-SEGAS3**((2 +
PORE_DIS[ID:1])/PORE_DIS[ID:1]))
! NOW CALCULATE CONSTANT FOR BRINE AND GAS
!JSS
CONBR3_L   = WELLPI_L * KRW3 / VISCO[ID:7]
!CONBR3_M   = WELLPI_M * KRW3 / VISCO[ID:7]
!CONBR3_U   = WELLPI_U * KRW3 / VISCO[ID:7]
CONGS3_L  = WELLPI_L * KRG3 / VISCO[ID:8]
!CONGS3_M  = WELLPI_M * KRG3 / VISCO[ID:8]
!CONGS3_U  = WELLPI_U * KRG3 / VISCO[ID:8]
!JSS
! NOW TAKE LOG BASE 10 OF PARAMETERS NEEDED FOR FBHP EQUATIONS
!JSS
LOG_B3_L   = IFEQ0(KRW3,-10,LOG10(CONBR3_L+1E-24))
!LOG_B3_M   = IFEQ0(KRW3,-10,LOG10(CONBR3_M+1E-24))
!LOG_B3_U   = IFEQ0(KRW3,-10,LOG10(CONBR3_U+1E-24))
!
LOG_KR3  = IFEQ0(KRW3,10,LOG10((KRG3+1E-24)/(KRW3+1E-24)))
! INTRODUCE A TERM FOR GAS DOMINATED FLOW
!JSS
LOG_G3_L   = IFEQ0(KRG3,-10,LOG10(CONGS3_L+1E-24))
!LOG_G3_M   = IFEQ0(KRG3,-10,LOG10(CONGS3_M+1E-24))
!LOG_G3_U   = IFEQ0(KRG3,-10,LOG10(CONGS3_U+1E-24))
!
!
! CALCULATE FBHP's AND SET WITHIN LIMITS
!
!
PR3_E1_L  = EQ1_A+EQ1_B*LOG_B3_L+EQ1_C*PRESPAN3[ID:1]+EQ1_D*LOG_B3_L**2+ &
          EQ1_E*PRESPAN3[ID:1]**2+EQ1_F*LOG_B3_L*PRESPAN3[ID:1]+ &
          EQ1_G*LOG_B3_L**3+EQ1_H*PRESPAN3[ID:1]**3+&
          EQ1_I*LOG_B3_L*PRESPAN3[ID:1]**2+EQ1_J*LOG_B3_L**2*PRESPAN3[ID:1]
PR3_E1_L  = IFLT0(8007390.0 - PR3_E1_L,IFLT0(8043910.0 - PR3_E1_L,8043910.0,&
          PR3_E1_L),8007390.0)
!PR3_E1_M  = EQ1_A+EQ1_B*LOG_B3_M+EQ1_C*PRESPAN3[ID:1]+EQ1_D*LOG_B3_M**2+ &
!           EQ1_E*PRESPAN3[ID:1]**2+EQ1_F*LOG_B3_M*PRESPAN3[ID:1]+ &
!           EQ1_G*LOG_B3_M**3+EQ1_H*PRESPAN3[ID:1]**3+&
!           EQ1_I*LOG_B3_M*PRESPAN3[ID:1]**2+EQ1_J*LOG_B3_M**2*PRESPAN3[ID:1]
!PR3_E1_M  = IFLT0(8007390.0 - PR3_E1_M,IFLT0(8043910.0 -
PR3_E1_M,8043910.0,&
!           PR3_E1_M),8007390.0)
!PR3_E1_U  = EQ1_A+EQ1_B*LOG_B3_U+EQ1_C*PRESPAN3[ID:1]+EQ1_D*LOG_B3_U**2+ &
!           EQ1_E*PRESPAN3[ID:1]**2+EQ1_F*LOG_B3_U*PRESPAN3[ID:1]+ &
!           EQ1_G*LOG_B3_U**3+EQ1_H*PRESPAN3[ID:1]**3+&
!           EQ1_I*LOG_B3_U*PRESPAN3[ID:1]**2+EQ1_J*LOG_B3_U**2*PRESPAN3[ID:1]
!PR3_E1_U  = IFLT0(8007390.0 - PR3_E1_U,IFLT0(8043910.0 -
PR3_E1_U,8043910.0,&
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!           PR3_E1_U),8007390.0)
!
PR3_E2  = (EQ2_A+EQ2_B*LOG_KR3+EQ2_C*LOG_KR3**2+EQ2_D*PRESPAN3[ID:1])/ &
          (1.0+EQ2_E*LOG_KR3+EQ2_F*LOG_KR3**2+EQ2_G*LOG_KR3**3+ &
          EQ2_H*PRESPAN3[ID:1])
PR3_E2  = IFLT0(742886.0 - PR3_E2,IFLT0(8043530.0 - PR3_E2,8043530.0, &
          PR3_E2),742886.0)
!
PR3_E3_L  = EQ3_A+EQ3_B/LOG_G3_L+EQ3_C*PRESPAN3[ID:1]+EQ3_D/LOG_G3_L**2+ &
          EQ3_E*PRESPAN3[ID:1]**2+EQ3_F*PRESPAN3[ID:1]/LOG_G3_L+ &
          EQ3_G/LOG_G3_L**3+ EQ3_H*PRESPAN3[ID:1]**3+ &
          EQ3_I*PRESPAN3[ID:1]**2/LOG_G3_L+ &
          EQ3_J*PRESPAN3[ID:1]/LOG_G3_L**2
!PR3_E3_M  = EQ3_A+EQ3_B/LOG_G3_M+EQ3_C*PRESPAN3[ID:1]+EQ3_D/LOG_G3_M**2+ &
!           EQ3_E*PRESPAN3[ID:1]**2+EQ3_F*PRESPAN3[ID:1]/LOG_G3_M+ &
!           EQ3_G/LOG_G3_M**3+ EQ3_H*PRESPAN3[ID:1]**3+ &
!           EQ3_I*PRESPAN3[ID:1]**2/LOG_G3_M+ &
!           EQ3_J*PRESPAN3[ID:1]/LOG_G3_M**2
!PR3_E3_U  = EQ3_A+EQ3_B/LOG_G3_U+EQ3_C*PRESPAN3[ID:1]+EQ3_D/LOG_G3_U**2+ &
!           EQ3_E*PRESPAN3[ID:1]**2+EQ3_F*PRESPAN3[ID:1]/LOG_G3_U+ &
!           EQ3_G/LOG_G3_U**3+ EQ3_H*PRESPAN3[ID:1]**3+ &
!           EQ3_I*PRESPAN3[ID:1]**2/LOG_G3_U+ &
!           EQ3_J*PRESPAN3[ID:1]/LOG_G3_U**2
!!
PR3_E3_L  = IFLT0(207363.0 - PR3_E3_L,IFLT0(1663940.0 - PR3_E3_L,1663940.0, &
          PR3_E3_L),207363.0)
!PR3_E3_M  = IFLT0(207363.0 - PR3_E3_M,IFLT0(1663940.0 - PR3_E3_M,1663940.0,
&
!           PR3_E3_M),207363.0)
!PR3_E3_U  = IFLT0(207363.0 - PR3_E3_U,IFLT0(1663940.0 - PR3_E3_U,1663940.0,
&
!           PR3_E3_U),207363.0)
!
! RESET FBHP TO 0 IF NO BRINE BLOWOUT (KRW = 0 OR PRESSURE < 8 MPa)
FBHP3_L    = IFEQ0(KRW3,0,IFLT0(PRESPAN3[ID:1]-8.0E6,0, &
          IFEQ0(KRG3,PR3_E1_L,IFLT0(LOG_KR3,PR3_E2,PR3_E3_L))))
!FBHP3_M    = IFEQ0(KRW3,0,IFLT0(PRESPAN3[ID:1]-8.0E6,0, &
!           IFEQ0(KRG3,PR3_E1_M,IFLT0(LOG_KR3,PR3_E2,PR3_E3_L))))
!FBHP3_U    = IFEQ0(KRW3,0,IFLT0(PRESPAN3[ID:1]-8.0E6,0, &
!           IFEQ0(KRG3,PR3_E1_U,IFLT0(LOG_KR3,PR3_E2,PR3_E3_L))))

! IF NO BLOWOUT, SET NUMBER OF BRAGFLO STEPS TO 1, ELSE 1000
NSTEP3_L = MAKEPROP(IFEQ0(FBHP3_L,1,1000))
!NSTEP3_M = MAKEPROP(IFEQ0(FBHP3_M,1,1000))
!NSTEP3_U = MAKEPROP(IFEQ0(FBHP3_U,1,1000))
DELETE BRINE1, BRINE2, BRINE3
!=====================================================================
!*********************************************************************
!SET UP BOUNDARY CONDITIONS FOR PREVIOUS INTRUSIONS HERE
!*********************************************************************
! WELLPI AND FBHP ARE SET TO ZERO FOR E2 INTRUSIONS (S4, S5)
WELPI_BC = MAKEPROP(0.0)
BHP_ABAN = MAKEPROP(0.0)
!*********************************************************************
!==============================================
!*********************************************************************
!CHAPTER 3.  COMPUTE DIP IN REPOSITORY
```

```
!*********************************************************************
!*********************************************************************
!===============================================
!===============================================
LIMIT ELEMENT OFF
!COMPUTE THE GRID BLOCK ELEVATIONS ACCOUNTING FOR 1 DEGREE DIP IN SALADO
!DEFINE GRID BLOCK ELEVATIONS DUE TO DIP
! USE ELEVATION OF SHAFT AT MID-REPOSITORY
ZORIGIN   =  382.671
YORIGIN   =  1000.0
ELEVN     = MAKENODE(COS(THETA1[ID:1])*(Z-ZORIGIN) &
           + SIN(THETA1[ID:1])*(Y-YORIGIN))
ELEVE     = NOD2ELE(ELEVN) + ZORIGIN
!COMPUTE GRID BLOCK POTENTIAL ASSUMING BRINE IS INCOMPRESSIBLE
(APPROXIMATELY)
POTE      = PRESEL/(DNSFLUID[ID:7]*GRAVACC[ID:10]) + ELEVE
!
! NOW SET GRID THICKNESS FOR ALL ELEMENTS TO CRUSHED PANEL HEIGHT
THICK    = MAKEATTR(HEIGHT[ID:1])
!
DELETE ELEVN, YORIGIN, ZORIGIN
EXIT
```

SCENARIO: S5

```
$ type alg_dbr_cra1_pre_dir_rel_s5.inp
!==========================================================================
!
!TITLE:BRAGFLO 1996 CCA CALCULATIONS: REPOSITORY SCALE BLOWOUT
!ANAYLST: Dan Stoelzel, SNL
!CREATED: NOV 2, 1995
!PURPOSE: ALGEBRA file computes properties that can not be obtained
!         from CAMDAT and/or assigns properties to element blocks.
!         THIS FILE PREPARES A .CDB FILE FOR PREBRAG TO READ
!IMPORTANT: This file originates from J.E. Bean's algebra file for his FEP
!           model. The methodologies to calculate dip were copied from his
!           file, with minor changes
!           made to account for the differences in the meshes.
!           ALGEBRA TO CALC. DIP IN REPOSITORY - SCALE BLOWOUT MODEL.
!           new version of bragflo
!
!       MODIFIED:
!               MARCH 26, 1996
!               BLOWOUT MODEL STRUGGLING IN PANEL SEAL REGION: TURNED OFF
!               CAP PRESSURE IN PANEL SEAL AND HALITE BY SETTING EQUAL TO
!               CAP PRESSURE IN WASTE REGION
!
!               MAY 17, 1996
!               ADDED BOUNDARY CONDITION WELL CALCULATION FOR E1-E2 SCEN.
!               NEW CHANGES FOR LATEST CCA ANALYSIS
!
!               June 29/1999   T. Hadgu
!               Corrected productivity index of intrusion borehole by
!               multiplying WELLPI by 2*PI.
!
!               July 22/1999   T. Hadgu
!               Changed the curve fit equations for Flowing Bottomhole
```

```
Pressure.
!               The new curve fits reflect the addition of 2*PI to WELLPI,
!               and were based on actual data from the 96 CCA 10,000 year
runs.
!
!               May 15/2002  T. Hadgu
!               Used equivalent permeabilities and porosities for panel
closure
!               (materials CONC_PCS AND PAN_S2) and DRZ next to panel closure
!               (material DRZ_PCS), to deal with Option D panel closure
!               implementation in the TBM vertical BRAGFLO grid.
!
!               May 28/2002 T. Hadgu
!               Subdivided the repository into 3 regions instead of 4
!               to account for new BRAGFLO TBM grid and Option D.
!
!               June 10/2002 T. Hadgu
!               Removed waste area properties that have been assigned to
other
!               materials. Proper material properties are now transferred
from
!               the 10,000-year BRAGFLO runs.
!
!               July 31,2003 J. Stein
!               Fixed AREA_TOT to represent the maximum spall volume of
!               4.0 m^3.  Changed the way initial porosity is calculated
!               for the panel closure materials.
!
!=========================================================================
!*************************************************************************
!CHAPTER 0:  DEFINE NEW VARIABLE NAMES AND SOME NEEDED CONSTANTS
!*************************************************************************
!=========================================================================
!
!
!  SET CONSTANTS AND PUT IN WASTE REGION
LIMIT BLOCK 1
THETA1   = MAKEPROP(DIP_DEG[ID:10]*2.0*PI[ID:10]/360.0)
THETA2   = MAKEPROP(0.0)
!
!
PERM_X   = 10**PRMX_LOG
PERM_Y   = 10**PRMY_LOG
PERM_Z   = 10**PRMZ_LOG
SB_MIN   = SAT_RBRN * 1.05
POR_COMP = COMP_RCK/POROSITY
!
! CALCULATE PROPERTIES FOR DRZ (DRZ_1)
LIMIT BLOCK 2
PERM_X   = PERMBRX
PERM_Y   = PERMBRX
PERM_Z   = PERMBRX
SB_MIN   = SAT_RBRN * 1.05
! NOW ADJUST POROSITY AND PORE COMPRESSIBILITY TO EQ. PORE VOL WITH CRUSHED
! ROOM HEIGHT
POROSITY = HEIGHT * POR_INTR / HEIGHT[ID:1]
POR_COMP = COMP_RCK/POROSITY
```

```
!
! CALCULATE PROPERTIES FOR SALADO HALITE (S_HALITE)
LIMIT BLOCK 3
PERM_X   = 10**PRMX_LOG
PERM_Y   = 10**PRMY_LOG
PERM_Z   = 10**PRMZ_LOG
SB_MIN   = SAT_RBRN * 1.05
! NOW ADJUST POROSITY AND PORE COMPRESSIBILITY TO EQ. PORE VOL WITH CRUSHED
! ROOM HEIGHT
POROSITY = HEIGHT * POROSITY / HEIGHT[ID:1]
POR_COMP = COMP_RCK/POROSITY
!
! CALC PROPERTIES FOR PANEL SEALS (CONC_PCS)
LIMIT BLOCK 4
! Changes made by T. Hadgu to introduce equivalent permeabilities:
!PERM_X   = 10**PRMX_LOG
!PERM_Y   = 10**PRMY_LOG
!
! Additions by T. Hadgu (04/23/02)
D1 = 32.1
D2 = 7.9
DE = 40.
PERM1_X = 10**PRMX_LOG[ID:1]
PERM2_X = 10**PRMX_LOG
PERM_X = DE*PERM1_X*PERM2_X/(D1*PERM2_X + D2*PERM1_X)
PERM_Y = D1*PERM1_X/DE + D2*PERM2_X/DE
!
PERM_Z   = 10**PRMZ_LOG
!
! JSS Define porosity of panel closures as length weighted mean porosity
!     of CONC_PCS and WAS_AREA. First define PORO_CONC for DRZ_CONC material.
PORO_CONC = POROSITY
POROSITY = (PORO_CONC*D2+POROSITY[ID:1]*D1)/DE
!
SB_MIN   = SAT_RBRN * 1.05
POR_COMP = COMP_RCK/POROSITY
!
PORE_DIS = PORE_DIS[ID:1]
SAT_RGAS = SAT_RGAS[ID:1]
SAT_RBRN = SAT_RBRN[ID:1]
CAP_MOD  = CAP_MOD[ID:1]
RELP_MOD = RELP_MOD[ID:1]
PC_MAX   = PC_MAX[ID:1]
PO_MIN   = PO_MIN[ID:1]
SB_MIN   = SAT_RBRN[ID:1]* 1.05
PCT_A    = PCT_A[ID:1]
PCT_EXP  = PCT_EXP[ID:1]
KPT      = KPT[ID:1]
!
! CALC PROPERTIES FOR DRZ/EXTENDED CONCRETE (DRZ_CONC):
!
LIMIT BLOCK 5
!
D1 = 32.1
D2 = 7.9
DE = 40.
PERM1_X = PERMBRX[ID:2]
```

```
PERM2_X = 10**PRMX_LOG[ID:4]
PERM_X = DE*PERM1_X*PERM2_X/(D1*PERM2_X + D2*PERM1_X)
PERM_Y = D1*PERM1_X/DE + D2*PERM2_X/DE
!
PERM_Z   = PERM_Z[ID:2]
!
!JSS Define porosity as length weighted mean porosity of DRZ and CONC_PCS
!
POROSITY = (POR_INTR[ID:2]*D2+PORO_CONC[ID:4]*D1)/DE
!
PORE_DIS = PORE_DIS[ID:2]
SAT_RGAS = SAT_RGAS[ID:2]
SAT_RBRN = SAT_RBRN[ID:2]
CAP_MOD  = CAP_MOD[ID:2]
RELP_MOD = RELP_MOD[ID:2]
PC_MAX   = PC_MAX[ID:2]
PO_MIN   = PO_MIN[ID:2]
SB_MIN   = SAT_RBRN[ID:2]* 1.05
KPT      = KPT[ID:2]
POR_INTR = POR_INTR[ID:2]
!
POR_COMP = COMP_RCK[ID:2]/POROSITY
!
! CALC PROPERTIES FOR CENTER PANEL SEALS (PAN_SL2):
!
LIMIT BLOCK 6
!
PERM_X   = PERM_Y[ID:4]
PERM_Y   = PERM_X[ID:4]
PERM_Z   = PERM_Z[ID:4]
!
POROSITY = POROSITY[ID:4]
!
PORE_DIS = PORE_DIS[ID:4]
SAT_RGAS = SAT_RGAS[ID:4]
SAT_RBRN = SAT_RBRN[ID:4]
CAP_MOD =  CAP_MOD[ID:4]
RELP_MOD = RELP_MOD[ID:4]
PC_MAX   = PC_MAX[ID:4]
PO_MIN   = PO_MIN[ID:4]
PCT_A    = PCT_A[ID:4]
PCT_EXP  = PCT_EXP[ID:4]
KPT      = KPT[ID:4]
HEIGHT   = HEIGHT[ID:4]
!
SB_MIN   = SB_MIN[ID:4]
POR_COMP = POR_COMP[ID:4]
!
!=======================================================================
! SET WELLBORE PROPS
LIMIT BLOCK 9
SEBRINE1 = MAKEPROP(0.0)
SEGAS1   = MAKEPROP(0.0)
KRW1     = MAKEPROP(0.0)
KRG1     = MAKEPROP(0.0)
SEBRINE2 = MAKEPROP(0.0)
SEGAS2   = MAKEPROP(0.0)
```

```
KRW2     = MAKEPROP(0.0)
KRG2     = MAKEPROP(0.0)
SEBRINE3 = MAKEPROP(0.0)
SEGAS3   = MAKEPROP(0.0)
KRW3     = MAKEPROP(0.0)
KRG3     = MAKEPROP(0.0)
! DEFINE CONSTANTS FOR THE THREE EQUATIONS TO BE USED TO CALCULATE FBHP
! EQUATION 1: (FOR BRINE FLOW ONLY, KRG = 0)
! FBHP = A + BX + CY + DX^2 + EY^2 + FXY + GX^3 + HY^3 + IXY^2 + JYX^2
!    X = LOG10(BRINE CONST) LOG M^3/pA-S
!    Y = PANEL PRESSURE (Pa)
!  8.00739E6 Pa < FBHP < 8.04391E6 Pa
EQ1_A  = MAKEPROP(3.2279346E+11)
EQ1_B  = MAKEPROP(9.4816648E+10)
EQ1_C  = MAKEPROP(-6200.2715)
EQ1_D  = MAKEPROP(9.2450601E+09)
EQ1_E  = MAKEPROP(4.1464475E-06)
EQ1_F  = MAKEPROP(-1288.6068)
EQ1_G  = MAKEPROP(2.9905582E+08)
EQ1_H  = MAKEPROP(1.0857041E-14)
EQ1_I  = MAKEPROP(4.7119798E-07)
EQ1_J  = MAKEPROP(-66.90712)
!
! EQUATION 2: (FOR LOG10(KRG/KRW) < 0  BRINE DOMINATED FLOW)
! FBHP = (A + BX + CX^2 + DY/(1 + EX + FX^2 + GX^3 + HY)
!    X = LOG10(KRG/KRB)
!    Y = PANEL PRESSURE (Pa)
!   7.42886E5 Pa < FBHP < 8.04353E6 Pa
EQ2_A  = MAKEPROP(1606507.7)
EQ2_B  = MAKEPROP(2624339.7)
EQ2_C  = MAKEPROP(2476889.9)
EQ2_D  = MAKEPROP(-0.053635476)
EQ2_E  = MAKEPROP(0.70815693)
EQ2_F  = MAKEPROP(0.38012696)
EQ2_G  = MAKEPROP(0.0041916956)
EQ2_H  = MAKEPROP(-2.4887085E-08)
!
! EQUATION 3: (FOR LOG10(KRG/KRW) > 0  GAS DOMINATED FLOW)
! FBHP = A + B/X + CY + D/X^2 + EY^2 + FY/X + G/X^3 + HY^3 + IY^2/X + JY/X^2
!    X = LOG10(GAS CONST) LOG M^3/pA-S
!    Y = PANEL PRESSURE (Pa)
! 2.07363E5 Pa < FBHP < 1.66394E6 Pa
EQ3_A  = MAKEPROP(-1.0098405E+09)
EQ3_B  = MAKEPROP(-2.3044622E+10)
EQ3_C  = MAKEPROP(9.8039146)
EQ3_D  = MAKEPROP(-1.7426466E+11)
EQ3_E  = MAKEPROP(1.8309137E-07)
EQ3_F  = MAKEPROP(174.97064)
EQ3_G  = MAKEPROP(-4.3698224E+11)
EQ3_H  = MAKEPROP(-1.4891198E-16)
EQ3_I  = MAKEPROP(1.3006196E-06)
EQ3_J  = MAKEPROP(757.44833)
!
! CALCULATE SKIN FROM SPALL REMOVED, & WELL PRODUCTIVITY INDEX
! ELEMENT 59 IS LOCATION OF WELL2 (2ND INTRUSION DOWN DIP)
!
! JSS: Setting AREA_TOT to a constant.  AREA_TOT=MAX[SPALL VOL]/Initial
```

```
Height
! JSS: AREA_TOT=4.0/3.96 = 1.01
!
AREA_TOT = 1.01
!
WELLRAD  = BITSIZE/2
!
DRNRAD_L = SQRT(DEL_X[E:59]*DEL_Y[E:59]/PI[ID:10])
!DRNRAD_M = SQRT(DEL_X[E:240]*DEL_Y[E:240]/PI[ID:10])
!DRNRAD_U = SQRT(DEL_X[E:708]*DEL_Y[E:708]/PI[ID:10])
!
SKIN     = -1.0*LOG(SQRT(AREA_TOT/PI[ID:10])/WELLRAD)
SKIN     = IFLT0(SKIN,SKIN,0)
! CHECK TO BE SURE WELLPI IS NOT 0 OR NEG, & SET TO 1.0 IF IT IS
! WELLPI   = PERM_X[ID:1] * HEIGHT[ID:1] / (LOG(DRNRAD/WELLRAD) + SKIN - 0.5)
!JSS
WELLPI_L   = IFGT0(LOG(DRNRAD_L/WELLRAD) + SKIN - 0.5,PERM_X[ID:1]* &
          HEIGHT[ID:1] &
          / (LOG(DRNRAD_L/WELLRAD) + SKIN - 0.5),1.0)
!WELLPI_M   = IFGT0(LOG(DRNRAD_M/WELLRAD) + SKIN - 0.5,PERM_X[ID:1]* &
!            HEIGHT[ID:1] &
!            / (LOG(DRNRAD_M/WELLRAD) + SKIN - 0.5),1.0)
!WELLPI_U   = IFGT0(LOG(DRNRAD_U/WELLRAD) + SKIN - 0.5,PERM_X[ID:1]* &
!            HEIGHT[ID:1] &
!            / (LOG(DRNRAD_U/WELLRAD) + SKIN - 0.5),1.0)
!!JSS
! WELLPI has been modified by T. Hadgu on 06/29/99 as follows:
!JSS
WELLPI_L   = WELLPI_L*2.*PI[ID:10]
!WELLPI_M   = WELLPI_M*2.*PI[ID:10]
!WELLPI_U   = WELLPI_U*2.*PI[ID:10]
!JSS
! CALCULATE CONSTANTS NEEDED FOR WELLBORE MODEL:
! CALCULATE EFFECTIVE SATURATION USING KRP = 4 (BROOKS - COREY MODIFIED,
! WITH LAMBDA (PORE_DIS) = 2.89, NO CAP PRESSURE). DO FOR 3 COUPLED REGIONS
! REGION NO 1 (PANELS 1,2,7,8 & 9)
BRINE1   = IFLT0((BSATPAN1[ID:1]-
SAT_RBRN[ID:1]),SAT_RBRN[ID:1],BSATPAN1[ID:1])
SEBRINE1 = (BRINE1 - SAT_RBRN[ID:1])/(1.0 - SAT_RBRN[ID:1])
SEGAS1   = (BRINE1 - SAT_RBRN[ID:1])/(1.0-SAT_RBRN[ID:1]-SAT_RGAS[ID:1])
SEGAS1   = IFLT0((1.0 - SEGAS1),1.0,SEGAS1)
KRW1     = SEBRINE1**((2+3*PORE_DIS[ID:1])/PORE_DIS[ID:1])
KRG1     = (1.0-SEGAS1)**2*(1.0-SEGAS1**((2 +
PORE_DIS[ID:1])/PORE_DIS[ID:1]))
! NOW CALCULATE CONSTANT FOR BRINE AND GAS
!JSS
CONBR1_L   = WELLPI_L * KRW1 / VISCO[ID:7]
!CONBR1_M   = WELLPI_M * KRW1 / VISCO[ID:7]
!CONBR1_U   = WELLPI_U * KRW1 / VISCO[ID:7]
CONGS1_L  = WELLPI_L * KRG1 / VISCO[ID:8]
!CONGS1_M  = WELLPI_M * KRG1 / VISCO[ID:8]
!CONGS1_U  = WELLPI_U * KRG1 / VISCO[ID:8]
!JSS
! NOW TAKE LOG BASE 10 OF PARAMETERS NEEDED FOR FBHP EQUATIONS
!JSS
LOG_B1_L   = IFEQ0(KRW1,-10,LOG10(CONBR1_L+1E-24))
!LOG_B1_M   = IFEQ0(KRW1,-10,LOG10(CONBR1_M+1E-24))
```

```
!LOG_B1_U   = IFEQ0(KRW1,-10,LOG10(CONBR1_U+1E-24))
!JSS
LOG_KR1  = IFEQ0(KRW1,10,LOG10((KRG1+1E-24)/(KRW1+1E-24)))
! INTRODUCE A TERM FOR GAS DOMINATED FLOW
!JSS
LOG_G1_L   = IFEQ0(KRG1,-10,LOG10(CONGS1_L+1E-24))
!LOG_G1_M   = IFEQ0(KRG1,-10,LOG10(CONGS1_M+1E-24))
!LOG_G1_U   = IFEQ0(KRG1,-10,LOG10(CONGS1_U+1E-24))
!
! CALCULATE FBHP's AND SET WITHIN LIMITS
!
PR1_E1_L  = EQ1_A+EQ1_B*LOG_B1_L+EQ1_C*PRESPAN1[ID:1]+EQ1_D*LOG_B1_L**2+ &
          EQ1_E*PRESPAN1[ID:1]**2+EQ1_F*LOG_B1_L*PRESPAN1[ID:1]+ &
          EQ1_G*LOG_B1_L**3+EQ1_H*PRESPAN1[ID:1]**3+&
          EQ1_I*LOG_B1_L*PRESPAN1[ID:1]**2+EQ1_J*LOG_B1_L**2*PRESPAN1[ID:1]
PR1_E1_L  = IFLT0(8007390.0 - PR1_E1_L,IFLT0(8043910.0 - PR1_E1_L,8043910.0,
&
          PR1_E1_L),8007390.0)
!PR1_E1_M  = EQ1_A+EQ1_B*LOG_B1_M+EQ1_C*PRESPAN1[ID:1]+EQ1_D*LOG_B1_M**2+ &
!           EQ1_E*PRESPAN1[ID:1]**2+EQ1_F*LOG_B1_M*PRESPAN1[ID:1]+ &
!           EQ1_G*LOG_B1_M**3+EQ1_H*PRESPAN1[ID:1]**3+&
!           EQ1_I*LOG_B1_M*PRESPAN1[ID:1]**2+EQ1_J*LOG_B1_M**2*PRESPAN1[ID:1]
!PR1_E1_M  = IFLT0(8007390.0 - PR1_E1_M,IFLT0(8043910.0 - PR1_E1_M,8043910.0,
&
!           PR1_E1_M),8007390.0)
!PR1_E1_U  = EQ1_A+EQ1_B*LOG_B1_U+EQ1_C*PRESPAN1[ID:1]+EQ1_D*LOG_B1_U**2+ &
!           EQ1_E*PRESPAN1[ID:1]**2+EQ1_F*LOG_B1_U*PRESPAN1[ID:1]+ &
!           EQ1_G*LOG_B1_U**3+EQ1_H*PRESPAN1[ID:1]**3+&
!           EQ1_I*LOG_B1_U*PRESPAN1[ID:1]**2+EQ1_J*LOG_B1_U**2*PRESPAN1[ID:1]
!PR1_E1_U  = IFLT0(8007390.0 - PR1_E1_U,IFLT0(8043910.0 - PR1_E1_U,8043910.0,
&
!           PR1_E1_U),8007390.0)
!!JSS
!
PR1_E2  = (EQ2_A+EQ2_B*LOG_KR1+EQ2_C*LOG_KR1**2+EQ2_D*PRESPAN1[ID:1])/ &
          (1.0+EQ2_E*LOG_KR1+EQ2_F*LOG_KR1**2+EQ2_G*LOG_KR1**3+ &
          EQ2_H*PRESPAN1[ID:1])
PR1_E2  = IFLT0(742886.0 - PR1_E2,IFLT0(8043530.0 - PR1_E2,8043530.0, &
          PR1_E2),742886.0)
!JSS
PR1_E3_L  = EQ3_A+EQ3_B/LOG_G1_L+EQ3_C*PRESPAN1[ID:1]+EQ3_D/LOG_G1_L**2+ &
          EQ3_E*PRESPAN1[ID:1]**2+EQ3_F*PRESPAN1[ID:1]/LOG_G1_L+ &
          EQ3_G/LOG_G1_L**3+ EQ3_H*PRESPAN1[ID:1]**3+ &
          EQ3_I*PRESPAN1[ID:1]**2/LOG_G1_L+ &
          EQ3_J*PRESPAN1[ID:1]/LOG_G1_L**2
!PR1_E3_M  = EQ3_A+EQ3_B/LOG_G1_M+EQ3_C*PRESPAN1[ID:1]+EQ3_D/LOG_G1_M**2+ &
!           EQ3_E*PRESPAN1[ID:1]**2+EQ3_F*PRESPAN1[ID:1]/LOG_G1_M+ &
!           EQ3_G/LOG_G1_M**3+ EQ3_H*PRESPAN1[ID:1]**3+ &
!           EQ3_I*PRESPAN1[ID:1]**2/LOG_G1_M+ &
!           EQ3_J*PRESPAN1[ID:1]/LOG_G1_M**2
!PR1_E3_U  = EQ3_A+EQ3_B/LOG_G1_U+EQ3_C*PRESPAN1[ID:1]+EQ3_D/LOG_G1_U**2+ &
!           EQ3_E*PRESPAN1[ID:1]**2+EQ3_F*PRESPAN1[ID:1]/LOG_G1_U+ &
!           EQ3_G/LOG_G1_U**3+ EQ3_H*PRESPAN1[ID:1]**3+ &
!           EQ3_I*PRESPAN1[ID:1]**2/LOG_G1_U+ &
!           EQ3_J*PRESPAN1[ID:1]/LOG_G1_U**2
!
PR1_E3_L  = IFLT0(207363.0 - PR1_E3_L,IFLT0(1663940.0 - PR1_E3_L,1663940.0, &
```

```
          PR1_E3_L),207363.0)
!PR1_E3_M  = IFLT0(207363.0 - PR1_E3_M,IFLT0(1663940.0 - PR1_E3_M,1663940.0,
&
!           PR1_E3_M),207363.0)
!PR1_E3_U  = IFLT0(207363.0 - PR1_E3_U,IFLT0(1663940.0 - PR1_E3_U,1663940.0,
&
!           PR1_E3_U),207363.0)
!JSS
!
! RESET FBHP TO 0 IF NO BRINE BLOWOUT (KRW = 0 OR PRESSURE < 8 MPa)
!JSS
FBHP1_L    = IFEQ0(KRW1,0,IFLT0(PRESPAN1[ID:1]-8.0E6,0, &
          IFEQ0(KRG1,PR1_E1_L,IFLT0(LOG_KR1,PR1_E2,PR1_E3_L))))
!FBHP1_M    = IFEQ0(KRW1,0,IFLT0(PRESPAN1[ID:1]-8.0E6,0, &
!           IFEQ0(KRG1,PR1_E1_M,IFLT0(LOG_KR1,PR1_E2,PR1_E3_M))))
!FBHP1_U    = IFEQ0(KRW1,0,IFLT0(PRESPAN1[ID:1]-8.0E6,0, &
!           IFEQ0(KRG1,PR1_E1_U,IFLT0(LOG_KR1,PR1_E2,PR1_E3_U))))
!JSS
!
! IF NO BLOWOUT, SET NUMBER OF BRAGFLO STEPS TO 1, ELSE 1000
!JSS
NSTEP1_L = MAKEPROP(IFEQ0(FBHP1_L,1,1000))
!NSTEP1_M = MAKEPROP(IFEQ0(FBHP1_M,1,1000))
!NSTEP1_U = MAKEPROP(IFEQ0(FBHP1_U,1,1000))
!JSS
! REGION NO 2 (PANELS 3,4,6 & 10)
BRINE2   = IFLT0((BSATPAN2[ID:1]-
SAT_RBRN[ID:1]),SAT_RBRN[ID:1],BSATPAN2[ID:1])
SEBRINE2 = (BRINE2 - SAT_RBRN[ID:1])/(1.0 - SAT_RBRN[ID:1])
SEGAS2   = (BRINE2 - SAT_RBRN[ID:1])/(1.0-SAT_RBRN[ID:1]-SAT_RGAS[ID:1])
SEGAS2   = IFLT0((1.0 - SEGAS2),1.0,SEGAS2)
KRW2     = SEBRINE2**((2+3*PORE_DIS[ID:1])/PORE_DIS[ID:1])
KRG2     = (1.0-SEGAS2)**2*(1.0-SEGAS2**((2 +
PORE_DIS[ID:1])/PORE_DIS[ID:1]))
! NOW CALCULATE CONSTANT FOR BRINE AND GAS
!JSS
CONBR2_L   = WELLPI_L * KRW2 / VISCO[ID:7]
!CONBR2_M   = WELLPI_M * KRW2 / VISCO[ID:7]
!CONBR2_U   = WELLPI_U * KRW2 / VISCO[ID:7]
CONGS2_L  = WELLPI_L * KRG2 / VISCO[ID:8]
!CONGS2_M  = WELLPI_M * KRG2 / VISCO[ID:8]
!CONGS2_U  = WELLPI_U * KRG2 / VISCO[ID:8]
!
! NOW TAKE LOG BASE 10 OF PARAMETERS NEEDED FOR FBHP EQUATIONS
!JSS
LOG_B2_L   = IFEQ0(KRW2,-10,LOG10(CONBR2_L+1E-24))
!LOG_B2_M   = IFEQ0(KRW2,-10,LOG10(CONBR2_M+1E-24))
!LOG_B2_U   = IFEQ0(KRW2,-10,LOG10(CONBR2_U+1E-24))
!
LOG_KR2  = IFEQ0(KRW2,10,LOG10((KRG2+1E-24)/(KRW2+1E-24)))
! INTRODUCE A TERM FOR GAS DOMINATED FLOW
!JSS
LOG_G2_L   = IFEQ0(KRG2,-10,LOG10(CONGS2_L+1E-24))
!LOG_G2_M   = IFEQ0(KRG2,-10,LOG10(CONGS2_M+1E-24))
!LOG_G2_U   = IFEQ0(KRG2,-10,LOG10(CONGS2_U+1E-24))
! CALCULATE FBHP's AND SET WITHIN LIMITS
!
```

```
PR2_E1_L  = EQ1_A+EQ1_B*LOG_B2_L+EQ1_C*PRESPAN2[ID:1]+EQ1_D*LOG_B2_L**2+ &
          EQ1_E*PRESPAN2[ID:1]**2+EQ1_F*LOG_B2_L*PRESPAN2[ID:1]+ &
          EQ1_G*LOG_B2_L**3+EQ1_H*PRESPAN2[ID:1]**3+&
          EQ1_I*LOG_B2_L*PRESPAN2[ID:1]**2+EQ1_J*LOG_B2_L**2*PRESPAN2[ID:1]
PR2_E1_L  = IFLT0(8007390.0 - PR2_E1_L,IFLT0(8043910.0 - PR2_E1_L,8043910.0,&
          PR2_E1_L),8007390.0)
!PR2_E1_M  = EQ1_A+EQ1_B*LOG_B2_M+EQ1_C*PRESPAN2[ID:1]+EQ1_D*LOG_B2_M**2+ &
!           EQ1_E*PRESPAN2[ID:1]**2+EQ1_F*LOG_B2_M*PRESPAN2[ID:1]+ &
!           EQ1_G*LOG_B2_M**3+EQ1_H*PRESPAN2[ID:1]**3+&
!           EQ1_I*LOG_B2_M*PRESPAN2[ID:1]**2+EQ1_J*LOG_B2_M**2*PRESPAN2[ID:1]
!PR2_E1_M  = IFLT0(8007390.0 - PR2_E1_M,IFLT0(8043910.0 -
PR2_E1_M,8043910.0,&
!           PR2_E1_M),8007390.0)
!PR2_E1_U  = EQ1_A+EQ1_B*LOG_B2_U+EQ1_C*PRESPAN2[ID:1]+EQ1_D*LOG_B2_U**2+ &
!           EQ1_E*PRESPAN2[ID:1]**2+EQ1_F*LOG_B2_U*PRESPAN2[ID:1]+ &
!           EQ1_G*LOG_B2_U**3+EQ1_H*PRESPAN2[ID:1]**3+&
!           EQ1_I*LOG_B2_U*PRESPAN2[ID:1]**2+EQ1_J*LOG_B2_U**2*PRESPAN2[ID:1]
!PR2_E1_U  = IFLT0(8007390.0 - PR2_E1_U,IFLT0(8043910.0 -
PR2_E1_U,8043910.0,&
!           PR2_E1_U),8007390.0)
!
PR2_E2  = (EQ2_A+EQ2_B*LOG_KR2+EQ2_C*LOG_KR2**2+EQ2_D*PRESPAN2[ID:1])/ &
          (1.0+EQ2_E*LOG_KR2+EQ2_F*LOG_KR2**2+EQ2_G*LOG_KR2**3+ &
          EQ2_H*PRESPAN2[ID:1])
PR2_E2  = IFLT0(742886.0 - PR2_E2,IFLT0(8043530.0 - PR2_E2,8043530.0, &
          PR2_E2),742886.0)
!
PR2_E3_L  = EQ3_A+EQ3_B/LOG_G2_L+EQ3_C*PRESPAN2[ID:1]+EQ3_D/LOG_G2_L**2+ &
          EQ3_E*PRESPAN2[ID:1]**2+EQ3_F*PRESPAN2[ID:1]/LOG_G2_L+ &
          EQ3_G/LOG_G2_L**3+ EQ3_H*PRESPAN2[ID:1]**3+ &
          EQ3_I*PRESPAN2[ID:1]**2/LOG_G2_L+ &
          EQ3_J*PRESPAN2[ID:1]/LOG_G2_L**2
!PR2_E3_M  = EQ3_A+EQ3_B/LOG_G2_M+EQ3_C*PRESPAN2[ID:1]+EQ3_D/LOG_G2_M**2+ &
!           EQ3_E*PRESPAN2[ID:1]**2+EQ3_F*PRESPAN2[ID:1]/LOG_G2_M+ &
!           EQ3_G/LOG_G2_M**3+ EQ3_H*PRESPAN2[ID:1]**3+ &
!           EQ3_I*PRESPAN2[ID:1]**2/LOG_G2_M+ &
!           EQ3_J*PRESPAN2[ID:1]/LOG_G2_M**2
!PR2_E3_U  = EQ3_A+EQ3_B/LOG_G2_U+EQ3_C*PRESPAN2[ID:1]+EQ3_D/LOG_G2_U**2+ &
!           EQ3_E*PRESPAN2[ID:1]**2+EQ3_F*PRESPAN2[ID:1]/LOG_G2_U+ &
!           EQ3_G/LOG_G2_U**3+ EQ3_H*PRESPAN2[ID:1]**3+ &
!           EQ3_I*PRESPAN2[ID:1]**2/LOG_G2_U+ &
!           EQ3_J*PRESPAN2[ID:1]/LOG_G2_U**2
!
PR2_E3_L  = IFLT0(207363.0 - PR2_E3_L,IFLT0(1663940.0 - PR2_E3_L,1663940.0, &
          PR2_E3_L),207363.0)
!PR2_E3_M  = IFLT0(207363.0 - PR2_E3_M,IFLT0(1663940.0 - PR2_E3_M,1663940.0,
&
!           PR2_E3_M),207363.0)
!PR2_E3_U  = IFLT0(207363.0 - PR2_E3_U,IFLT0(1663940.0 - PR2_E3_U,1663940.0,
&
!           PR2_E3_U),207363.0)
!
! RESET FBHP TO 0 IF NO BRINE BLOWOUT (KRW = 0 OR PRESSURE < 8 MPa)
FBHP2_L    = IFEQ0(KRW2,0,IFLT0(PRESPAN2[ID:1]-8.0E6,0, &
          IFEQ0(KRG2,PR2_E1_L,IFLT0(LOG_KR2,PR2_E2,PR2_E3_L))))
!FBHP2_M    = IFEQ0(KRW2,0,IFLT0(PRESPAN2[ID:1]-8.0E6,0, &
!           IFEQ0(KRG2,PR2_E1_M,IFLT0(LOG_KR2,PR2_E2,PR2_E3_M))))
```

```
!FBHP2_U    = IFEQ0(KRW2,0,IFLT0(PRESPAN2[ID:1]-8.0E6,0, &
!           IFEQ0(KRG2,PR2_E1_U,IFLT0(LOG_KR2,PR2_E2,PR2_E3_U))))
!
! IF NO BLOWOUT, SET NUMBER OF BRAGFLO STEPS TO 1, ELSE 1000
NSTEP2_L = MAKEPROP(IFEQ0(FBHP2_L,1,1000))
!NSTEP2_M = MAKEPROP(IFEQ0(FBHP2_M,1,1000))
!NSTEP2_U = MAKEPROP(IFEQ0(FBHP2_U,1,1000))
!!
! REGION NO 3 (PANEL 5)
BRINE3   = IFLT0((BSATPAN3[ID:1]-
SAT_RBRN[ID:1]),SAT_RBRN[ID:1],BSATPAN3[ID:1])
SEBRINE3 = (BRINE3 - SAT_RBRN[ID:1])/(1.0 - SAT_RBRN[ID:1])
SEGAS3   = (BRINE3 - SAT_RBRN[ID:1])/(1.0-SAT_RBRN[ID:1]-SAT_RGAS[ID:1])
SEGAS3   = IFLT0((1.0 - SEGAS3),1.0,SEGAS3)
KRW3     = SEBRINE3**((2+3*PORE_DIS[ID:1])/PORE_DIS[ID:1])
KRG3     = (1.0-SEGAS3)**2*(1.0-SEGAS3**((2 +
PORE_DIS[ID:1])/PORE_DIS[ID:1]))
! NOW CALCULATE CONSTANT FOR BRINE AND GAS
!JSS
CONBR3_L   = WELLPI_L * KRW3 / VISCO[ID:7]
!CONBR3_M   = WELLPI_M * KRW3 / VISCO[ID:7]
!CONBR3_U   = WELLPI_U * KRW3 / VISCO[ID:7]
CONGS3_L  = WELLPI_L * KRG3 / VISCO[ID:8]
!CONGS3_M  = WELLPI_M * KRG3 / VISCO[ID:8]
!CONGS3_U  = WELLPI_U * KRG3 / VISCO[ID:8]
!JSS
! NOW TAKE LOG BASE 10 OF PARAMETERS NEEDED FOR FBHP EQUATIONS
!JSS
LOG_B3_L   = IFEQ0(KRW3,-10,LOG10(CONBR3_L+1E-24))
!LOG_B3_M   = IFEQ0(KRW3,-10,LOG10(CONBR3_M+1E-24))
!LOG_B3_U   = IFEQ0(KRW3,-10,LOG10(CONBR3_U+1E-24))
!
LOG_KR3  = IFEQ0(KRW3,10,LOG10((KRG3+1E-24)/(KRW3+1E-24)))
! INTRODUCE A TERM FOR GAS DOMINATED FLOW
!JSS
LOG_G3_L   = IFEQ0(KRG3,-10,LOG10(CONGS3_L+1E-24))
!LOG_G3_M   = IFEQ0(KRG3,-10,LOG10(CONGS3_M+1E-24))
!LOG_G3_U   = IFEQ0(KRG3,-10,LOG10(CONGS3_U+1E-24))
!
!
! CALCULATE FBHP's AND SET WITHIN LIMITS
!
!
PR3_E1_L  = EQ1_A+EQ1_B*LOG_B3_L+EQ1_C*PRESPAN3[ID:1]+EQ1_D*LOG_B3_L**2+ &
          EQ1_E*PRESPAN3[ID:1]**2+EQ1_F*LOG_B3_L*PRESPAN3[ID:1]+ &
          EQ1_G*LOG_B3_L**3+EQ1_H*PRESPAN3[ID:1]**3+&
          EQ1_I*LOG_B3_L*PRESPAN3[ID:1]**2+EQ1_J*LOG_B3_L**2*PRESPAN3[ID:1]
PR3_E1_L  = IFLT0(8007390.0 - PR3_E1_L,IFLT0(8043910.0 - PR3_E1_L,8043910.0,&
          PR3_E1_L),8007390.0)
!PR3_E1_M  = EQ1_A+EQ1_B*LOG_B3_M+EQ1_C*PRESPAN3[ID:1]+EQ1_D*LOG_B3_M**2+ &
!           EQ1_E*PRESPAN3[ID:1]**2+EQ1_F*LOG_B3_M*PRESPAN3[ID:1]+ &
!           EQ1_G*LOG_B3_M**3+EQ1_H*PRESPAN3[ID:1]**3+&
!           EQ1_I*LOG_B3_M*PRESPAN3[ID:1]**2+EQ1_J*LOG_B3_M**2*PRESPAN3[ID:1]
!PR3_E1_M  = IFLT0(8007390.0 - PR3_E1_M,IFLT0(8043910.0 -
PR3_E1_M,8043910.0,&
!           PR3_E1_M),8007390.0)
!PR3_E1_U  = EQ1_A+EQ1_B*LOG_B3_U+EQ1_C*PRESPAN3[ID:1]+EQ1_D*LOG_B3_U**2+ &
```

```
!           EQ1_E*PRESPAN3[ID:1]**2+EQ1_F*LOG_B3_U*PRESPAN3[ID:1]+ &
!           EQ1_G*LOG_B3_U**3+EQ1_H*PRESPAN3[ID:1]**3+&
!           EQ1_I*LOG_B3_U*PRESPAN3[ID:1]**2+EQ1_J*LOG_B3_U**2*PRESPAN3[ID:1]
!PR3_E1_U  = IFLT0(8007390.0 - PR3_E1_U,IFLT0(8043910.0 -
PR3_E1_U,8043910.0,&
!           PR3_E1_U),8007390.0)
!
PR3_E2  = (EQ2_A+EQ2_B*LOG_KR3+EQ2_C*LOG_KR3**2+EQ2_D*PRESPAN3[ID:1])/ &
          (1.0+EQ2_E*LOG_KR3+EQ2_F*LOG_KR3**2+EQ2_G*LOG_KR3**3+ &
          EQ2_H*PRESPAN3[ID:1])
PR3_E2  = IFLT0(742886.0 - PR3_E2,IFLT0(8043530.0 - PR3_E2,8043530.0, &
          PR3_E2),742886.0)
!
PR3_E3_L  = EQ3_A+EQ3_B/LOG_G3_L+EQ3_C*PRESPAN3[ID:1]+EQ3_D/LOG_G3_L**2+ &
          EQ3_E*PRESPAN3[ID:1]**2+EQ3_F*PRESPAN3[ID:1]/LOG_G3_L+ &
          EQ3_G/LOG_G3_L**3+ EQ3_H*PRESPAN3[ID:1]**3+ &
          EQ3_I*PRESPAN3[ID:1]**2/LOG_G3_L+ &
          EQ3_J*PRESPAN3[ID:1]/LOG_G3_L**2
!PR3_E3_M  = EQ3_A+EQ3_B/LOG_G3_M+EQ3_C*PRESPAN3[ID:1]+EQ3_D/LOG_G3_M**2+ &
!           EQ3_E*PRESPAN3[ID:1]**2+EQ3_F*PRESPAN3[ID:1]/LOG_G3_M+ &
!           EQ3_G/LOG_G3_M**3+ EQ3_H*PRESPAN3[ID:1]**3+ &
!           EQ3_I*PRESPAN3[ID:1]**2/LOG_G3_M+ &
!           EQ3_J*PRESPAN3[ID:1]/LOG_G3_M**2
!PR3_E3_U  = EQ3_A+EQ3_B/LOG_G3_U+EQ3_C*PRESPAN3[ID:1]+EQ3_D/LOG_G3_U**2+ &
!           EQ3_E*PRESPAN3[ID:1]**2+EQ3_F*PRESPAN3[ID:1]/LOG_G3_U+ &
!           EQ3_G/LOG_G3_U**3+ EQ3_H*PRESPAN3[ID:1]**3+ &
!           EQ3_I*PRESPAN3[ID:1]**2/LOG_G3_U+ &
!           EQ3_J*PRESPAN3[ID:1]/LOG_G3_U**2
!!
PR3_E3_L  = IFLT0(207363.0 - PR3_E3_L,IFLT0(1663940.0 - PR3_E3_L,1663940.0, &
          PR3_E3_L),207363.0)
!PR3_E3_M  = IFLT0(207363.0 - PR3_E3_M,IFLT0(1663940.0 - PR3_E3_M,1663940.0,
&
!           PR3_E3_M),207363.0)
!PR3_E3_U  = IFLT0(207363.0 - PR3_E3_U,IFLT0(1663940.0 - PR3_E3_U,1663940.0,
&
!           PR3_E3_U),207363.0)
!
! RESET FBHP TO 0 IF NO BRINE BLOWOUT (KRW = 0 OR PRESSURE < 8 MPa)
FBHP3_L    = IFEQ0(KRW3,0,IFLT0(PRESPAN3[ID:1]-8.0E6,0, &
          IFEQ0(KRG3,PR3_E1_L,IFLT0(LOG_KR3,PR3_E2,PR3_E3_L))))
!FBHP3_M    = IFEQ0(KRW3,0,IFLT0(PRESPAN3[ID:1]-8.0E6,0, &
!           IFEQ0(KRG3,PR3_E1_M,IFLT0(LOG_KR3,PR3_E2,PR3_E3_L))))
!FBHP3_U    = IFEQ0(KRW3,0,IFLT0(PRESPAN3[ID:1]-8.0E6,0, &
!           IFEQ0(KRG3,PR3_E1_U,IFLT0(LOG_KR3,PR3_E2,PR3_E3_L))))

! IF NO BLOWOUT, SET NUMBER OF BRAGFLO STEPS TO 1, ELSE 1000
NSTEP3_L = MAKEPROP(IFEQ0(FBHP3_L,1,1000))
!NSTEP3_M = MAKEPROP(IFEQ0(FBHP3_M,1,1000))
!NSTEP3_U = MAKEPROP(IFEQ0(FBHP3_U,1,1000))
DELETE BRINE1, BRINE2, BRINE3
!========================================================================
!**********************************************************************
!SET UP BOUNDARY CONDITIONS FOR PREVIOUS INTRUSIONS HERE
!**********************************************************************
! WELLPI AND FBHP ARE SET TO ZERO FOR E2 INTRUSIONS (S4, S5)
WELPI_BC = MAKEPROP(0.0)
```

```
BHP_ABAN = MAKEPROP(0.0)
!*********************************************************************
!==============================================
!*********************************************************************
!CHAPTER 3.  COMPUTE DIP IN REPOSITORY
!*********************************************************************
!*********************************************************************
!==============================================
!==============================================
LIMIT ELEMENT OFF
!COMPUTE THE GRID BLOCK ELEVATIONS ACCOUNTING FOR 1 DEGREE DIP IN SALADO
!DEFINE GRID BLOCK ELEVATIONS DUE TO DIP
! USE ELEVATION OF SHAFT AT MID-REPOSITORY
ZORIGIN   =  382.671
YORIGIN   =  1000.0
ELEVN     = MAKENODE(COS(THETA1[ID:1])*(Z-ZORIGIN) &
           + SIN(THETA1[ID:1])*(Y-YORIGIN))
ELEVE     = NOD2ELE(ELEVN) + ZORIGIN
!COMPUTE GRID BLOCK POTENTIAL ASSUMING BRINE IS INCOMPRESSIBLE
(APPROXIMATELY)
POTE      = PRESEL/(DNSFLUID[ID:7]*GRAVACC[ID:10]) + ELEVE
!
! NOW SET GRID THICKNESS FOR ALL ELEMENTS TO CRUSHED PANEL HEIGHT
THICK    = MAKEATTR(HEIGHT[ID:1])
!
DELETE ELEVN, YORIGIN, ZORIGIN
EXIT
$
```

B.2.6 INPUT FILE TO CORRELATE PROPERTIES FROM PA MODEL TO BLOWOUT MODEL, FOR SCENARIO 1.

There are two types of relate input files: one related to CUTTINGS S (CUSP file) and one for each of 5 scenarios for DBR.

```
CUSP File:

$ type rel_dbr_cusp_cra1_dir_rel.inp
!*************************************************************************
**
! RELATE FILE TO MAP PROP's FROM PA MODEL TO BLOWOUT MODEL
! CREATED   9/14/95
! FILE      RELATE.INP
! ANALYST   D.M. STOELZEL
!
!   5/29/02 T. Hadgu
!   Removed any reference to Region 4. The repository has been subdivided to
!   three regions for the TBM calculations instead of four.
!*************************************************************************
**
*PROPERTIES
 WAS_AREA POROSITY  =  BLOWOUT POROSITY
 WAS_AREA HEIGHT    =  BLOWOUT HEIGHT
 WAS_AREA PRESPAN1  =  BLOWOUT BRNPRES1
 WAS_AREA GPRSPAN1  =  BLOWOUT GASPRES1
 WAS_AREA BSATPAN1  =  BLOWOUT BRN_SAT1
```

```
 WAS_AREA GSATPAN1  =  BLOWOUT GAS_SAT1
 WAS_AREA PRESPAN2  =  BLOWOUT BRNPRES2
 WAS_AREA GPRSPAN2  =  BLOWOUT GASPRES2
 WAS_AREA BSATPAN2  =  BLOWOUT BRN_SAT2
 WAS_AREA GSATPAN2  =  BLOWOUT GAS_SAT2
 WAS_AREA PRESPAN3  =  BLOWOUT BRNPRES3
 WAS_AREA GPRSPAN3  =  BLOWOUT GASPRES3
 WAS_AREA BSATPAN3  =  BLOWOUT BRN_SAT3
 WAS_AREA GSATPAN3  =  BLOWOUT GAS_SAT3
!
 WELLBORE INTR_TME  =  BLOWOUT INTR_TME
 WELLBORE AREA_TOT  =  BLOWOUT AREA_TOT
 WELLBORE VOLU_TOT  =  BLOWOUT VOLU_TOT
 WELLBORE BITSIZE   =  BLOWOUT BITSIZE
 WELLBORE CAST_WB   =  BLOWOUT CAST_WB
 WELLBORE CAST_RE   =  BLOWOUT CAST_RE
 WELLBORE WELL_PAN  =  BLOWOUT WELL_PAN
!
 DRZ_1    PERMBRX   =  BLOWOUT PERMDRZ
 DRZ_1    POR_INTR  =  BLOWOUT POR_DRZ
```

DBR Files:

SCENARIO: S1

```
$ type rel_dbr_brag_cra1_dir_rel_s1.inp
!*****************************************************************************
**
! RELATE FILE TO MAP PROP's FROM PA MODEL TO BLOWOUT MODEL
! CREATED   5/15/96
! FILE      RELATE_brag.INP
! ANALYST   D.M. STOELZEL
!
!       MODIFIED 6/8/96
!       REMOVED LINES THAT RELATED BOREHOLE AND CASILE PROPS.  NEW FILE:
!       RELEATE_BRAG_DIRECT_RELEASE_UND.INP
!       FOR UNDISTURBED CASES ONLY (S1)
!
!       6/10/02   T. Hadgu
!       Added LDRZ_F and S_HALITE to get properties from the 10,000-year
!       BRAGFLO runs. For PAN_SL and PAN_SL2 properties, those of WAS_AREA
!       were used (except permeability, and rock compressibility).
!*****************************************************************************
**
*PROPERTIES
 WAS_AREA PORE_DIS  =  WAS_AREA PORE_DIS
 WAS_AREA SAT_RGAS  =  WAS_AREA SAT_RGAS
 WAS_AREA SAT_RBRN  =  WAS_AREA SAT_RBRN
 WAS_AREA COMP_RCK  =  WAS_AREA COMP_RCK
 WAS_AREA RELP_MOD  =  WAS_AREA RELP_MOD
 WAS_AREA KPT       =  WAS_AREA KPT
 WAS_AREA CAP_MOD   =  WAS_AREA CAP_MOD
 WAS_AREA PO_MIN    =  WAS_AREA PO_MIN
 WAS_AREA PCT_A     =  WAS_AREA PCT_A
 WAS_AREA PCT_EXP   =  WAS_AREA PCT_EXP
 WAS_AREA PC_MAX    =  WAS_AREA PC_MAX
```

```
!
 DRZ_1 PRMX_LOG     =  DRZ_1 PRMX_LOG
 DRZ_1 PRMY_LOG     =  DRZ_1 PRMY_LOG
 DRZ_1 PRMZ_LOG     =  DRZ_1 PRMZ_LOG
 DRZ_1 POROSITY     =  DRZ_1 POROSITY
 DRZ_1 PORE_DIS     =  DRZ_1 PORE_DIS
 DRZ_1 SAT_RGAS     =  DRZ_1 SAT_RGAS
 DRZ_1 SAT_RBRN     =  DRZ_1 SAT_RBRN
 DRZ_1 COMP_RCK     =  DRZ_1 COMP_RCK
 DRZ_1 RELP_MOD     =  DRZ_1 RELP_MOD
 DRZ_1 KPT          =  DRZ_1 KPT
 DRZ_1 CAP_MOD      =  DRZ_1 CAP_MOD
 DRZ_1 PO_MIN       =  DRZ_1 PO_MIN
 DRZ_1 PCT_A        =  DRZ_1 PCT_A
 DRZ_1 PCT_EXP      =  DRZ_1 PCT_EXP
 DRZ_1 PC_MAX       =  DRZ_1 PC_MAX
!
 S_HALITE PRMX_LOG  =  S_HALITE PRMX_LOG
 S_HALITE PRMY_LOG  =  S_HALITE PRMY_LOG
 S_HALITE PRMZ_LOG  =  S_HALITE PRMZ_LOG
 S_HALITE POROSITY  =  S_HALITE POROSITY
 S_HALITE PORE_DIS  =  S_HALITE PORE_DIS
 S_HALITE SAT_RGAS  =  S_HALITE SAT_RGAS
 S_HALITE SAT_RBRN  =  S_HALITE SAT_RBRN
 S_HALITE COMP_RCK  =  S_HALITE COMP_RCK
 S_HALITE RELP_MOD  =  S_HALITE RELP_MOD
 S_HALITE KPT       =  S_HALITE KPT
 S_HALITE CAP_MOD   =  S_HALITE CAP_MOD
 S_HALITE PO_MIN    =  S_HALITE PO_MIN
 S_HALITE PCT_A     =  S_HALITE PCT_A
 S_HALITE PCT_EXP   =  S_HALITE PCT_EXP
 S_HALITE PC_MAX    =  S_HALITE PC_MAX
!
 CONC_PCS PRMX_LOG  =  CONC_PCS PRMX_LOG
 CONC_PCS PRMY_LOG  =  CONC_PCS PRMY_LOG
 CONC_PCS PRMZ_LOG  =  CONC_PCS PRMZ_LOG
 CONC_PCS POROSITY  =  CONC_PCS POROSITY
$
```

SCENARIO: S2

```
$ type rel_dbr_brag_cra1_dir_rel_s2.inp
!*****************************************************************************
**
! RELATE FILE TO MAP PROP's FROM PA MODEL TO BLOWOUT MODEL
! CREATED   5/15/96
! FILE      RELATE_brag.INP
! ANALYST   D.M. STOELZEL
!
!       MODIFIED 6/8/96
!       REMOVED LINES THAT RELATED BOREHOLE AND CASILE PROPS.  NEW FILE:
!       RELEATE_BRAG_DIRECT_RELEASE_UND.INP
!       FOR UNDISTURBED CASES ONLY (S1)
!
!       6/10/02   T. Hadgu
!       Added DRZ_1 and S_HALITE to get properties from the 10,000-year
!       BRAGFLO runs. For PAN_SL and PAN_SL2 properties, those of WAS_AREA
```

```
!       were used (except permeability, and rock compressibility).
!***************************************************************************
**
*PROPERTIES
 WAS_AREA PORE_DIS  =  WAS_AREA PORE_DIS
 WAS_AREA SAT_RGAS  =  WAS_AREA SAT_RGAS
 WAS_AREA SAT_RBRN  =  WAS_AREA SAT_RBRN
 WAS_AREA COMP_RCK  =  WAS_AREA COMP_RCK
 WAS_AREA RELP_MOD  =  WAS_AREA RELP_MOD
 WAS_AREA KPT       =  WAS_AREA KPT
 WAS_AREA CAP_MOD   =  WAS_AREA CAP_MOD
 WAS_AREA PO_MIN    =  WAS_AREA PO_MIN
 WAS_AREA PCT_A     =  WAS_AREA PCT_A
 WAS_AREA PCT_EXP   =  WAS_AREA PCT_EXP
 WAS_AREA PC_MAX    =  WAS_AREA PC_MAX
!
 WELLBORE PRM_CAST  =  CASTILER PERM_X
 WELLBORE PRM_OPEN  =  BH_OPEN  PERM_Y
 WELLBORE PRM_SAND  =  BH_SAND  PERM_Y
 WELLBORE PRM_CREP  =  BH_CREEP PERM_Y
!
 DRZ_1 PRMX_LOG     =  DRZ_1 PRMX_LOG
 DRZ_1 PRMY_LOG     =  DRZ_1 PRMY_LOG
 DRZ_1 PRMZ_LOG     =  DRZ_1 PRMZ_LOG
 DRZ_1 POROSITY     =  DRZ_1 POROSITY
 DRZ_1 PORE_DIS     =  DRZ_1 PORE_DIS
 DRZ_1 SAT_RGAS     =  DRZ_1 SAT_RGAS
 DRZ_1 SAT_RBRN     =  DRZ_1 SAT_RBRN
 DRZ_1 COMP_RCK     =  DRZ_1 COMP_RCK
 DRZ_1 RELP_MOD     =  DRZ_1 RELP_MOD
 DRZ_1 KPT          =  DRZ_1 KPT
 DRZ_1 CAP_MOD      =  DRZ_1 CAP_MOD
 DRZ_1 PO_MIN       =  DRZ_1 PO_MIN
 DRZ_1 PCT_A        =  DRZ_1 PCT_A
 DRZ_1 PCT_EXP      =  DRZ_1 PCT_EXP
 DRZ_1 PC_MAX       =  DRZ_1 PC_MAX
!
 S_HALITE PRMX_LOG  =  S_HALITE PRMX_LOG
 S_HALITE PRMY_LOG  =  S_HALITE PRMY_LOG
 S_HALITE PRMZ_LOG  =  S_HALITE PRMZ_LOG
 S_HALITE POROSITY  =  S_HALITE POROSITY
 S_HALITE PORE_DIS  =  S_HALITE PORE_DIS
 S_HALITE SAT_RGAS  =  S_HALITE SAT_RGAS
 S_HALITE SAT_RBRN  =  S_HALITE SAT_RBRN
 S_HALITE COMP_RCK  =  S_HALITE COMP_RCK
 S_HALITE RELP_MOD  =  S_HALITE RELP_MOD
 S_HALITE KPT       =  S_HALITE KPT
 S_HALITE CAP_MOD   =  S_HALITE CAP_MOD
 S_HALITE PO_MIN    =  S_HALITE PO_MIN
 S_HALITE PCT_A     =  S_HALITE PCT_A
 S_HALITE PCT_EXP   =  S_HALITE PCT_EXP
 S_HALITE PC_MAX    =  S_HALITE PC_MAX
!
 CONC_PCS PRMX_LOG  =  CONC_PCS PRMX_LOG
 CONC_PCS PRMY_LOG  =  CONC_PCS PRMY_LOG
 CONC_PCS PRMZ_LOG  =  CONC_PCS PRMZ_LOG
 CONC_PCS POROSITY  =  CONC_PCS POROSITY
```

SCENARIO: S3

```
$ type rel_dbr_brag_cra1_dir_rel_s3.inp
!***************************************************************************
**
! RELATE FILE TO MAP PROP's FROM PA MODEL TO BLOWOUT MODEL
! CREATED   5/15/96
! FILE      RELATE_brag.INP
! ANALYST   D.M. STOELZEL
!
!       MODIFIED 6/8/96
!       REMOVED LINES THAT RELATED BOREHOLE AND CASILE PROPS.  NEW FILE:
!       RELEATE_BRAG_DIRECT_RELEASE_UND.INP
!       FOR UNDISTURBED CASES ONLY (S1)
!
!       6/10/02   T. Hadgu
!       Added DRZ_1 and S_HALITE to get properties from the 10,000-year
!       BRAGFLO runs. For PAN_SL and PAN_SL2 properties, those of WAS_AREA
!       were used (except permeability, and rock compressibility).
!***************************************************************************
**
*PROPERTIES
 WAS_AREA PORE_DIS  =  WAS_AREA PORE_DIS
 WAS_AREA SAT_RGAS  =  WAS_AREA SAT_RGAS
 WAS_AREA SAT_RBRN  =  WAS_AREA SAT_RBRN
 WAS_AREA COMP_RCK  =  WAS_AREA COMP_RCK
 WAS_AREA RELP_MOD  =  WAS_AREA RELP_MOD
 WAS_AREA KPT       =  WAS_AREA KPT
 WAS_AREA CAP_MOD   =  WAS_AREA CAP_MOD
 WAS_AREA PO_MIN    =  WAS_AREA PO_MIN
 WAS_AREA PCT_A     =  WAS_AREA PCT_A
 WAS_AREA PCT_EXP   =  WAS_AREA PCT_EXP
 WAS_AREA PC_MAX    =  WAS_AREA PC_MAX
!
 WELLBORE PRM_CAST  =  CASTILER PERM_X
 WELLBORE PRM_OPEN  =  BH_OPEN  PERM_Y
 WELLBORE PRM_SAND  =  BH_SAND  PERM_Y
 WELLBORE PRM_CREP  =  BH_CREEP PERM_Y
!
 DRZ_1 PRMX_LOG     =  DRZ_1 PRMX_LOG
 DRZ_1 PRMY_LOG     =  DRZ_1 PRMY_LOG
 DRZ_1 PRMZ_LOG     =  DRZ_1 PRMZ_LOG
 DRZ_1 POROSITY     =  DRZ_1 POROSITY
 DRZ_1 PORE_DIS     =  DRZ_1 PORE_DIS
 DRZ_1 SAT_RGAS     =  DRZ_1 SAT_RGAS
 DRZ_1 SAT_RBRN     =  DRZ_1 SAT_RBRN
 DRZ_1 COMP_RCK     =  DRZ_1 COMP_RCK
 DRZ_1 RELP_MOD     =  DRZ_1 RELP_MOD
 DRZ_1 KPT          =  DRZ_1 KPT
 DRZ_1 CAP_MOD      =  DRZ_1 CAP_MOD
 DRZ_1 PO_MIN       =  DRZ_1 PO_MIN
 DRZ_1 PCT_A        =  DRZ_1 PCT_A
 DRZ_1 PCT_EXP      =  DRZ_1 PCT_EXP
 DRZ_1 PC_MAX       =  DRZ_1 PC_MAX
!
```

```
 S_HALITE PRMX_LOG  =  S_HALITE PRMX_LOG
 S_HALITE PRMY_LOG  =  S_HALITE PRMY_LOG
 S_HALITE PRMZ_LOG  =  S_HALITE PRMZ_LOG
 S_HALITE POROSITY  =  S_HALITE POROSITY
 S_HALITE PORE_DIS  =  S_HALITE PORE_DIS
 S_HALITE SAT_RGAS  =  S_HALITE SAT_RGAS
 S_HALITE SAT_RBRN  =  S_HALITE SAT_RBRN
 S_HALITE COMP_RCK  =  S_HALITE COMP_RCK
 S_HALITE RELP_MOD  =  S_HALITE RELP_MOD
 S_HALITE KPT       =  S_HALITE KPT
 S_HALITE CAP_MOD   =  S_HALITE CAP_MOD
 S_HALITE PO_MIN    =  S_HALITE PO_MIN
 S_HALITE PCT_A     =  S_HALITE PCT_A
 S_HALITE PCT_EXP   =  S_HALITE PCT_EXP
 S_HALITE PC_MAX    =  S_HALITE PC_MAX
!
 CONC_PCS PRMX_LOG  =  CONC_PCS PRMX_LOG
 CONC_PCS PRMY_LOG  =  CONC_PCS PRMY_LOG
 CONC_PCS PRMZ_LOG  =  CONC_PCS PRMZ_LOG
 CONC_PCS POROSITY  =  CONC_PCS POROSITY
```

SCENARIO: S4

```
$ type rel_dbr_brag_cra1_dir_rel_s4.inp
!***************************************************************************
**
! RELATE FILE TO MAP PROP's FROM PA MODEL TO BLOWOUT MODEL
! CREATED   5/15/96
! FILE      RELATE_brag.INP
! ANALYST   D.M. STOELZEL
!
!       MODIFIED 6/8/96
!       REMOVED LINES THAT RELATED BOREHOLE AND CASILE PROPS.  NEW FILE:
!       RELEATE_BRAG_DIRECT_RELEASE_UND.INP
!       FOR UNDISTURBED CASES ONLY (S1)
!
!       6/10/02   T. Hadgu
!       Added DRZ_1 and S_HALITE to get properties from the 10,000-year
!       BRAGFLO runs. For PAN_SL and PAN_SL2 properties, those of WAS_AREA
!       were used (except permeability, and rock compressibility).
!***************************************************************************
**
*PROPERTIES
 WAS_AREA PORE_DIS  =  WAS_AREA PORE_DIS
 WAS_AREA SAT_RGAS  =  WAS_AREA SAT_RGAS
 WAS_AREA SAT_RBRN  =  WAS_AREA SAT_RBRN
 WAS_AREA COMP_RCK  =  WAS_AREA COMP_RCK
 WAS_AREA RELP_MOD  =  WAS_AREA RELP_MOD
 WAS_AREA KPT       =  WAS_AREA KPT
 WAS_AREA CAP_MOD   =  WAS_AREA CAP_MOD
 WAS_AREA PO_MIN    =  WAS_AREA PO_MIN
 WAS_AREA PCT_A     =  WAS_AREA PCT_A
 WAS_AREA PCT_EXP   =  WAS_AREA PCT_EXP
 WAS_AREA PC_MAX    =  WAS_AREA PC_MAX
!
 WELLBORE PRM_CAST  =  CASTILER PERM_X
```

```
 WELLBORE PRM_OPEN  =  BH_OPEN  PERM_Y
 WELLBORE PRM_SAND  =  BH_SAND  PERM_Y
 WELLBORE PRM_CREP  =  BH_CREEP PERM_Y
!
 DRZ_1 PRMX_LOG     =  DRZ_1 PRMX_LOG
 DRZ_1 PRMY_LOG     =  DRZ_1 PRMY_LOG
 DRZ_1 PRMZ_LOG     =  DRZ_1 PRMZ_LOG
 DRZ_1 POROSITY     =  DRZ_1 POROSITY
 DRZ_1 PORE_DIS     =  DRZ_1 PORE_DIS
 DRZ_1 SAT_RGAS     =  DRZ_1 SAT_RGAS
 DRZ_1 SAT_RBRN     =  DRZ_1 SAT_RBRN
 DRZ_1 COMP_RCK     =  DRZ_1 COMP_RCK
 DRZ_1 RELP_MOD     =  DRZ_1 RELP_MOD
 DRZ_1 KPT          =  DRZ_1 KPT
 DRZ_1 CAP_MOD      =  DRZ_1 CAP_MOD
 DRZ_1 PO_MIN       =  DRZ_1 PO_MIN
 DRZ_1 PCT_A        =  DRZ_1 PCT_A
 DRZ_1 PCT_EXP      =  DRZ_1 PCT_EXP
 DRZ_1 PC_MAX       =  DRZ_1 PC_MAX
!
 S_HALITE PRMX_LOG  =  S_HALITE PRMX_LOG
 S_HALITE PRMY_LOG  =  S_HALITE PRMY_LOG
 S_HALITE PRMZ_LOG  =  S_HALITE PRMZ_LOG
 S_HALITE POROSITY  =  S_HALITE POROSITY
 S_HALITE PORE_DIS  =  S_HALITE PORE_DIS
 S_HALITE SAT_RGAS  =  S_HALITE SAT_RGAS
 S_HALITE SAT_RBRN  =  S_HALITE SAT_RBRN
 S_HALITE COMP_RCK  =  S_HALITE COMP_RCK
 S_HALITE RELP_MOD  =  S_HALITE RELP_MOD
 S_HALITE KPT       =  S_HALITE KPT
 S_HALITE CAP_MOD   =  S_HALITE CAP_MOD
 S_HALITE PO_MIN    =  S_HALITE PO_MIN
 S_HALITE PCT_A     =  S_HALITE PCT_A
 S_HALITE PCT_EXP   =  S_HALITE PCT_EXP
 S_HALITE PC_MAX    =  S_HALITE PC_MAX
!
 CONC_PCS PRMX_LOG  =  CONC_PCS PRMX_LOG
 CONC_PCS PRMY_LOG  =  CONC_PCS PRMY_LOG
 CONC_PCS PRMZ_LOG  =  CONC_PCS PRMZ_LOG
 CONC_PCS POROSITY  =  CONC_PCS POROSITY
$
```

SCENARIO: S5

```
$ type rel_dbr_brag_cra1_dir_rel_s5.inp
!**************************************************************************
**
! RELATE FILE TO MAP PROP's FROM PA MODEL TO BLOWOUT MODEL
! CREATED   5/15/96
! FILE      RELATE_brag.INP
! ANALYST   D.M. STOELZEL
!
!       MODIFIED 6/8/96
!       REMOVED LINES THAT RELATED BOREHOLE AND CASILE PROPS.  NEW FILE:
!       RELEATE_BRAG_DIRECT_RELEASE_UND.INP
!       FOR UNDISTURBED CASES ONLY (S1)
```

```
!
!       6/10/02   T. Hadgu
!       Added DRZ_1 and S_HALITE to get properties from the 10,000-year
!       BRAGFLO runs. For PAN_SL and PAN_SL2 properties, those of WAS_AREA
!       were used (except permeability, and rock compressibility).
!***************************************************************************
**
*PROPERTIES
 WAS_AREA PORE_DIS  =  WAS_AREA PORE_DIS
 WAS_AREA SAT_RGAS  =  WAS_AREA SAT_RGAS
 WAS_AREA SAT_RBRN  =  WAS_AREA SAT_RBRN
 WAS_AREA COMP_RCK  =  WAS_AREA COMP_RCK
 WAS_AREA RELP_MOD  =  WAS_AREA RELP_MOD
 WAS_AREA KPT       =  WAS_AREA KPT
 WAS_AREA CAP_MOD   =  WAS_AREA CAP_MOD
 WAS_AREA PO_MIN    =  WAS_AREA PO_MIN
 WAS_AREA PCT_A     =  WAS_AREA PCT_A
 WAS_AREA PCT_EXP   =  WAS_AREA PCT_EXP
 WAS_AREA PC_MAX    =  WAS_AREA PC_MAX
!
 WELLBORE PRM_CAST  =  CASTILER PERM_X
 WELLBORE PRM_OPEN  =  BH_OPEN  PERM_Y
 WELLBORE PRM_SAND  =  BH_SAND  PERM_Y
 WELLBORE PRM_CREP  =  BH_CREEP PERM_Y
!
 DRZ_1 PRMX_LOG     =  DRZ_1 PRMX_LOG
 DRZ_1 PRMY_LOG     =  DRZ_1 PRMY_LOG
 DRZ_1 PRMZ_LOG     =  DRZ_1 PRMZ_LOG
 DRZ_1 POROSITY     =  DRZ_1 POROSITY
 DRZ_1 PORE_DIS     =  DRZ_1 PORE_DIS
 DRZ_1 SAT_RGAS     =  DRZ_1 SAT_RGAS
 DRZ_1 SAT_RBRN     =  DRZ_1 SAT_RBRN
 DRZ_1 COMP_RCK     =  DRZ_1 COMP_RCK
 DRZ_1 RELP_MOD     =  DRZ_1 RELP_MOD
 DRZ_1 KPT          =  DRZ_1 KPT
 DRZ_1 CAP_MOD      =  DRZ_1 CAP_MOD
 DRZ_1 PO_MIN       =  DRZ_1 PO_MIN
 DRZ_1 PCT_A        =  DRZ_1 PCT_A
 DRZ_1 PCT_EXP      =  DRZ_1 PCT_EXP
 DRZ_1 PC_MAX       =  DRZ_1 PC_MAX
!
 S_HALITE PRMX_LOG  =  S_HALITE PRMX_LOG
 S_HALITE PRMY_LOG  =  S_HALITE PRMY_LOG
 S_HALITE PRMZ_LOG  =  S_HALITE PRMZ_LOG
 S_HALITE POROSITY  =  S_HALITE POROSITY
 S_HALITE PORE_DIS  =  S_HALITE PORE_DIS
 S_HALITE SAT_RGAS  =  S_HALITE SAT_RGAS
 S_HALITE SAT_RBRN  =  S_HALITE SAT_RBRN
 S_HALITE COMP_RCK  =  S_HALITE COMP_RCK
 S_HALITE RELP_MOD  =  S_HALITE RELP_MOD
 S_HALITE KPT       =  S_HALITE KPT
 S_HALITE CAP_MOD   =  S_HALITE CAP_MOD
 S_HALITE PO_MIN    =  S_HALITE PO_MIN
 S_HALITE PCT_A     =  S_HALITE PCT_A
 S_HALITE PCT_EXP   =  S_HALITE PCT_EXP
 S_HALITE PC_MAX    =  S_HALITE PC_MAX
!
```

```
 CONC_PCS PRMX_LOG  =  CONC_PCS PRMX_LOG
 CONC_PCS PRMY_LOG  =  CONC_PCS PRMY_LOG
 CONC_PCS PRMZ_LOG  =  CONC_PCS PRMZ_LOG
 CONC_PCS POROSITY  =  CONC_PCS POROSITY
$
```

B.2.6 PREBRAG INPUT FILE

There are 15 of these files, one for each of 5 scenarios and each of 3 locations (U,M,L). One of each scenario is reproduced here.

SCENARIO: S1

```
$ type dbr_bf1_cra1_dir_rel_s1_U.inp
!==========================================================================
!
!   TITLE:   PREBRAG INPUT FOR BLOWOUT CALCULATION: REPOSIRORY SCALE MODEL
!   ANALYST: DAN M. STOELZEL
!   DATE:    NOV 3, 1995
!   SCENARIO: UNDISTURBED SCENERIO: NO FLOW IN DRZ AND SALADO
!             DIP INCLUDED
!
!   MODIFIED MARCH 22, 1996
!   CHANGES MADE TO WELL INPUT CARD TO INCORPORATE FBHP MODEL (FROM
!   PREVIOUS ALGEBRA)
!
!   6/5/02  T. Hadgu
!   Changes made to reflect the three regions of the repository
!   replacing the original four. This affects location of wells.
!   For up-dip the well is now located in Region 1.
!
!   6/11/02, T. Hadgu
!   Made modifications for TBM calculations. The modifications include
!   adding Materials CONC_PCS, PAN_SL2 and DRZ_CONC, and removing Material
!   DRZ_INIT.
!
!   7/31/2003 J. Stein
!   Updated this file for the 2003 CRA PA Calculations
!
!==========================================================================
*HEADING
TITLE2 = BRINE BLOWOUT IN REPOSITORY SCALE MODEL
!==========================================================================
*GAS_TRANSPORT_initial_conditions
CALC=NO
!=========================================================================
*INITIAL_CONDITIONS
!BEGIN SIMULATION AT 0 YEARS
BEGIN, TIME= 0.0
CAMDAT,TIME= 0.0
SATBR,   ID_BRINE =SATBREL
PRESSURE,ID_PRES  =PRESEL
CONFE  , ID_CONFE =FECONC
CONCELL, ID_CONCEL=CH2OCONC
ELEVAT,  ID_ELEV  =ELEVE
!===========================================================================
```

```
!*STEP_CONTROL
!!TIME STEP IS REDUCED AT TIME THE WELLBORE IS ACTIVATED, TIME=0.0 YEARS
! TIME,BEGIN=0.0, DT=8.64e-02
!==========================================================================
*WELL_DATA
TIME_CONTROL, TIME_ID=1,WELLTIME=0.0
!PRODUCTION WELL WITH F-BHP AND PI BASED ON INPUTS
WELL_CONTROL, MAT=WELLBORE,TIME_ID=1,NUM=1,TYPE=PROD, &
              ILOC=21,JLOC=27,KLOC=1,&
              QO=0.0, QG=0.0, PIWELL=WELLPI_L,&
              PRWELL= FBHP1_L
!
!==========================================================================
*GEOMETRY
COORD= CARTESIAN
!==========================================================================
*SIMULATION_CONTROL
INTEGRATION, TMAX=4.323E06, DT_INIT=8.64e-01,DT_MIN= 8.64E-2,
DT_MAX=8.646E4,&
           DT_INCR=1.25,   DT_REDU= 0.5,   AUTODT=YES,  TSWITCH=1.0,&
           MATERIAL=WELLBORE,MAXSTEPS=NSTEP1_L
!
ITERATION, DSATLIM= 2.E-1, DPRESLIM = -1.E8 , SATLIM= 1.E-3,&
           SATNORM= 0.30,  PRESNORM = 5.0E5,&
           ITMAX= 8,       IRESETMAX= 40, IJACINT= 1,&
           IJACSWITCH=41,  IJACMIN= 1,    IJACRESET= 5,&
           IUPRPFLAG =9,   IUPMFFLAG= 9,   IUPRPLOOSE= 9,&
           IUPMFLOOSE=9
!
ITERATION, DHSAT_REL= 1.0E-8,   DHPRES_REL=1.0E-8,&
           DHSAT_MIN= 1.0E-10,  DHPRES_MIN=1.0E-2
!
ITERATION, EPS_SAT  = 3.0E+0,     EPS_PRES    = 1.E-2,&
           R_EPS_SAT= 3.0E+0,     R_EPS_PRES  = 1.E-2,&
           FTOL_SAT = 1.0E-2,     FTOL_PRES   = 1.0E-2,&
           R_FTOL_SAT=1.0E-2,     R_FTOL_PRES = 1.0E-2, CONV_TEST = and
!
NUMERICS,SOLVER=LU
NUMERICS,JACSCALE= 1.0e7, VSWITCH = NO
NUMERICS, ITRAVE= HARMONIC, IMFRAVE=UPSTREAM
!
GRAVITY, MAT= REFCON, G_ACC= GRAVACC
!
!========================================================================
*OUTPUT_CONTROL

UNITS= SI
MONITOR, ILOC =  8, JLOC = 5, KLOC = 1
MONITOR, ILOC = 19, JLOC =18, KLOC = 1
MONITOR, ILOC = 34, JLOC =35, KLOC = 1
!
STEPS, FILE= BINARY, NSTEP=5
 TIMES, FILE= ASCII,  VALUES= 0.0, 9.504E5
!
PRIBIN,&
     PRESBRIN,  PRESGAS,   POROS,    SATGAS,&
     FLOWGASX,  FLOWGASY,  FLOWBRX,  FLOWBRY,&
```

```
     BRINRATE,  WELLBRINE, WELLGAS
!
PRIASC,&
     PRESBRIN,  PRESGAS,   POROS,    SATGAS
!
HISTORY, NAMES=   WELLBRINE,  IRANGE= 21,21,  JRANGE= 27,27, KRANGE=1,1
HISTORY, NAMES=   WELLBRINE,  IRANGE= 6,6,    JRANGE= 5, 5, KRANGE=1,1
!
HISTORY, NAMES=   WELLGAS,    IRANGE= 21,21,  JRANGE= 27,27, KRANGE=1,1
HISTORY, NAMES=   WELLGAS,    IRANGE= 6,6,    JRANGE= 5, 5, KRANGE=1,1
!============================================================================
*PROPERTIES
! GET SOLID properties from CAMDAT file
!
SOLID, MAT=WAS_AREA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!Salado Halite
SOLID, MAT=S_HALITE,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_1,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CONC_PCS,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_CONC,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
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```
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=PAN_SL2,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
!
! GET FLUID (brine and gas) properties from CAMDAT file
FLUID, MAT=BRINESAL, SALINITY=WTF, DEN_BR=DNSFLUID,&
                     COMPR_BR= COMPRES, REF_TEMP= REF_TEMP,&
                     REF_PRES=REF_PRES, INTERP=1, VIS_BR=VISCO
FLUID, MAT=H2,       VIS_GAS=VISCO,DGAS = OFF,&
                     H2_MOLE =1.0, CO2_MOLE=0.0, CH4_MOLE=0.0,&
                     N2_MOLE= 0.0, H2S_MOLE=0.0, O2_MOLE=0.0
!
FLUID, MAT= REFCON,  R_GAS    = R
FLUID, MAT= REFCON,  MW_H2O   = MW_H2O
FLUID, MAT= REFCON,  MW_SALT  = MW_NACL
FLUID, MAT= REFCON,  MW_H2    = MW_H2,   TC_H2  = TC_H2,   PC_H2  = PC_H2,&
                     ACEN_H2  = ACF_H2,  H2_CO2 = BIP_12,  H2_CH4 = BIP_13,&
                     H2_N2    = BIP_14,  H2_H2S = BIP_15,  H2_O2  = BIP_16
FLUID, MAT= REFCON,  MW_CO2   = MW_CO2,  TC_CO2 = TC_CO2,  PC_CO2 = PC_CO2,&
                     ACEN_CO2 = ACF_CO2, CO2_CH4= BIP_23,  CO2_N2 = BIP_24,&
                     CO2_H2S  = BIP_25 , CO2_O2 = BIP_26
FLUID, MAT= REFCON,  MW_CH4   = MW_CH4,  TC_CH4 = TC_CH4,  PC_CH4 = PC_CH4,&
                     ACEN_CH4 = ACF_CH4, CH4_N2 = BIP_34,  CH4_H2S= BIP_35,&
                     CH4_O2   = BIP_36
FLUID, MAT= REFCON,  MW_N2    = MW_N2,   TC_N2  = TC_N2,   PC_N2  = PC_N2,&
                     ACEN_N2  = ACF_N2,  N2_H2S = BIP_45,  N2_O2  = BIP_46
FLUID, MAT= REFCON,  MW_H2S   = MW_H2S,  TC_H2S = TC_H2S,  PC_H2S = PC_H2S,&
                     ACEN_H2S = ACF_H2S, H2S_O2 = BIP_56
FLUID, MAT= REFCON,  MW_O2    = MW_O2,   TC_O2  = TC_O2,   PC_O2  = PC_O2,&
                     ACEN_O2  = ACF_O2
FLUID, MAT= REFCON,  OMEGA_A  = OMEGAA , OMEGA_B = OMEGAB
*END
!===================================================================
```

SCENARIO: S2

```
$ type dbr_bf1_cra1_dir_rel_s2_u.inp
!==========================================================================
!
!   TITLE:   PREBRAG INPUT FOR BLOWOUT CALCULATION: REPOSIRORY SCALE MODEL
!   ANALYST: DAN M. STOELZEL
!   DATE:    NOV 3, 1995
!   SCENARIO: UNDISTURBED SCENERIO: NO FLOW IN DRZ AND SALADO
```

```
!              DIP INCLUDED
!
!    MODIFIED MARCH 22, 1996
!    CHANGES MADE TO WELL INPUT CARD TO INCORPORATE FBHP MODEL (FROM
!    PREVIOUS ALGEBRA)
!
!    6/5/02  T. Hadgu
!    Changes made to reflect the three regions of the repository
!    replacing the original four. This affects location of wells.
!    For up-dip the well is now located in Region 1.
!
!    6/11/02, T. Hadgu
!    Made modifications for TBM calculations. The modifications include
!    adding Materials CONC_PCS, PAN_SL2 and DRZ_CONC, and removing Material
!    DRZ_INIT.
!
!    7/31/2003 J. Stein
!    Updated this file for the 2003 CRA PA Calculations
!
!==========================================================================
*HEADING
TITLE2 = BRINE BLOWOUT IN REPOSITORY SCALE MODEL
!==========================================================================
*GAS_TRANSPORT_initial_conditions
CALC=NO
!=========================================================================
*INITIAL_CONDITIONS
!BEGIN SIMULATION AT 0 YEARS
BEGIN, TIME= 0.0
CAMDAT,TIME= 0.0
SATBR,   ID_BRINE =SATBREL
PRESSURE,ID_PRES  =PRESEL
CONFE  , ID_CONFE =FECONC
CONCELL, ID_CONCEL=CH2OCONC
ELEVAT,  ID_ELEV  =ELEVE
!===========================================================================
!*STEP_CONTROL
!!TIME STEP IS REDUCED AT TIME THE WELLBORE IS ACTIVATED, TIME=0.0 YEARS
! TIME,BEGIN=0.0, DT=8.64e-02
!==========================================================================
*WELL_DATA
TIME_CONTROL, TIME_ID=1,WELLTIME=0.0
!PRODUCTION WELL WITH F-BHP AND PI BASED ON INPUTS
WELL_CONTROL, MAT=WELLBORE,TIME_ID=1,NUM=1,TYPE=PROD, &
              ILOC=21,JLOC=27,KLOC=1,&
              QO=0.0, QG=0.0, PIWELL=WELLPI_L,&
              PRWELL= FBHP1_L
!
WELL_CONTROL, MAT=WELLBORE,TIME_ID=1,NUM=1,TYPE=INJP, &
              ILOC=6,JLOC=5,KLOC=1,&
              QO=0.0, QG=0.0, PIWELL=WELPI_BC,&
              PRWELL= BHP_ABAN
!==========================================================================
*GEOMETRY
COORD= CARTESIAN
!==========================================================================
*SIMULATION_CONTROL
```

```
INTEGRATION, TMAX=4.323E06, DT_INIT=8.64e-01,DT_MIN= 8.64E-2,
DT_MAX=8.646E4,&
           DT_INCR=1.25,   DT_REDU= 0.5,   AUTODT=YES,  TSWITCH=1.0,&
           MATERIAL=WELLBORE,MAXSTEPS=NSTEP1_L
!
ITERATION, DSATLIM= 2.E-1, DPRESLIM = -1.E8 , SATLIM= 1.E-3,&
           SATNORM= 0.30,  PRESNORM = 5.0E5,&
           ITMAX= 8,       IRESETMAX= 40, IJACINT= 1,&
           IJACSWITCH=41,  IJACMIN= 1,    IJACRESET= 5,&
           IUPRPFLAG =9,   IUPMFFLAG= 9,   IUPRPLOOSE= 9,&
           IUPMFLOOSE=9
!
ITERATION, DHSAT_REL= 1.0E-8,   DHPRES_REL=1.0E-8,&
           DHSAT_MIN= 1.0E-10,  DHPRES_MIN=1.0E-2
!
ITERATION, EPS_SAT  = 3.0E+0,     EPS_PRES    = 1.E-2,&
           R_EPS_SAT= 3.0E+0,     R_EPS_PRES  = 1.E-2,&
           FTOL_SAT = 1.0E-2,     FTOL_PRES   = 1.0E-2,&
           R_FTOL_SAT=1.0E-2,     R_FTOL_PRES = 1.0E-2, CONV_TEST = and
!
NUMERICS,SOLVER=LU
NUMERICS,JACSCALE= 1.0e7, VSWITCH = NO
NUMERICS, ITRAVE= HARMONIC, IMFRAVE=UPSTREAM
!
GRAVITY, MAT= REFCON, G_ACC= GRAVACC
!
!==========================================================================
*OUTPUT_CONTROL

UNITS= SI
MONITOR, ILOC =  8, JLOC = 5, KLOC = 1
MONITOR, ILOC = 19, JLOC =18, KLOC = 1
MONITOR, ILOC = 34, JLOC =35, KLOC = 1
!
STEPS, FILE= BINARY, NSTEP=5
 TIMES, FILE= ASCII,  VALUES= 0.0, 9.504E5
!
PRIBIN,&
     PRESBRIN,  PRESGAS,   POROS,    SATGAS,&
     FLOWGASX,  FLOWGASY,  FLOWBRX,  FLOWBRY,&
     BRINRATE,  WELLBRINE, WELLGAS
!
PRIASC,&
     PRESBRIN,  PRESGAS,   POROS,    SATGAS
!
HISTORY, NAMES=   WELLBRINE,  IRANGE= 21,21,  JRANGE= 27,27, KRANGE=1,1
HISTORY, NAMES=   WELLBRINE,  IRANGE= 6,6,    JRANGE= 5, 5, KRANGE=1,1
!
HISTORY, NAMES=   WELLGAS,    IRANGE= 21,21,  JRANGE= 27,27, KRANGE=1,1
HISTORY, NAMES=   WELLGAS,    IRANGE= 6,6,    JRANGE= 5, 5, KRANGE=1,1
!============================================================================
*PROPERTIES
! GET SOLID properties from CAMDAT file
!
SOLID, MAT=WAS_AREA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
```

```
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!Salado Halite
SOLID, MAT=S_HALITE,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_1,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CONC_PCS,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_CONC,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=PAN_SL2,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
```

```
!
! GET FLUID (brine and gas) properties from CAMDAT file
FLUID, MAT=BRINESAL, SALINITY=WTF, DEN_BR=DNSFLUID,&
                     COMPR_BR= COMPRES, REF_TEMP= REF_TEMP,&
                     REF_PRES=REF_PRES, INTERP=1, VIS_BR=VISCO
FLUID, MAT=H2,       VIS_GAS=VISCO,DGAS = OFF,&
                     H2_MOLE =1.0, CO2_MOLE=0.0, CH4_MOLE=0.0,&
                     N2_MOLE= 0.0, H2S_MOLE=0.0, O2_MOLE=0.0
!
FLUID, MAT= REFCON,  R_GAS    = R
FLUID, MAT= REFCON,  MW_H2O   = MW_H2O
FLUID, MAT= REFCON,  MW_SALT  = MW_NACL
FLUID, MAT= REFCON,  MW_H2    = MW_H2,   TC_H2  = TC_H2,   PC_H2  = PC_H2,&
                     ACEN_H2  = ACF_H2,  H2_CO2 = BIP_12,  H2_CH4 = BIP_13,&
                     H2_N2    = BIP_14,  H2_H2S = BIP_15,  H2_O2  = BIP_16
FLUID, MAT= REFCON,  MW_CO2   = MW_CO2,  TC_CO2 = TC_CO2,  PC_CO2 = PC_CO2,&
                     ACEN_CO2 = ACF_CO2, CO2_CH4= BIP_23,  CO2_N2 = BIP_24,&
                     CO2_H2S  = BIP_25 , CO2_O2 = BIP_26
FLUID, MAT= REFCON,  MW_CH4   = MW_CH4,  TC_CH4 = TC_CH4,  PC_CH4 = PC_CH4,&
                     ACEN_CH4 = ACF_CH4, CH4_N2 = BIP_34,  CH4_H2S= BIP_35,&
                     CH4_O2   = BIP_36
FLUID, MAT= REFCON,  MW_N2    = MW_N2,   TC_N2  = TC_N2,   PC_N2  = PC_N2,&
                     ACEN_N2  = ACF_N2,  N2_H2S = BIP_45,  N2_O2  = BIP_46
FLUID, MAT= REFCON,  MW_H2S   = MW_H2S,  TC_H2S = TC_H2S,  PC_H2S = PC_H2S,&
                     ACEN_H2S = ACF_H2S, H2S_O2 = BIP_56
FLUID, MAT= REFCON,  MW_O2    = MW_O2,   TC_O2  = TC_O2,   PC_O2  = PC_O2,&
                     ACEN_O2  = ACF_O2
FLUID, MAT= REFCON,  OMEGA_A  = OMEGAA , OMEGA_B = OMEGAB
*END
!==========================================================================
$
```

SCENARIO: S3

```
$ type dbr_bf1_cra1_dir_rel_s3_l.inp
!==========================================================================
!
!   TITLE:   PREBRAG INPUT FOR BLOWOUT CALCULATION: REPOSIRORY SCALE MODEL
!   ANALYST: DAN M. STOELZEL
!   DATE:    NOV 3, 1995
!   SCENARIO: UNDISTURBED SCENERIO: NO FLOW IN DRZ AND SALADO
!             DIP INCLUDED
!
!   MODIFIED MARCH 22, 1996
!   CHANGES MADE TO WELL INPUT CARD TO INCORPORATE FBHP MODEL (FROM
!   PREVIOUS ALGEBRA)
!
!   6/5/02  T. Hadgu
!   Changes made to reflect the three regions of the repository
!   replacing the original four. This affects location of wells.
!   For down-dip the well is now located in Region 3.
!
!   6/11/02, T. Hadgu
!   Made modifications for TBM calculations. The modifications include
!   adding Materials CONC_PCS, PAN_SL2 and DRZ_CONC, and removing Material
!   DRZ_INIT.
```

```
!
!   7/31/2003 J. Stein
!   Updated this file for the 2003 CRA PA Calculations
!
!===========================================================================
*HEADING
TITLE2 = BRINE BLOWOUT IN REPOSITORY SCALE MODEL
!===========================================================================
*GAS_TRANSPORT_initial_conditions
CALC=NO
!==========================================================================
*INITIAL_CONDITIONS
!BEGIN SIMULATION AT 0 YEARS
BEGIN, TIME= 0.0
CAMDAT,TIME= 0.0
SATBR,   ID_BRINE =SATBREL
PRESSURE,ID_PRES  =PRESEL
CONFE  , ID_CONFE =FECONC
CONCELL, ID_CONCEL=CH2OCONC
ELEVAT,  ID_ELEV  =ELEVE
!============================================================================
!*STEP_CONTROL
!!TIME STEP IS REDUCED AT TIME THE WELLBORE IS ACTIVATED, TIME=0.0 YEARS
! TIME,BEGIN=0.0, DT=8.64e-02
!============================================================================
*WELL_DATA
TIME_CONTROL, TIME_ID=1,WELLTIME=0.0
!PRODUCTION WELL WITH F-BHP AND PI BASED ON INPUTS
WELL_CONTROL, MAT=WELLBORE,TIME_ID=1,NUM=1,TYPE=PROD, &
              ILOC=12,JLOC=5,KLOC=1,&
              QO=0.0, QG=0.0, PIWELL=WELLPI_L,&
              PRWELL= FBHP3_L
!
WELL_CONTROL, MAT=WELLBORE,TIME_ID=1,NUM=1,TYPE=INJP, &
              ILOC=6,JLOC=5,KLOC=1,&
              QO=0.0, QG=0.0, PIWELL=WELPI_BC,&
              PRWELL= BHP_ABAN
!============================================================================
*GEOMETRY
COORD= CARTESIAN
!============================================================================
*SIMULATION_CONTROL
INTEGRATION, TMAX=4.323E06, DT_INIT=8.64e-01,DT_MIN= 8.64E-2,
DT_MAX=8.646E4,&
           DT_INCR=1.25,   DT_REDU= 0.5,   AUTODT=YES,  TSWITCH=1.0,&
           MATERIAL=WELLBORE,MAXSTEPS=NSTEP3_L
!
ITERATION, DSATLIM= 2.E-1, DPRESLIM = -1.E8 , SATLIM= 1.E-3,&
           SATNORM= 0.30,  PRESNORM = 5.0E5,&
           ITMAX= 8,       IRESETMAX= 40, IJACINT= 1,&
           IJACSWITCH=41,  IJACMIN= 1,    IJACRESET= 5,&
           IUPRPFLAG =9,   IUPMFFLAG= 9,   IUPRPLOOSE= 9,&
           IUPMFLOOSE=9
!
ITERATION, DHSAT_REL= 1.0E-8,   DHPRES_REL=1.0E-8,&
           DHSAT_MIN= 1.0E-10,  DHPRES_MIN=1.0E-2
!
```

```
ITERATION, EPS_SAT  = 3.0E+0,     EPS_PRES    = 1.E-2,&
           R_EPS_SAT= 3.0E+0,     R_EPS_PRES  = 1.E-2,&
           FTOL_SAT = 1.0E-2,     FTOL_PRES   = 1.0E-2,&
           R_FTOL_SAT=1.0E-2,     R_FTOL_PRES = 1.0E-2, CONV_TEST = and
!
NUMERICS,SOLVER=LU
NUMERICS,JACSCALE= 1.0e7, VSWITCH = NO
NUMERICS, ITRAVE= HARMONIC, IMFRAVE=UPSTREAM
!
GRAVITY, MAT= REFCON, G_ACC= GRAVACC
!
!==========================================================================
*OUTPUT_CONTROL

UNITS= SI
MONITOR, ILOC =  8, JLOC = 5, KLOC = 1
MONITOR, ILOC = 19, JLOC =18, KLOC = 1
MONITOR, ILOC = 34, JLOC =35, KLOC = 1
!
STEPS, FILE= BINARY, NSTEP=5
 TIMES, FILE= ASCII,  VALUES= 0.0, 9.504E5
!
PRIBIN,&
     PRESBRIN,  PRESGAS,   POROS,    SATGAS,&
     FLOWGASX,  FLOWGASY,  FLOWBRX,  FLOWBRY,&
     BRINRATE,  WELLBRINE, WELLGAS
!
PRIASC,&
     PRESBRIN,  PRESGAS,   POROS,    SATGAS
!
HISTORY, NAMES=   WELLBRINE,  IRANGE= 12,12,  JRANGE= 5, 5, KRANGE=1,1
HISTORY, NAMES=   WELLBRINE,  IRANGE= 6,6,    JRANGE= 5, 5, KRANGE=1,1
!
HISTORY, NAMES=   WELLGAS,    IRANGE= 12,12,  JRANGE= 5, 5, KRANGE=1,1
HISTORY, NAMES=   WELLGAS,    IRANGE= 6,6,    JRANGE= 5, 5, KRANGE=1,1
!============================================================================
*PROPERTIES
! GET SOLID properties from CAMDAT file
!
SOLID, MAT=WAS_AREA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!Salado Halite
SOLID, MAT=S_HALITE,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
```

```
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_1,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CONC_PCS,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_CONC,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=PAN_SL2,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
!
! GET FLUID (brine and gas) properties from CAMDAT file
FLUID, MAT=BRINESAL, SALINITY=WTF, DEN_BR=DNSFLUID,&
                     COMPR_BR= COMPRES, REF_TEMP= REF_TEMP,&
                     REF_PRES=REF_PRES, INTERP=1, VIS_BR=VISCO
FLUID, MAT=H2,       VIS_GAS=VISCO,DGAS = OFF,&
                     H2_MOLE =1.0, CO2_MOLE=0.0, CH4_MOLE=0.0,&
                     N2_MOLE= 0.0, H2S_MOLE=0.0, O2_MOLE=0.0
!
FLUID, MAT= REFCON,  R_GAS     = R
FLUID, MAT= REFCON,  MW_H2O    = MW_H2O
FLUID, MAT= REFCON,  MW_SALT   = MW_NACL
FLUID, MAT= REFCON,  MW_H2     = MW_H2,   TC_H2  = TC_H2,   PC_H2  = PC_H2,&
                     ACEN_H2   = ACF_H2,  H2_CO2 = BIP_12,  H2_CH4 = BIP_13,&
                     H2_N2     = BIP_14,  H2_H2S = BIP_15,  H2_O2  = BIP_16
```

```
FLUID, MAT= REFCON,  MW_CO2   = MW_CO2,  TC_CO2 = TC_CO2,  PC_CO2 = PC_CO2,&
                     ACEN_CO2 = ACF_CO2, CO2_CH4= BIP_23,  CO2_N2 = BIP_24,&
                     CO2_H2S  = BIP_25 , CO2_O2 = BIP_26
FLUID, MAT= REFCON,  MW_CH4   = MW_CH4,  TC_CH4 = TC_CH4,  PC_CH4 = PC_CH4,&
                     ACEN_CH4 = ACF_CH4, CH4_N2 = BIP_34,  CH4_H2S= BIP_35,&
                     CH4_O2   = BIP_36
FLUID, MAT= REFCON,  MW_N2    = MW_N2,   TC_N2  = TC_N2,   PC_N2  = PC_N2,&
                     ACEN_N2  = ACF_N2,  N2_H2S = BIP_45,  N2_O2  = BIP_46
FLUID, MAT= REFCON,  MW_H2S   = MW_H2S,  TC_H2S = TC_H2S,  PC_H2S = PC_H2S,&
                     ACEN_H2S = ACF_H2S, H2S_O2 = BIP_56
FLUID, MAT= REFCON,  MW_O2    = MW_O2,   TC_O2  = TC_O2,   PC_O2  = PC_O2,&
                     ACEN_O2  = ACF_O2
FLUID, MAT= REFCON,  OMEGA_A  = OMEGAA , OMEGA_B = OMEGAB
*END
!===========================================================================
$
```

SCENARIO: S4

```
$ type dbr_bf1_cra1_dir_rel_s4_l.inp
!===========================================================================
!
!   TITLE:   PREBRAG INPUT FOR BLOWOUT CALCULATION: REPOSIRORY SCALE MODEL
!   ANALYST: DAN M. STOELZEL
!   DATE:    NOV 3, 1995
!   SCENARIO: UNDISTURBED SCENERIO: NO FLOW IN DRZ AND SALADO
!             DIP INCLUDED
!
!   MODIFIED MARCH 22, 1996
!   CHANGES MADE TO WELL INPUT CARD TO INCORPORATE FBHP MODEL (FROM
!   PREVIOUS ALGEBRA)
!
!   6/5/02  T. Hadgu
!   Changes made to reflect the three regions of the repository
!   replacing the original four. This affects location of wells.
!   For down-dip the well is now located in Region 3.
!
!   6/11/02, T. Hadgu
!   Made modifications for TBM calculations. The modifications include
!   adding Materials CONC_PCS, PAN_SL2 and DRZ_CONC, and removing Material
!   DRZ_INIT.
!
!   7/31/2003 J. Stein
!   Updated this file for the 2003 CRA PA Calculations
!
!===========================================================================
*HEADING
TITLE2 = BRINE BLOWOUT IN REPOSITORY SCALE MODEL
!===========================================================================
*GAS_TRANSPORT_initial_conditions
CALC=NO
!==========================================================================
*INITIAL_CONDITIONS
!BEGIN SIMULATION AT 0 YEARS
BEGIN, TIME= 0.0
CAMDAT,TIME= 0.0
```

```
SATBR,   ID_BRINE =SATBREL
PRESSURE,ID_PRES  =PRESEL
CONFE  , ID_CONFE =FECONC
CONCELL, ID_CONCEL=CH2OCONC
ELEVAT,  ID_ELEV  =ELEVE
!============================================================================
!*STEP_CONTROL
!!TIME STEP IS REDUCED AT TIME THE WELLBORE IS ACTIVATED, TIME=0.0 YEARS
! TIME,BEGIN=0.0, DT=8.64e-02
!===========================================================================
*WELL_DATA
TIME_CONTROL, TIME_ID=1,WELLTIME=0.0
!PRODUCTION WELL WITH F-BHP AND PI BASED ON INPUTS
WELL_CONTROL, MAT=WELLBORE,TIME_ID=1,NUM=1,TYPE=PROD, &
              ILOC=12,JLOC=5,KLOC=1,&
              QO=0.0, QG=0.0, PIWELL=WELLPI_L,&
              PRWELL= FBHP3_L
!
WELL_CONTROL, MAT=WELLBORE,TIME_ID=1,NUM=1,TYPE=INJP, &
              ILOC=6,JLOC=5,KLOC=1,&
              QO=0.0, QG=0.0, PIWELL=WELPI_BC,&
              PRWELL= BHP_ABAN
!===========================================================================
*GEOMETRY
COORD= CARTESIAN
!===========================================================================
*SIMULATION_CONTROL
INTEGRATION, TMAX=4.323E06, DT_INIT=8.64e-01,DT_MIN= 8.64E-2,
DT_MAX=8.646E4,&
           DT_INCR=1.25,   DT_REDU= 0.5,   AUTODT=YES,  TSWITCH=1.0,&
           MATERIAL=WELLBORE,MAXSTEPS=NSTEP3_L
!
ITERATION, DSATLIM= 2.E-1, DPRESLIM = -1.E8 , SATLIM= 1.E-3,&
           SATNORM= 0.30,  PRESNORM = 5.0E5,&
           ITMAX= 8,       IRESETMAX= 40, IJACINT= 1,&
           IJACSWITCH=41,  IJACMIN= 1,    IJACRESET= 5,&
           IUPRPFLAG =9,   IUPMFFLAG= 9,   IUPRPLOOSE= 9,&
           IUPMFLOOSE=9
!
ITERATION, DHSAT_REL= 1.0E-8,   DHPRES_REL=1.0E-8,&
           DHSAT_MIN= 1.0E-10,  DHPRES_MIN=1.0E-2
!
ITERATION, EPS_SAT  = 3.0E+0,     EPS_PRES    = 1.E-2,&
           R_EPS_SAT= 3.0E+0,     R_EPS_PRES  = 1.E-2,&
           FTOL_SAT = 1.0E-2,     FTOL_PRES   = 1.0E-2,&
           R_FTOL_SAT=1.0E-2,     R_FTOL_PRES = 1.0E-2, CONV_TEST = and
!
NUMERICS,SOLVER=LU
NUMERICS,JACSCALE= 1.0e7, VSWITCH = NO
NUMERICS, ITRAVE= HARMONIC, IMFRAVE=UPSTREAM
!
GRAVITY, MAT= REFCON, G_ACC= GRAVACC
!
!==========================================================================
*OUTPUT_CONTROL

UNITS= SI
```

```
MONITOR, ILOC =  8, JLOC = 5, KLOC = 1
MONITOR, ILOC = 19, JLOC =18, KLOC = 1
MONITOR, ILOC = 34, JLOC =35, KLOC = 1
!
STEPS, FILE= BINARY, NSTEP=5
 TIMES, FILE= ASCII,  VALUES= 0.0, 9.504E5
!
PRIBIN,&
     PRESBRIN,  PRESGAS,   POROS,    SATGAS,&
     FLOWGASX,  FLOWGASY,  FLOWBRX,  FLOWBRY,&
     BRINRATE,  WELLBRINE, WELLGAS
!
PRIASC,&
     PRESBRIN,  PRESGAS,   POROS,    SATGAS
!
HISTORY, NAMES=   WELLBRINE,  IRANGE= 12,12,  JRANGE= 5, 5, KRANGE=1,1
HISTORY, NAMES=   WELLBRINE,  IRANGE= 6,6,    JRANGE= 5, 5, KRANGE=1,1
!
HISTORY, NAMES=   WELLGAS,    IRANGE= 12,12,  JRANGE= 5, 5, KRANGE=1,1
HISTORY, NAMES=   WELLGAS,    IRANGE= 6,6,    JRANGE= 5, 5, KRANGE=1,1
!============================================================================
*PROPERTIES
! GET SOLID properties from CAMDAT file
!
SOLID, MAT=WAS_AREA,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!Salado Halite
SOLID, MAT=S_HALITE,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_1,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=CONC_PCS,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
```

```
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=DRZ_CONC,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
SOLID, MAT=PAN_SL2,&
                    PRM_X      = PERM_X,       PRM_Y      = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY   = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR      = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES    = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN     = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD    = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A      = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG   = KPT
!
!
! GET FLUID (brine and gas) properties from CAMDAT file
FLUID, MAT=BRINESAL, SALINITY=WTF, DEN_BR=DNSFLUID,&
                     COMPR_BR= COMPRES, REF_TEMP= REF_TEMP,&
                     REF_PRES=REF_PRES, INTERP=1, VIS_BR=VISCO
FLUID, MAT=H2,       VIS_GAS=VISCO,DGAS = OFF,&
                     H2_MOLE =1.0, CO2_MOLE=0.0, CH4_MOLE=0.0,&
                     N2_MOLE= 0.0, H2S_MOLE=0.0, O2_MOLE=0.0
!
FLUID, MAT= REFCON,  R_GAS     = R
FLUID, MAT= REFCON,  MW_H2O    = MW_H2O
FLUID, MAT= REFCON,  MW_SALT   = MW_NACL
FLUID, MAT= REFCON,  MW_H2     = MW_H2,   TC_H2  = TC_H2,   PC_H2  = PC_H2,&
                     ACEN_H2   = ACF_H2,  H2_CO2 = BIP_12,  H2_CH4 = BIP_13,&
                     H2_N2     = BIP_14,  H2_H2S = BIP_15,  H2_O2  = BIP_16
FLUID, MAT= REFCON,  MW_CO2    = MW_CO2,  TC_CO2 = TC_CO2,  PC_CO2 = PC_CO2,&
                     ACEN_CO2 = ACF_CO2, CO2_CH4= BIP_23,  CO2_N2 = BIP_24,&
                     CO2_H2S   = BIP_25 , CO2_O2 = BIP_26
FLUID, MAT= REFCON,  MW_CH4    = MW_CH4,  TC_CH4 = TC_CH4,  PC_CH4 = PC_CH4,&
                     ACEN_CH4 = ACF_CH4, CH4_N2 = BIP_34,  CH4_H2S= BIP_35,&
                     CH4_O2    = BIP_36
FLUID, MAT= REFCON,  MW_N2     = MW_N2,   TC_N2  = TC_N2,   PC_N2  = PC_N2,&
                     ACEN_N2   = ACF_N2,  N2_H2S = BIP_45,  N2_O2  = BIP_46
FLUID, MAT= REFCON,  MW_H2S    = MW_H2S,  TC_H2S = TC_H2S,  PC_H2S = PC_H2S,&
                     ACEN_H2S = ACF_H2S, H2S_O2 = BIP_56
FLUID, MAT= REFCON,  MW_O2     = MW_O2,   TC_O2  = TC_O2,   PC_O2  = PC_O2,&
                     ACEN_O2   = ACF_O2
FLUID, MAT= REFCON,  OMEGA_A   = OMEGAA , OMEGA_B = OMEGAB
*END
```

SCENARIO: S5

```
$ type dbr_bf1_cra1_dir_rel_s5_m.inp
!==========================================================================
!
!   TITLE:   PREBRAG INPUT FOR BLOWOUT CALCULATION: REPOSIRORY SCALE MODEL
!   ANALYST: DAN M. STOELZEL
!   DATE:    NOV 3, 1995
!   SCENARIO: UNDISTURBED SCENERIO: NO FLOW IN DRZ AND SALADO
!             DIP INCLUDED
!
!   MODIFIED MARCH 22, 1996
!   CHANGES MADE TO WELL INPUT CARD TO INCORPORATE FBHP MODEL (FROM
!   PREVIOUS ALGEBRA)
!
!   6/5/02  T. Hadgu
!   Changes made to reflect the three regions of the repository
!   replacing the original four. This affects location of wells.
!   For down-dip the well is now located in Region 3.
!
!   6/11/02, T. Hadgu
!   Made modifications for TBM calculations. The modifications include
!   adding Materials CONC_PCS, PAN_SL2 and DRZ_CONC, and removing Material
!   DRZ_INIT.
!
!   7/31/2003 J. Stein
!   Updated this file for the 2003 CRA PA Calculations
!
!==========================================================================
*HEADING
TITLE2 = BRINE BLOWOUT IN REPOSITORY SCALE MODEL
!==========================================================================
*GAS_TRANSPORT_initial_conditions
CALC=NO
!=========================================================================
*INITIAL_CONDITIONS
!BEGIN SIMULATION AT 0 YEARS
BEGIN, TIME= 0.0
CAMDAT,TIME= 0.0
SATBR,   ID_BRINE =SATBREL
PRESSURE,ID_PRES  =PRESEL
CONFE  , ID_CONFE =FECONC
CONCELL, ID_CONCEL=CH2OCONC
ELEVAT,  ID_ELEV  =ELEVE
!===========================================================================
!*STEP_CONTROL
!!TIME STEP IS REDUCED AT TIME THE WELLBORE IS ACTIVATED, TIME=0.0 YEARS
! TIME,BEGIN=0.0, DT=8.64e-02
!==========================================================================
*WELL_DATA
TIME_CONTROL, TIME_ID=1,WELLTIME=0.0
!PRODUCTION WELL WITH F-BHP AND PI BASED ON INPUTS
WELL_CONTROL, MAT=WELLBORE,TIME_ID=1,NUM=1,TYPE=PROD, &
              ILOC=36,JLOC=15,KLOC=1,&
              QO=0.0, QG=0.0, PIWELL=WELLPI_L,&
              PRWELL= FBHP2_L
```

```
!
WELL_CONTROL, MAT=WELLBORE,TIME_ID=1,NUM=1,TYPE=INJP, &
              ILOC=6,JLOC=5,KLOC=1,&
              QO=0.0, QG=0.0, PIWELL=WELPI_BC,&
              PRWELL= BHP_ABAN
!=============================================================================
*GEOMETRY
COORD= CARTESIAN
!=============================================================================
*SIMULATION_CONTROL
INTEGRATION, TMAX=4.323E06, DT_INIT=8.64e-01,DT_MIN= 8.64E-2,
DT_MAX=8.646E4,&
           DT_INCR=1.25,   DT_REDU= 0.5,   AUTODT=YES,  TSWITCH=1.0,&
           MATERIAL=WELLBORE,MAXSTEPS=NSTEP2_L
!
ITERATION, DSATLIM= 2.E-1, DPRESLIM = -1.E8 , SATLIM= 1.E-3,&
           SATNORM= 0.30,  PRESNORM = 5.0E5,&
           ITMAX= 8,       IRESETMAX= 40, IJACINT= 1,&
           IJACSWITCH=41,  IJACMIN= 1,    IJACRESET= 5,&
           IUPRPFLAG =9,   IUPMFFLAG= 9,   IUPRPLOOSE= 9,&
           IUPMFLOOSE=9
!
ITERATION, DHSAT_REL= 1.0E-8,   DHPRES_REL=1.0E-8,&
           DHSAT_MIN= 1.0E-10,  DHPRES_MIN=1.0E-2
!
ITERATION, EPS_SAT  = 3.0E+0,     EPS_PRES    = 1.E-2,&
           R_EPS_SAT= 3.0E+0,     R_EPS_PRES  = 1.E-2,&
           FTOL_SAT = 1.0E-2,     FTOL_PRES   = 1.0E-2,&
           R_FTOL_SAT=1.0E-2,     R_FTOL_PRES = 1.0E-2, CONV_TEST = and
!
NUMERICS,SOLVER=LU
NUMERICS,JACSCALE= 1.0e7, VSWITCH = NO
NUMERICS, ITRAVE= HARMONIC, IMFRAVE=UPSTREAM
!
GRAVITY, MAT= REFCON, G_ACC= GRAVACC
!
!===========================================================================
*OUTPUT_CONTROL

UNITS= SI
MONITOR, ILOC =  8, JLOC = 5, KLOC = 1
MONITOR, ILOC = 19, JLOC =18, KLOC = 1
MONITOR, ILOC = 34, JLOC =35, KLOC = 1
!
STEPS, FILE= BINARY, NSTEP=5
 TIMES, FILE= ASCII,  VALUES= 0.0, 9.504E5
!
PRIBIN,&
     PRESBRIN,  PRESGAS,   POROS,    SATGAS,&
     FLOWGASX,  FLOWGASY,  FLOWBRX,  FLOWBRY,&
     BRINRATE,  WELLBRINE, WELLGAS
!
PRIASC,&
     PRESBRIN,  PRESGAS,   POROS,    SATGAS
!
HISTORY, NAMES=   WELLBRINE,  IRANGE= 36,36,  JRANGE= 15, 15, KRANGE=1,1
HISTORY, NAMES=   WELLBRINE,  IRANGE= 6,6,    JRANGE= 5, 5, KRANGE=1,1
```

```
!
HISTORY, NAMES=   WELLGAS,    IRANGE= 36,36,  JRANGE= 15, 15, KRANGE=1,1
HISTORY, NAMES=   WELLGAS,    IRANGE= 6,6,    JRANGE= 5, 5, KRANGE=1,1
!==========================================================================
*PROPERTIES
! GET SOLID properties from CAMDAT file
!
SOLID, MAT=WAS_AREA,&
                    PRM_X      = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG    = KPT
!Salado Halite
SOLID, MAT=S_HALITE,&
                    PRM_X      = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG    = KPT
!
SOLID, MAT=DRZ_1,&
                    PRM_X      = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG    = KPT
!
SOLID, MAT=CONC_PCS,&
                    PRM_X      = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG    = KPT
!
SOLID, MAT=DRZ_CONC,&
                    PRM_X      = PERM_X,       PRM_Y       = PERM_Y,&
                    PRM_Z      = PERM_Z,       POROSITY    = POROSITY,&
                    BCSOR      = SAT_RBRN,     BCSGR       = SAT_RGAS,&
                    BCLAM      = PORE_DIS,     COMPRES     = POR_COMP,&
                    SB_MIN     = SB_MIN,       PB_MIN      = PO_MIN,&
                    PC_MAX     = PC_MAX,       CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,     PCT_A       = PCT_A,&
                    PCT_EXP    = PCT_EXP,      PCT_FLAG    = KPT
!
```

```
SOLID, MAT=PAN_SL2,&
                    PRM_X       = PERM_X,        PRM_Y       = PERM_Y,&
                    PRM_Z       = PERM_Z,        POROSITY    = POROSITY,&
                    BCSOR       = SAT_RBRN,      BCSGR       = SAT_RGAS,&
                    BCLAM       = PORE_DIS,      COMPRES     = POR_COMP,&
                    SB_MIN      = SB_MIN,        PB_MIN      = PO_MIN,&
                    PC_MAX      = PC_MAX,        CAP_MOD     = CAP_MOD,&
                    RELP_MODEL = RELP_MOD,       PCT_A       = PCT_A,&
                    PCT_EXP     = PCT_EXP,       PCT_FLAG    = KPT
!
!
! GET FLUID (brine and gas) properties from CAMDAT file
FLUID, MAT=BRINESAL, SALINITY=WTF, DEN_BR=DNSFLUID,&
                     COMPR_BR= COMPRES, REF_TEMP= REF_TEMP,&
                     REF_PRES=REF_PRES, INTERP=1, VIS_BR=VISCO
FLUID, MAT=H2,       VIS_GAS=VISCO,DGAS = OFF,&
                     H2_MOLE =1.0, CO2_MOLE=0.0, CH4_MOLE=0.0,&
                     N2_MOLE= 0.0, H2S_MOLE=0.0, O2_MOLE=0.0
!
FLUID, MAT= REFCON,  R_GAS    = R
FLUID, MAT= REFCON,  MW_H2O   = MW_H2O
FLUID, MAT= REFCON,  MW_SALT  = MW_NACL
FLUID, MAT= REFCON,  MW_H2    = MW_H2,   TC_H2  = TC_H2,   PC_H2  = PC_H2,&
                     ACEN_H2  = ACF_H2,  H2_CO2 = BIP_12,  H2_CH4 = BIP_13,&
                     H2_N2    = BIP_14,  H2_H2S = BIP_15,  H2_O2  = BIP_16
FLUID, MAT= REFCON,  MW_CO2   = MW_CO2,  TC_CO2 = TC_CO2,  PC_CO2 = PC_CO2,&
                     ACEN_CO2 = ACF_CO2, CO2_CH4= BIP_23,  CO2_N2 = BIP_24,&
                     CO2_H2S  = BIP_25 , CO2_O2 = BIP_26
FLUID, MAT= REFCON,  MW_CH4   = MW_CH4,  TC_CH4 = TC_CH4,  PC_CH4 = PC_CH4,&
                     ACEN_CH4 = ACF_CH4, CH4_N2 = BIP_34,  CH4_H2S= BIP_35,&
                     CH4_O2   = BIP_36
FLUID, MAT= REFCON,  MW_N2    = MW_N2,   TC_N2  = TC_N2,   PC_N2  = PC_N2,&
                     ACEN_N2  = ACF_N2,  N2_H2S = BIP_45,  N2_O2  = BIP_46
FLUID, MAT= REFCON,  MW_H2S   = MW_H2S,  TC_H2S = TC_H2S,  PC_H2S = PC_H2S,&
                     ACEN_H2S = ACF_H2S, H2S_O2 = BIP_56
FLUID, MAT= REFCON,  MW_O2    = MW_O2,   TC_O2  = TC_O2,   PC_O2  = PC_O2,&
                     ACEN_O2  = ACF_O2
FLUID, MAT= REFCON,  OMEGA_A  = OMEGAA , OMEGA_B = OMEGAB
!

*END
```

APPENDIX C: INPUT FILES FOR DRSPALL

C.1 GENMESH INPUT FILE Sets up grid for DR SPALL

```
$ type gm_drs_cra1_R1.inp
!==========================================================================
!   FILETYPE: GENMESH input text file
!   TITLE:    Simple GENMESH to set up CRA CDB for DRSPALL
!   ANALYSTS: David K. Rudeen
!   DATE:     10-1-03
!==========================================================================
!
 *SETUP
   DIM=     3
   ORIGIN= 0.0, 0.0, 0.0
   IJKMAX= 2, 2, 2
 *GRID
!   ==================== X direction ======================
   DEL, COORD=X, DEL=   1.00, INRANGE=  1,  2, FACTOR= 1.0
!   ==================== Y direction ======================
   DEL, COORD=Y, DEL=   1.00, INRANGE=  1,  2, FACTOR= 1.0
!   ==================== Z direction ======================
   DEL, COORD=Z, DEL=   1.00, INRANGE=  1,  2, FACTOR= 1.0
!
 *REGIONS
  REGION= 1, IRANGE= 1,2, JRANGE= 1,2 KRANGE= 1, 2
!=======================================================================
 *END
```

C.2 MATSET FILE: Calls out parameters/defines/assigns parameters to blocks

```
$ type ms_drs_cra1_R1.inp
!===========================================================================
! TITLE:    DRSPALL INITIAL MATSET
! ANALYSTS: David Rudeen
! CREATED:  October 1, 2003
! PURPOSE:  PREPARE INPUT CDB FOR  DRSPALL
!========================================================================
!
*HEADING
RUN=0
SCALE=SOURCE
SCENARIO=00
TITLE=SPALLING
!
*PRINT_ASSIGNED_VALUES
!
*UNITS=SI
!
*CREATE_BLOCK
 BLOCKID=      2 ,3 ,4 ,5, 6, 7, 8
*RETRIEVE*NAME
COORDINATE, DIM=3, NAMES=X, Y, Z
MATERIAL,    1=GLOBAL, 2=SPALLMOD, 3=REFCON,  4=BLOWOUT, 5=BRINESAL, &
             6=H2,     7=DRILLMUD, 8=BOREHOLE
```

```
!
PROPERTY, MATERIAL=SPALLMOD,    NAMES = SURFELEV, REPOSTOP,REPOSTCK,&
DRZTCK,   DRZPERM,  REPOTRAD, FFSTRESS, REPIPERM, REPIPOR, &
BIOTBETA, POISRAT,  COHESION, FRICTANG, TENSLSTR, PARTDIAM,&
ANNUROUG, MUDSOLMX, MUDSOLVE, REFPRS,   SALTDENS, &
PIPEID,   DRILRATE, INITBAR,  MUDPRATE, DDZTHICK, DDZPERM,&
STPDVOLR, STPPVOLR, STPDTIME, SHAPEFAC,&
FRCHBETA, CHARLEN,  PIPEROUG, EXITPLEN, EXITPDIA, MAXPPRES
PROPERTY, MATERIAL=REFCON,   NAMES= PI,   GRAVACC
PROPERTY, MATERIAL=BLOWOUT,  NAMES= RGAS, TREPO,  RHOS
PROPERTY, MATERIAL=BRINESAL, NAMES= COMPRES
PROPERTY, MATERIAL=H2,       NAMES= VISCO
PROPERTY, MATERIAL=DRILLMUD, NAMES= DNSFLUID, VISCO
PROPERTY, MATERIAL=BOREHOLE, NAMES= DIAMMOD,  PIPED, COLDIA, L1

!============================================================================
*SET*VALUES
PROPERTY   MATERIAL=SPALLMOD,    NAMES*VALUE: DRZTCK=0.85
PROPERTY   MATERIAL=SPALLMOD,    NAMES*VALUE: REPOSTCK=0.0
PROPERTY   MATERIAL=SPALLMOD,    NAMES*VALUE: REPOTRAD=19.2
PROPERTY   MATERIAL=SPALLMOD,    NAMES*VALUE: FRCHBETA=1.15E-6
PROPERTY   MATERIAL=SPALLMOD,    NAMES*VALUE: CHARLEN=0.02
PROPERTY   MATERIAL=SPALLMOD,    NAMES*VALUE: EXITPLEN=0.0
PROPERTY   MATERIAL=SPALLMOD,    NAMES*VALUE: EXITPDIA=0.2032
PROPERTY   MATERIAL=SPALLMOD,    NAMES*VALUE: INITBAR=0.15
PROPERTY   MATERIAL=SPALLMOD,    NAMES*VALUE: MAXPPRES=27.5e6
PROPERTY   MATERIAL=SPALLMOD,    NAMES*VALUE: STPDTIME=1000.
PROPERTY   MATERIAL=SPALLMOD,    NAMES*VALUE: REPIPOR=0.5
!
*END
!------
```

C.3 LHS INPUT FILE–calls sampled parameters

```
$ type LHS1_drs_cra1_a1.inp
! TITLE:    DRSPALL 2003 CRA1 (LHS1)
! SCENARIO:
! ANALYSTS: David Rudeen, David Lord
! CREATED:  October 1, 2003
! Modified: October 6, 2003
!  CWH: removed REPIPRES as a sampled variable for the CRA1
!  LHSCALC = CRA1 REALIZATION 1
!=========================================================================
!
!  DESCRIPTION:
!
!  WIPP 2003 Compliance Recertification Analyses (CRA)
!
!  This input file to PRELHS is used to generate, as an output file, an LHS
!  input file containing all distribution information and execution options
!  required to create a sample for DRSPALL spall response surface for the
!  WIPP 2003 CRA
!
!========= No Comments Allowed between *ECHO and *ENDECHO ================
!
*ECHOLHS
```

```
TITLE 2003 CRA PA Calculation Input File for the LHS Code for DRSPALL
NOBS            50
RANDOM SEED    921196800
UNIFORM                  SPALLMOD  REPIPOR
   3.50000E-01     6.6000E-01
OUTPUT CORR HIST DATA
*ENDECHO
!
!== PROPERTIES TO BE RETRIEVED FROM WIPP 1997 PA CALCULATION DATABASE ==
!
*RETRIEVE
!1
  MATERIALS,  SPALLMOD
  PROPERTIES, REPIPERM
!2
  MATERIALS,  SPALLMOD
  PROPERTIES, TENSLSTR
!3
  MATERIALS,  SPALLMOD
  PROPERTIES, PARTDIAM
!
!==========================================================================
!
*END
```

C.4 DRSPALL INPUT FILE (rep 1, scen1)

```
$ type drs_cra1_R1_s1.drs
REPOSITORY
Land Elevation                  (m):  SPALLMOD SURFELEV
Repository top                  (m):  SPALLMOD REPOSTOP
Total Thickness                 (m):  0.0
DRZ Thickness                   (m):  0.85     !SPALLMOD DRZTCK
DRZ Permeability              (m^2):  SPALLMOD DRZPERM
Outer Radius                    (m):  19.2
Initial Gas Pressure           (Pa):  10.0e+6
Far-Field In-Situ Stress        (m):  SPALLMOD FFSTRESS

WASTE
Porosity                        (-):  SPALLMOD REPIPOR
Permeability                  (m^2):  SPALLMOD REPIPERM
Forch Beta                      (-):  1.15e-6
Biot Beta                       (-):  SPALLMOD BIOTBETA
Poisoson   Ratio                (-):  SPALLMOD POISRAT
Cohesion                       (Pa):  SPALLMOD COHESION
Friction Angle                (deg):  SPALLMOD FRICTANG
Tensile Strength               (Pa):  SPALLMOD TENSLSTR
Lt                              (m):  0.02
Particle Diameter               (m):  SPALLMOD PARTDIAM
Gas Viscosity                (Pa-s):  H2       VISCO

MUD
Density                    (kg/m^3):  DRILLMUD DNSFLUID
Viscosity                    (Pa-s):  DRILLMUD VISCO
Wall Roughness Pipe             (m):  SPALLMOD PIPEROUG
Wall Roughness Annulus          (m):  SPALLMOD ANNUROUG
```

```
Max Solids Vol. Frac.         (Pa-s):  SPALLMOD MUDSOLMX
Solids Viscosity Exp.         (Pa-s):  SPALLMOD MUDSOLVE

WELLBORE/DRILLING
Bit Diameter                     (m):  BOREHOLE DIAMMOD
Pipe Diameter                    (m):  BOREHOLE PIPED
Collar Diameter                  (m):  BOREHOLE COLDIA
Pipe Inside Diameter             (m):  SPALLMOD PIPEID
Collar Length                    (m):  BOREHOLE L1
Exit pipe Length                 (m):  0.0
Exit Pipe Diameter               (m):  0.2032
Drilling Rate                  (m/s):  SPALLMOD DRILRATE
Bit Above Respository(init.)     (m):  0.15
Mud Pump Rate                (m^3/s):  SPALLMOD MUDPRATE
Max Pump Pressure               (Pa):  27.5d6
DDZ Thickness                    (m):  SPALLMOD DDZTHICK
DDZ Permeability               (m^2):  SPALLMOD DDZPERM
Stop Drill Exit Vol Rate     (m^3/s):  SPALLMOD STPDVOLR
Stop Pump Exit Vol Rate      (m^3/s):  SPALLMOD STPPVOLR
Stop Drilling Time               (s):  1.0000E+03

COMPUTATIONAL
Spherical/Cylindrical          (S/C): S
Allow Fluidization             (Y/N): Y
Max Run Time                     (s):  600.
Respository Cell Length          (m):  0.004
radius, Growth rate            (m,-):  0.5, 1.01
Wellbore Cell Length             (m):  2.0
wellbore Zone Growth Rate        (-):  1.0
First wellbore Zone              (-):  10
Well Stability factor            (-):  0.05
Repository Stability factor      (-):  5.0
Mass Diffusion factor            (-):  0.0001
Momentum Diffusion factor        (-):  0.01

PARAMETERS
Pi                              (-):  REFCON   PI
Atmospheric Pressure           (Pa):  SPALLMOD REFPRS
gravity                     (m/s^2):  REFCON   GRAVACC
Gas Constant               (J/kg K):  BLOWOUT  RGAS
Repository Temperature          (K):  BLOWOUT  TREPO
Water Compressibility        (1/Pa):  BRINESAL COMPRES
Waste Density              (kg/m^3):  BLOWOUT  RHOS
Salt Density               (kg/m^3):  SPALLMOD SALTDENS
Shape Factor                    (-):  SPALLMOD SHAPEFAC
Tensile Velocity             (m/s):  1.0000E+03
Bit Nozzle Number               (-):  3.0000E+00
Bit Nozzle Diameter             (m):  1.1112E-02
Choke Efficiency                (-):  9.0000E-01
$

scenario three input
$ type drs_cra1_r1_s3.drs
REPOSITORY
Land Elevation                   (m):  SPALLMOD SURFELEV
Repository top                   (m):  SPALLMOD REPOSTOP
Total Thickness                  (m):  0.0
```

```
DRZ Thickness                   (m):  0.85     !SPALLMOD DRZTCK
DRZ Permeability              (m^2):  SPALLMOD DRZPERM
Outer Radius                    (m):  19.2
Initial Gas Pressure           (Pa):  14.0e+6
Far-Field In-Situ Stress        (m):  SPALLMOD FFSTRESS

WASTE
Porosity                        (-):  SPALLMOD REPIPOR
Permeability                  (m^2):  SPALLMOD REPIPERM
Forch Beta                      (-):  1.15e-6
Biot Beta                       (-):  SPALLMOD BIOTBETA
Poisoson   Ratio                (-):  SPALLMOD POISRAT
Cohesion                       (Pa):  SPALLMOD COHESION
Friction Angle                (deg):  SPALLMOD FRICTANG
Tensile Strength               (Pa):  SPALLMOD TENSLSTR
Lt                              (m):  0.02
Particle Diameter               (m):  SPALLMOD PARTDIAM
Gas Viscosity                (Pa-s):  H2       VISCO

MUD
Density                   (kg/m^3):  DRILLMUD DNSFLUID
Viscosity                    (Pa-s):  DRILLMUD VISCO
Wall Roughness Pipe             (m):  SPALLMOD PIPEROUG
Wall Roughness Annulus          (m):  SPALLMOD ANNUROUG
Max Solids Vol. Frac.        (Pa-s):  SPALLMOD MUDSOLMX
Solids Viscosity Exp.        (Pa-s):  SPALLMOD MUDSOLVE

WELLBORE/DRILLING
Bit Diameter                    (m):  BOREHOLE DIAMMOD
Pipe Diameter                   (m):  BOREHOLE PIPED
Collar Diameter                 (m):  BOREHOLE COLDIA
Pipe Inside Diameter            (m):  SPALLMOD PIPEID
Collar Length                   (m):  BOREHOLE L1
Exit pipe Length                (m):  0.0
Exit Pipe Diameter              (m):  0.2032
Drilling Rate                 (m/s):  SPALLMOD DRILRATE
Bit Above Respository(init.)    (m):  0.15
Mud Pump Rate               (m^3/s):  SPALLMOD MUDPRATE
Max Pump Pressure              (Pa):  27.5d6
DDZ Thickness                   (m):  SPALLMOD DDZTHICK
DDZ Permeability              (m^2):  SPALLMOD DDZPERM
Stop Drill Exit Vol Rate    (m^3/s):  SPALLMOD STPDVOLR
Stop Pump Exit Vol Rate     (m^3/s):  SPALLMOD STPPVOLR
Stop Drilling Time              (s):  1.0000E+03

COMPUTATIONAL
Spherical/Cylindrical         (S/C): S
Allow Fluidization            (Y/N): Y
Max Run Time                    (s):  600.
Respository Cell Length         (m):  0.004
radius, Growth rate           (m,-):  0.5, 1.01
Wellbore Cell Length            (m):  2.0
wellbore Zone Growth Rate       (-):  1.0
First wellbore Zone             (-):  10
Well Stability factor           (-):  0.05
Repository Stability factor     (-):  5.0
Mass Diffusion factor           (-):  0.0001
```

```
Momentum Diffusion factor       (-):  0.01

PARAMETERS
Pi                             (-):  REFCON   PI
Atmospheric Pressure          (Pa):  SPALLMOD REFPRS
gravity                   (m/s^2):  REFCON   GRAVACC
Gas Constant             (J/kg K):  BLOWOUT  RGAS
Repository Temperature         (K):  BLOWOUT  TREPO
Water Compressibility       (1/Pa):  BRINESAL COMPRES
Waste Density            (kg/m^3):  BLOWOUT  RHOS
Salt Density             (kg/m^3):  SPALLMOD SALTDENS
Shape Factor                   (-):  SPALLMOD SHAPEFAC
Tensile Velocity             (m/s):  1.0000E+03
Bit Nozzle Number              (-):  3.0000E+00
Bit Nozzle Diameter            (m):  1.1112E-02
Choke Efficiency               (-):  9.0000E-01
$
Scenario 4 and 2
VV$ type drs_cra1_r1_s4.drs
REPOSITORY
Land Elevation                  (m):  SPALLMOD SURFELEV
Repository top                  (m):  SPALLMOD REPOSTOP
Total Thickness                 (m):  0.0
DRZ Thickness                   (m):  0.85     !SPALLMOD DRZTCK
DRZ Permeability              (m^2):  SPALLMOD DRZPERM
Outer Radius                    (m):  19.2
Initial Gas Pressure           (Pa):  14.8e+6
Far-Field In-Situ Stress        (m):  SPALLMOD FFSTRESS

WASTE
Porosity                        (-):  SPALLMOD REPIPOR
Permeability                  (m^2):  SPALLMOD REPIPERM
Forch Beta                      (-):  1.15e-6
Biot Beta                       (-):  SPALLMOD BIOTBETA
Poisoson   Ratio                (-):  SPALLMOD POISRAT
Cohesion                       (Pa):  SPALLMOD COHESION
Friction Angle                (deg):  SPALLMOD FRICTANG
Tensile Strength               (Pa):  SPALLMOD TENSLSTR
Lt                              (m):  0.02
Particle Diameter               (m):  SPALLMOD PARTDIAM
Gas Viscosity                (Pa-s):  H2       VISCO

MUD
Density                    (kg/m^3):  DRILLMUD DNSFLUID
Viscosity                    (Pa-s):  DRILLMUD VISCO
Wall Roughness Pipe             (m):  SPALLMOD PIPEROUG
Wall Roughness Annulus          (m):  SPALLMOD ANNUROUG
Max Solids Vol. Frac.        (Pa-s):  SPALLMOD MUDSOLMX
Solids Viscosity Exp.        (Pa-s):  SPALLMOD MUDSOLVE

WELLBORE/DRILLING
Bit Diameter                    (m):  BOREHOLE DIAMMOD
Pipe Diameter                   (m):  BOREHOLE PIPED
Collar Diameter                 (m):  BOREHOLE COLDIA
Pipe Inside Diameter            (m):  SPALLMOD PIPEID
Collar Length                   (m):  BOREHOLE L1
Exit pipe Length                (m):  0.0
```

```
Exit Pipe Diameter               (m):  0.2032
Drilling Rate                  (m/s):  SPALLMOD DRILRATE
Bit Above Respository(init.)     (m):  0.15
Mud Pump Rate                (m^3/s):  SPALLMOD MUDPRATE
Max Pump Pressure               (Pa):  27.5d6
DDZ Thickness                    (m):  SPALLMOD DDZTHICK
DDZ Permeability               (m^2):  SPALLMOD DDZPERM
Stop Drill Exit Vol Rate     (m^3/s):  SPALLMOD STPDVOLR
Stop Pump Exit Vol Rate      (m^3/s):  SPALLMOD STPPVOLR
Stop Drilling Time               (s):  1.0000E+03

COMPUTATIONAL
Spherical/Cylindrical          (S/C): S
Allow Fluidization             (Y/N): Y
Max Run Time                     (s):  600.
Respository Cell Length          (m):  0.004
radius, Growth rate            (m,-):  0.5, 1.01
Wellbore Cell Length             (m):  2.0
wellbore Zone Growth Rate        (-):  1.0
First wellbore Zone              (-):  10
Well Stability factor            (-):  0.05
Repository Stability factor      (-):  5.0
Mass Diffusion factor            (-):  0.0001
Momentum Diffusion factor        (-):  0.01

PARAMETERS
Pi                              (-):  REFCON   PI
Atmospheric Pressure           (Pa):  SPALLMOD REFPRS
gravity                     (m/s^2):  REFCON   GRAVACC
Gas Constant               (J/kg K):  BLOWOUT  RGAS
Repository Temperature          (K):  BLOWOUT  TREPO
Water Compressibility        (1/Pa):  BRINESAL COMPRES
Waste Density              (kg/m^3):  BLOWOUT  RHOS
Salt Density               (kg/m^3):  SPALLMOD SALTDENS
Shape Factor                    (-):  SPALLMOD SHAPEFAC
Tensile Velocity              (m/s):  1.0000E+03
Bit Nozzle Number               (-):  3.0000E+00
Bit Nozzle Diameter             (m):  1.1112E-02
Choke Efficiency                (-):  9.0000E-01
$
$ type drs_cra1_r1_s2.drs
REPOSITORY
Land Elevation                   (m):  SPALLMOD SURFELEV
Repository top                   (m):  SPALLMOD REPOSTOP
Total Thickness                  (m):  0.0
DRZ Thickness                    (m):  0.85     !SPALLMOD DRZTCK
DRZ Permeability               (m^2):  SPALLMOD DRZPERM
Outer Radius                     (m):  19.2
Initial Gas Pressure            (Pa):  12.0e+6
Far-Field In-Situ Stress         (m):  SPALLMOD FFSTRESS

WASTE
Porosity                         (-):  SPALLMOD REPIPOR
Permeability                   (m^2):  SPALLMOD REPIPERM
Forch Beta                       (-):  1.15e-6
Biot Beta                        (-):  SPALLMOD BIOTBETA
Poisoson   Ratio                 (-):  SPALLMOD POISRAT
```

```
Cohesion                          (Pa):  SPALLMOD COHESION
Friction Angle                   (deg):  SPALLMOD FRICTANG
Tensile Strength                  (Pa):  SPALLMOD TENSLSTR
Lt                                 (m):  0.02
Particle Diameter                  (m):  SPALLMOD PARTDIAM
Gas Viscosity                   (Pa-s):  H2       VISCO

MUD
Density                       (kg/m^3):  DRILLMUD DNSFLUID
Viscosity                       (Pa-s):  DRILLMUD VISCO
Wall Roughness Pipe                (m):  SPALLMOD PIPEROUG
Wall Roughness Annulus             (m):  SPALLMOD ANNUROUG
Max Solids Vol. Frac.           (Pa-s):  SPALLMOD MUDSOLMX
Solids Viscosity Exp.           (Pa-s):  SPALLMOD MUDSOLVE

WELLBORE/DRILLING
Bit Diameter                       (m):  BOREHOLE DIAMMOD
Pipe Diameter                      (m):  BOREHOLE PIPED
Collar Diameter                    (m):  BOREHOLE COLDIA
Pipe Inside Diameter               (m):  SPALLMOD PIPEID
Collar Length                      (m):  BOREHOLE L1
Exit pipe Length                   (m):  0.0
Exit Pipe Diameter                 (m):  0.2032
Drilling Rate                    (m/s):  SPALLMOD DRILRATE
Bit Above Respository(init.)       (m):  0.15
Mud Pump Rate                  (m^3/s):  SPALLMOD MUDPRATE
Max Pump Pressure                 (Pa):  27.5d6
DDZ Thickness                      (m):  SPALLMOD DDZTHICK
DDZ Permeability                 (m^2):  SPALLMOD DDZPERM
Stop Drill Exit Vol Rate       (m^3/s):  SPALLMOD STPDVOLR
Stop Pump Exit Vol Rate        (m^3/s):  SPALLMOD STPPVOLR
Stop Drilling Time                 (s):  1.0000E+03

COMPUTATIONAL
Spherical/Cylindrical            (S/C): S
Allow Fluidization               (Y/N): Y
Max Run Time                       (s):  600.
Respository Cell Length            (m):  0.004
radius, Growth rate              (m,-):  0.5, 1.01
Wellbore Cell Length               (m):  2.0
wellbore Zone Growth Rate          (-):  1.0
First wellbore Zone                (-):  10
Well Stability factor              (-):  0.05
Repository Stability factor        (-):  5.0
Mass Diffusion factor              (-):  0.0001
Momentum Diffusion factor          (-):  0.01

PARAMETERS
Pi                                (-):  REFCON   PI
Atmospheric Pressure             (Pa):  SPALLMOD REFPRS
gravity                       (m/s^2):  REFCON   GRAVACC
Gas Constant                 (J/kg K):  BLOWOUT  RGAS
Repository Temperature            (K):  BLOWOUT  TREPO
Water Compressibility          (1/Pa):  BRINESAL COMPRES
Waste Density                (kg/m^3):  BLOWOUT  RHOS
Salt Density                 (kg/m^3):  SPALLMOD SALTDENS
Shape Factor                      (-):  SPALLMOD SHAPEFAC
```

Tensile Velocity	(m/s):	1.0000E+03
Bit Nozzle Number	(-):	3.0000E+00
Bit Nozzle Diameter	(m):	1.1112E-02
Choke Efficiency	(-):	9.0000E-01

APPENDIX D: REPRESENTATIVE INPUT FILES FOR CUTTINGS_S

D.1 GENMESH INPUT FILE–sets up grid

```
$ type gm_cusp_cra1.inp
=============================================================================

TITLE:     CUSP Input GENMESH file
ANALYST:   Joel D. Miller

=============================================================================

SETup_grid
DIMension=       3
ORIgin=  0.0000E+00,  0.0000E+00,  0.0000E+00
IJKmax=       2,       2,       2

GRID_spacing
DEL,COORD=X,DEL=  1.0000E+00,INRANGE=       1,       2
DEL,COORD=Y,DEL=  1.0000E+00,INRANGE=       1,       2
DEL,COORD=Z,DEL=  1.0000E+00,INRANGE=       1,       2

REGion
REGion=       1,IRANGE=       1,       2,JRANGE=       1,       2,KRANGE=
1,       2

END
```

D.2 MATSET INPUT FILE: calls parameters/defines parameters/ assigns blocks

```
$ type ms_cusp_cra1.inp
!==========================================================================
!
!   FILETYPE: MATSET input file for Cuttings_S
!   ANALYSTS: Joel D. Miller
!   DATE:     06/20/97
!   PURPOSE:  WIPP PA C97
!
!==========================================================================
!
*PRINT_ASSIGNED_VALUES
!
*HEADING
 TITLE, CUSP MATSET INPUT FILE
 SCALE, LOCAL
 SCENARIO, ALL
!
*UNITS=SI
!
*CREATE_blocks
 BLOCK_IDS=2,3,4,5
!
*RETRIEVE
 COORD, DIM=3, NAMES=X,Y,Z
```

```
!
! ...Define region names
 MATERIAL, 1=BLOWOUT, 2=BOREHOLE, 3=DRILLMUD, 4=WAS_AREA, 5=SPALLMOD
!
!1...Define BLOWOUT  property names
 PROPERTY, MATerial=BLOWOUT, NAMES=PARTDIA
!
!2...Define BOREHOLE property names
 PROPERTY, MATerial=BOREHOLE, NAMES=DIAMMOD, DOMEGA, TAUFAIL
!
!3...Define DRILLMUD property names
 PROPERTY, MATerial=DRILLMUD, NAMES=DNSFLUID, VISCO, YLDSTRSS
!
!
!4...Define WAS_AREA property names
 PROPERTY, MATerial=WAS_AREA, NAMES=ABSROUGH, PTHRESH, VOLSPALL
!
!5...Define SPALLMOD property names
 PROPERTY, MATerial=SPALLMOD, NAMES=RNDSPALL
!
!
SET*VALUES
!
!#### Assign values to material property names not   ####
!#### found in the Secondary Database (PROPERTY.SDB) ####
!
PROPERTY   MATERIAL=SPALLMOD,    NAMES*VALUE: RNDSPALL=0.5
!========================================================================
*END
$
```

D.3 LHS INPUT FILE: calls out sampled parameters

```
$ type lhs1_cra1_a1.inp
! TITLE:    BRAGFLO 2003 CRA1 (LHS1)
! SCENARIO: S1, S2, S3, S4, S5, and S6
! ANALYSTS: Joshua Stein and Bill Zelinski
! CREATED:  April  2003
! MODIFIED: April 7
!
!  LHSCALC = CRA1 REALIZATION 1
!==========================================================================
!
!  DESCRIPTION:
!
!  WIPP 2003 Compliance Recertification Analyses (CRA)
!
!  This input file to PRELHS is used to generate, as an output file, an LHS
!  input file containing all distribution information and execution options
!  required to create a sample for Replicate R1 for the WIPP 2003 CRA
!
!  Modifed for CRA analyses:  LHSBLANK dummy changed to LHSBLANK and
!           REFCON MATERIAL (LHSBLANK) changed to REFCON
!           #59 dummy replaced with VOLSPALL
!========= No Comments Allowed between *ECHO and *ENDECHO ================
```

```
!
*ECHOLHS
TITLE 2002 TBM PA Calculation, Replicate R1 Input File for the LHS Code
NOBS            100
RANDOM SEED     921196800
CORRELATION MATRIX
   3
   18  19 -0.99
   20  21 -0.99
   28  29 -0.75
OUTPUT CORR HIST DATA
*ENDECHO
!
!== PROPERTIES TO BE RETRIEVED FROM WIPP 1997 PA CALCULATION DATABASE ==
!
*RETRIEVE
!1
  MATERIALS,  STEEL
  PROPERTIES, CORRMCO2
!2
  MATERIALS,  WAS_AREA
  PROPERTIES, PROBDEG
!3
  MATERIALS,  WAS_AREA
  PROPERTIES, GRATMICI
!4
  MATERIALS,  WAS_AREA
  PROPERTIES, GRATMICH
!5
  MATERIALS,  CELLULS
  PROPERTIES, FBETA
!6
  MATERIALS,  WAS_AREA
  PROPERTIES, SAT_RGAS
!7
  MATERIALS,  WAS_AREA
  PROPERTIES, SAT_RBRN
!8
  MATERIALS,  WAS_AREA
  PROPERTIES, SAT_WICK
!9
  MATERIALS,  DRZ_PCS
  PROPERTIES, PRMX_LOG
!10
  MATERIALS,  CONC_PCS
  PROPERTIES, PRMX_LOG
!11
  MATERIALS,  SOLU4
  PROPERTIES, SOLCIM
!12
  MATERIALS,  SOLTH4
  PROPERTIES, SOLCIM
!13 dummy placeholder
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!14
  MATERIALS,  CONC_PCS
```

```
  PROPERTIES, SAT_RGAS
!15
  MATERIALS,  CONC_PCS
  PROPERTIES, SAT_RBRN
!16
  MATERIALS,  CONC_PCS
  PROPERTIES, PORE_DIS
!17
  MATERIALS,  S_HALITE
  PROPERTIES, POROSITY
!18
  MATERIALS,  S_HALITE
  PROPERTIES, PRMX_LOG
!19
  MATERIALS,  S_HALITE
  PROPERTIES, COMP_RCK
!20
  MATERIALS,  S_MB139
  PROPERTIES, PRMX_LOG
!21
  MATERIALS,  S_MB139
  PROPERTIES, COMP_RCK
!22
  MATERIALS,  S_MB139
  PROPERTIES, RELP_MOD
!23
  MATERIALS,  S_MB139
  PROPERTIES, SAT_RBRN
!24
  MATERIALS,  S_MB139
  PROPERTIES, SAT_RGAS
!25
  MATERIALS,  S_MB139
  PROPERTIES, PORE_DIS
!26
  MATERIALS,  S_HALITE
  PROPERTIES, PRESSURE
!27
  MATERIALS,  CASTILER
  PROPERTIES, PRESSURE
!28
  MATERIALS,  CASTILER
  PROPERTIES, PRMX_LOG
!29
  MATERIALS,  CASTILER
  PROPERTIES, COMP_RCK
!30
  MATERIALS,  BH_SAND
  PROPERTIES, PRMX_LOG
!31
  MATERIALS,  DRZ_1
  PROPERTIES, PRMX_LOG
!32
  MATERIALS,  CONC_PLG
  PROPERTIES, PRMX_LOG
!33 dummy placeholder
  MATERIALS,  REFCON
```

```
  PROPERTIES, LHSBLANK
!34
  MATERIALS,  SOLAM3
  PROPERTIES, SOLSIM
!35
  MATERIALS,  SOLAM3
  PROPERTIES, SOLCIM
!36
  MATERIALS,  SOLPU3
  PROPERTIES, SOLSIM
!37
  MATERIALS,  SOLPU3
  PROPERTIES, SOLCIM
!38
  MATERIALS,  SOLPU4
  PROPERTIES, SOLSIM
!39
  MATERIALS,  SOLPU4
  PROPERTIES, SOLCIM
!40
  MATERIALS,  SOLU4
  PROPERTIES, SOLSIM
!41
  MATERIALS,  SOLU6
  PROPERTIES, SOLSIM
!42
  MATERIALS,  SOLU6
  PROPERTIES, SOLCIM
!43
  MATERIALS,  SOLTH4
  PROPERTIES, SOLSIM
!44
  MATERIALS,  PHUMOX3
  PROPERTIES, PHUMCIM
!45
  MATERIALS,  GLOBAL
  PROPERTIES, OXSTAT
!46
  MATERIALS,  CULEBRA
  PROPERTIES, MINP_FAC
!47
  MATERIALS,  GLOBAL
  PROPERTIES, TRANSIDX
!48
  MATERIALS,  GLOBAL
  PROPERTIES, CLIMTIDX
!49
  MATERIALS,  CULEBRA
  PROPERTIES, HMBLKLT
!50
  MATERIALS,  CULEBRA
  PROPERTIES, APOROS
!51
  MATERIALS,  CULEBRA
  PROPERTIES, DPOROS
!52
  MATERIALS,  U+6
```

```
  PROPERTIES, MKD_U
!53
  MATERIALS,  U+4
  PROPERTIES, MKD_U
!54
  MATERIALS,  PU+3
  PROPERTIES, MKD_PU
!55
  MATERIALS,  PU+4
  PROPERTIES, MKD_PU
!56
  MATERIALS,  TH+4
  PROPERTIES, MKD_TH
!57
  MATERIALS,  AM+3
  PROPERTIES, MKD_AM
!58
  MATERIALS,  BOREHOLE
  PROPERTIES, TAUFAIL
!59 dummy placeholder for VOLSPALL
  MATERIALS,  WAS_AREA
  PROPERTIES, VOLSPALL
!60
  MATERIALS,  GLOBAL
  PROPERTIES, PBRINE
!61
  MATERIALS,  BOREHOLE
  PROPERTIES, DOMEGA
!62
  MATERIALS,  SHFTU
  PROPERTIES, SAT_RBRN
!63
  MATERIALS,  SHFTU
  PROPERTIES, SAT_RGAS
!64
  MATERIALS,  SHFTU
  PROPERTIES, PRMX_LOG
!65
  MATERIALS,  SHFTL_T1
  PROPERTIES, PRMX_LOG
!66
  MATERIALS,  SHFTL_T2
  PROPERTIES, PRMX_LOG
!67
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!68
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!69
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!70
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!71
  MATERIALS,  REFCON
```

```
  PROPERTIES, LHSBLANK
!72
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!73
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!74
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!75
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!
!============================================================================
!
*END
$
```

D.4 CUTTINGS INPUT FILES

Scenario: 1, upper cavity, time 100 yrs (input to CUTTINGS S preprocessor)

```
$ libcra1_cusp

$ type cusp_cra1_s1_u_T100.inp
!   J. Stein: May 05/2003 Modified to account for CRA BRAGFLO grid.
!   Changes include element numbers from CCA/PAVT to TBM to CRA and
subdividing
!   the repository into 3 regions instead of 4.
!
!   Intrusion
!
TINTR          100.0
PARTDIA    BLOWOUT:PARTDIA

!   Properties

TAUFAIL    BOREHOLE:TAUFAIL

DIAMMOD    BOREHOLE:DIAMMOD
DOMEGA     BOREHOLE:DOMEGA
DNSFLUID   DRILLMUD:DNSFLUID
VISCO      DRILLMUD:VISCO
YLDSTRSS   DRILLMUD:YLDSTRSS
ABSROUGH   WAS_AREA:ABSROUGH

!
!   BRAGFLO
!
! Multiple hits (max of 10, 0 thru 9)
!
! NHIT_0   is associated with the hit that
!           CUTTINGS used for BRAGFLO properties
!
```

```
INTR_0   CAVITY_2       <

INTR_1   1434 1435 1436 1437 1438 1439 <

INTR_2   1428 1429 1430 1431 1432 1433  <

INTR_3   2225  <

INTR_4   2244  <

INTR_5   1168  <

INTR_6   1417  <

INTR_7   DRZ_0  <

!
!   Spallings
!

MODEL4

! Properties for Model 4

PTHRESH   WAS_AREA:PTHRESH
RNDSPALL  SPALLMOD:RNDSPALL
REPPRES   1434 1435 1436 1437 1438 1439 <

$
$ type cusp_cra1_template.inp
!!  WIPP PA TBM
!!
!!  Template file for PRE_CUSP Ingres SDB interface
!!

  MODEL_DATA
!!
!!  =wipp::my_database:calc_name
!!
=wipp::wipp_copy:epa_test

!
!    The following input variables are hard wired and are related to the
!    repository model J. W. Berglund paper
!
! PR_MAX  <>The maximum pressure allowed by model
 PR_MAX            15.0E6

! PR_MIN  <>The minimum pressure allowed by model
 PR_MIN             0.0E6

! PE_MAX  <>The maximum permeability allowed by model
 PE_MAX           1.0E-12

! PE_MIN  <>The minimum permeability allowed by model
 PE_MIN           1.0E-17
```

```
! PCUT    <> Pressure (pa) which defines the border between the
!                      erosion phase and the blowout phase
 PCUT               8.0E6

! PGAS    <> Pressure (pa) whick defines the border between the gas
!                      erosion phase and the stuck pipe phase
 PGAS              10.0E6

! KCRIT   <> Permeability which defines the border between the blowout
!                      phase and the gas erosion/stuck pipe phase
 KCRIT            1.0E-16



!
! Properties relative to the model (repository) <<<<<<<<<<<<<<<<<<<<<<<
!
! DELTR   <>  Delta radius for derivative in stress calculation
 DELTR            0.00001

! ITER    <> Number of iterations to solve for Reynolds number
 ITER         1

! FGE     <>  Gravity  effectiveness factor
 BLOWOUT:FGE

! FSE     <>  Strength effectiveness factor
 BLOWOUT:FSE

! FCE     <>  Cementation  effectiveness factor
 BLOWOUT:FCE

! CEMCEM  <>  Cementation stress
 BLOWOUT:CEMENT

! SUFTEN  <> Surface tension (N/N)
 BLOWOUT:SUFTEN



! Properities of the gas (Hydrogen) the repository <<<<<<<<<<<<<<<<<<<<<<<
!
! KGAS    <> Ratio of Specific Heats
 BLOWOUT:KGAS

! RGAS    <> Gas Constant for Hydrogen
 BLOWOUT:RGAS

! VISC    <> Hydrogen viscosity
 BLOWOUT:VISC

! PSUF    <> Surface presure (Pa)
 BLOWOUT:PSUF



! Properities to do with the repository <<<<<<<<<<<<<<<<<<<<<<<<
```

```
!
! TREPO   <> Temperature of repository (K)
 BLOWOUT:TREPO

! DEPTH   <> Distance from repository depth to depth where casing
!                     is set (m)
 BLOWOUT            716.0

! FLWCNST <> Percent volume of material that is carried by drilling
!                     mud (unitless)
 FLWCNST             0.05

! HREPO   <> Height of repository at burial time      (4m)
 BLOWOUT:HREPO

! RPANEL  <> The equivalent radius of 1 panel     (910.0m**2)
 BLOWOUT:RPANEL

! ROOM    <> The equivalent radius of 1 room     (11,640m**2)
 BLOWOUT:ROOM

! RHOS    <> Waste particle density                (kg/m**3)
 BLOWOUT:RHOS


! Variables to do with drilling <<<<<<<<<<<<<<<<<<<<<<<<

! L1      <> Collar Length (m)
 BOREHOLE:L1

! L2      <> Drill pipe length (m)
 BOREHOLE:L2

! COLDIA  <> Collar diameter (m)
 BOREHOLE:COLDIA

! PIPED   <> Drill pipe diameter (m)
 BOREHOLE:PIPED

! ROUGHP  <> Friction factor (unitless)
 BOREHOLE:ROUGHP

!
! APORO   <> A constant in equation to determine permeability as a
!                     function of porosity
 BLOWOUT:APORO

! NPORO   <> N constant in equation to determine permeability as a
!                     function of porosity
 BLOWOUT             0.0
!
! END_OF_MODEL_INPUT
!


  RADIONUCLIDE_DATA
```

```
!GEOMETRY

 BOREHOLE:INV_AR

 BOREHOLE:RHW_AR

 BOREHOLE:WUF

!MATERIAL
 OUT_MAT      BOREHOLE

!REPOSITORY_TYPE

REP_NAME    WIPP
REP_GEOLogy HALITE

RADWASte_type  CONtact_handled

!RADIOISOTOPE_chains

!
!  chain1/chain2 from U234  & down are the same:
!  (It is required that both chains are input)

!         \/      \/      \/      \/      \/       \/      \/

CHAIN1    PU242   U238    TH234   PA234M  U234    TH230   RA226
          RN222   PO218   PB214   BI214   PO214   PB210   <

CHAIN2    PU238   U234    TH230   RA226   RN222   PO218
          PB214   BI214   PO214   PB210   <

!  chain3/chain4 from PU239 & down are the same:

CHAIN3    AM243   NP239   PU239   U235    TH231   PA231   AC227
          TH227   RA223   RN219   PO215   PB211   BI211   TL207   <

CHAIN4    CM243   PU239   U235    TH231   PA231   AC227   TH227
          RA223   RN219   PO215   PB211   BI211   TL207   PB209   <

!  chain5/chain6 from U236  & down are the same:

CHAIN5    CF252   CM248   PU244   PU240   U236    TH232   RA228
          AC228   TH228   RA224   RN220   PO216   PB212   BI212
          PO212   <

CHAIN6    CM244   PU240   U236    TH232   RA228   AC228   TH228
          RA224   RN220   PO216   PB212   BI212   PO212   <


CHAIN7    CM245   PU241   AM241   NP237   PA233   U233    TH229
          RA225   AC225   FR221   AT217   BI213   PO213    <

CHAIN8    CS137   BA137M  <

CHAIN9    PM147   SM147   ND143   <
```

```
CHAIN10   SR90    Y90     ZR90    <

!          ^       ^       ^       ^       ^       ^       ^


SAVE    AM241  AM243  CF252  CM243  CM244  CM245  CM248  CS137
        NP237  PA231  PB210  PM147  PU238  PU239  PU240  PU241
        PU242  PU244  RA226  RA228  SR90   TH229  TH230  TH232
        U233   U234   U235   U236   U238  <


  TABLULAR_DATA

!
! Example of how the radioisotope data is input:
!
!...1st Line: Radionuclide (an asterisk in column 1 followed
!                      by radionuclide name, ex; *AC225 )
!...2nd & 3rd line
!
!...Field#1 Atomic Weight       (Kg/Mole) AWT    [REAL] (3(11x,1pe14.6))
!...Field#2 Half-Life            (Years)  HALFY  [REAL]         "
!...Field#3 Activity Conversion  (Ci/Kg)  AWTCNV [REAL]         "
!...Field#4 EPA Release Limit     (Ci)    EPAREL [REAL]         "
!...Field#5 Inventory             (Ci)    INVCHD [REAL]         "
!...Field#6 Inventory             (Ci)    INVRHD [REAL]         "
!
!*PU241
!xxxaaaaaaaaeeeeeeeeeeeeeeeexxxaaaaaaaaeeeeeeeeeeeeeeeexxxaaaaaaaaeeeeeeeeeeeeeeee
!   AWT       2.410000E-01   HALFY     1.439900E+01   ACTCNV    1.030000E+05
!   EPAREL    1.000000E+07   INVCHD    1.930000E+06   INVRHD    0.000000E+00
!
!
<TABLE_INPUTS
<GENERATE_RADIO>
END_TABLES>
!
! END_OF_RADIOISOTOPE_INPUT
```

SCENARIO: **1**, lower cavity, time = 100 years

```
$ type cusp_cra1_s1_L_t100.inp
!   J. Stein: May 05/2003 Modified to account for CRA BRAGFLO grid.
!   Changes include element numbers from CCA/PAVT to TBM to CRA and
subdividing
!   the repository into 3 regions instead of 4.
!
!   Intrusion
!
TINTR          100.0
PARTDIA    BLOWOUT:PARTDIA

!   Properties

TAUFAIL    BOREHOLE:TAUFAIL
```

```
DIAMMOD    BOREHOLE:DIAMMOD
DOMEGA     BOREHOLE:DOMEGA
DNSFLUID   DRILLMUD:DNSFLUID
VISCO      DRILLMUD:VISCO
YLDSTRSS   DRILLMUD:YLDSTRSS
ABSROUGH   WAS_AREA:ABSROUGH

!
!   BRAGFLO
!
! Multiple hits (max of 10, 0 thru 9)
!
! NHIT_0   is associated with the hit that
!           CUTTINGS used for BRAGFLO properties
!

INTR_0   CAVITY_1  <

INTR_1   1434 1435 1436 1437 1438 1439 <

INTR_2   1428 1429 1430 1431 1432 1433  <

INTR_3   2225  <

INTR_4   2244  <

INTR_5   1168  <

INTR_6   1417  <

INTR_7   DRZ_0  <

!
!   Spallings
!

MODEL4

! Properties for Model 4

PTHRESH   WAS_AREA:PTHRESH
RNDSPALL  SPALLMOD:RNDSPALL
REPPRES   CAVITY_1  <
```

SCENARIO: 1, upper cavity, time = 5000 years

```
$ type cusp_cra1_s1_u_T5000.inp
!   J. Stein: May 05/2003 Modified to account for CRA BRAGFLO grid.
!   Changes include element numbers from CCA/PAVT to TBM to CRA and
subdividing
!   the repository into 3 regions instead of 4.
!
!   Intrusion
!
TINTR          5000.0
```

```
PARTDIA    BLOWOUT:PARTDIA

!   Properties

TAUFAIL    BOREHOLE:TAUFAIL

DIAMMOD    BOREHOLE:DIAMMOD
DOMEGA     BOREHOLE:DOMEGA
DNSFLUID   DRILLMUD:DNSFLUID
VISCO      DRILLMUD:VISCO
YLDSTRSS   DRILLMUD:YLDSTRSS
ABSROUGH   WAS_AREA:ABSROUGH

!
!   BRAGFLO
!
! Multiple hits (max of 10, 0 thru 9)
!
! NHIT_0   is associated with the hit that
!           CUTTINGS used for BRAGFLO properties
!

INTR_0   CAVITY_2       <

INTR_1   1434 1435 1436 1437 1438 1439 <

INTR_2   1428 1429 1430 1431 1432 1433  <

INTR_3   2225  <

INTR_4   2244  <

INTR_5   1168  <

INTR_6   1417  <

INTR_7   DRZ_0  <

!
!   Spallings
!

MODEL4

! Properties for Model 4

PTHRESH   WAS_AREA:PTHRESH
RNDSPALL  SPALLMOD:RNDSPALL
REPPRES   1434 1435 1436 1437 1438 1439 <

$
```

SCENARIO: **5**, lower cavity, time = 1200 years

```
$ type cusp_cra1_s5_l_t1200.inp
!   J. Stein: May 05/2003 Modified to account for CRA BRAGFLO grid.
!   Changes include element numbers from CCA/PAVT to TBM to CRA and
subdividing
```

```
!   the repository into 3 regions instead of 4.
!
!   Intrusion
!
TINTR          1200.0
PARTDIA    BLOWOUT:PARTDIA

!   Properties

TAUFAIL    BOREHOLE:TAUFAIL

DIAMMOD    BOREHOLE:DIAMMOD
DOMEGA     BOREHOLE:DOMEGA
DNSFLUID   DRILLMUD:DNSFLUID
VISCO      DRILLMUD:VISCO
YLDSTRSS   DRILLMUD:YLDSTRSS
ABSROUGH   WAS_AREA:ABSROUGH

!
!   BRAGFLO
!
! Multiple hits (max of 10, 0 thru 9)
!
! NHIT_0   is associated with the hit that
!           CUTTINGS used for BRAGFLO properties
!

INTR_0   CAVITY_1       <

INTR_1   1434 1435 1436 1437 1438 1439 <

INTR_2   1428 1429 1430 1431 1432 1433  <

INTR_3   2225  <

INTR_4   2244  <

INTR_5   1168  <

INTR_6   1417  <

INTR_7   DRZ_0  <

!
!   Spallings
!

MODEL4

! Properties for Model 4

PTHRESH   WAS_AREA:PTHRESH
RNDSPALL  SPALLMOD:RNDSPALL
REPPRES   CAVITY_1  <
```

D.5 CUTTINGS INPUT FILE 2—sets up file of parameter values

```
$ type CUSP_CRA1.SDB
value
         3220 AC225    ATWEIGHT  2.2502300e-001  2.2502300e-001  2.2502300e-
001
 2.2502300e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3321 AC225    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3267 AC225    HALFLIFE  8.6400000e+005  8.6400000e+005
8.6400000e+005
 8.6400000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3221 AC227    ATWEIGHT  2.2702800e-001  2.2702800e-001  2.2702800e-
001
 2.2702800e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3364 AC227    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3268 AC227    HALFLIFE  6.8710000e+008  6.8710000e+008
6.8710000e+008
 6.8710000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3222 AC228    ATWEIGHT  2.2803100e-001  2.2803100e-001  2.2803100e-
001
 2.2803100e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3322 AC228    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3269 AC228    HALFLIFE  2.2070000e+004  2.2070000e+004
2.2070000e+004
 2.2070000e+004  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3457 AM       CAPHUM    1.1000000e-005  1.1000000e-005  1.1000000e-
005
 1.1000000e-005  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3447 AM       CAPMIC    1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3310 AM       CONCINT   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3441 AM       CONCMIN   2.6000000e-008  2.6000000e-008  2.6000000e-
008
 2.6000000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3311 AM       PROPMIC   3.6000000e+000  3.6000000e+000
3.6000000e+000
 3.6000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3444 AM+3     MD0       3.0000000e-010  3.0000000e-010  3.0000000e-
010
 3.0000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     m^2/s
         3482 AM+3     MKD_AM    1.3000000e-001  9.0000000e-002  2.0000000e-
002
 4.0000000e-001  0.00000000e+000 0.0000000e+000 LOGUNIFORM   m^3/kg
            2 AM241    ATWEIGHT  2.4105700e-001  2.4105700e-001  2.4105700e-
001
 2.4105700e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3363 AM241    EPAREL    1.0000000e+002  1.0000000e+002
```

```
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
            3 AM241    HALFLIFE  1.3640000e+010  1.3640000e+010
1.3640000e+010
 1.3640000e+010  0.00000000e+000 0.0000000e+000 CONSTANT     s
            4 AM241    INVCHD    4.7800000e+005  4.7800000e+005
4.7800000e+005
 4.7800000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
            5 AM241    INVRHD    3.9600000e+004  3.9600000e+004
3.9600000e+004
 3.9600000e+004  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3504 AM241L   INVCHD    4.9500000e+005  4.9500000e+005
4.9500000e+005
 4.9500000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3509 AM241L   INVRHD    4.4600000e+004  4.4600000e+004
4.4600000e+004
 4.4600000e+004  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3223 AM243    ATWEIGHT  2.4306100e-001  2.4306100e-001  2.4306100e-
001
 2.4306100e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3365 AM243    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
            6 AM243    HALFLIFE  2.3290000e+011  2.3290000e+011
2.3290000e+011
 2.3290000e+011  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3415 AM243    INVCHD    3.3400000e+001  3.3400000e+001
3.3400000e+001
 3.3400000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3416 AM243    INVRHD    7.9800000e-001  7.9800000e-001  7.9800000e-
001
 7.9800000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         2276 ASPHALT  CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2277 ASPHALT  COMP_RCK  3.0000000e-010  3.0000000e-010  3.0000000e-
010
 3.0000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3238 ASPHALT  DNSGRAIN  2.0222000e+003  2.0222000e+003
2.0222000e+003
 2.0222000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2599 ASPHALT  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2278 ASPHALT  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2600 ASPHALT  PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2601 ASPHALT  PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2281 ASPHALT  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2279 ASPHALT  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
```

```
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2279 ASPHALT  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2279 ASPHALT  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2280 ASPHALT  POROSITY  1.0000000e-002  1.0000000e-002  1.0000000e-
002
 1.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2282 ASPHALT  PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2283 ASPHALT  PRMX_LOG -1.9667000e+001 -2.0000000e+001 -
2.1000000e+001
-1.8000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2284 ASPHALT  PRMY_LOG -1.9667000e+001 -2.0000000e+001 -
2.1000000e+001
-1.8000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2285 ASPHALT  PRMZ_LOG -1.9667000e+001 -2.0000000e+001 -
2.1000000e+001
-1.8000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2933 ASPHALT  RADN_DRZ  1.6290000e+000  1.6290000e+000
1.6290000e+000
 1.6290000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2289 ASPHALT  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2929 ASPHALT  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2932 ASPHALT  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2930 ASPHALT  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2931 ASPHALT  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2290 ASPHALT  SAT_IBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2291 ASPHALT  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2291 ASPHALT  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2291 ASPHALT  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2292 ASPHALT  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         3224 AT217    ATWEIGHT  2.1700500e-001  2.1700500e-001  2.1700500e-
```

001
 2.1700500e-001 0.00000000e+000 0.0000000e+000 CONSTANT   kg/mole
         3323 AT217   EPAREL   0.0000000e+000 0.0000000e+000
0.0000000e+000
 0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   Curies/wuf
         3270 AT217   HALFLIFE 3.2300000e-002 3.2300000e-002 3.2300000e-
002
 3.2300000e-002 0.00000000e+000 0.0000000e+000 CONSTANT   s
         3225 BA137   ATWEIGHT 1.3690600e-001 1.3690600e-001 1.3690600e-
001
 1.3690600e-001 0.00000000e+000 0.0000000e+000 CONSTANT   kg/mole
         3324 BA137   EPAREL   0.0000000e+000 0.0000000e+000
0.0000000e+000
 0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   Curies/wuf
         3271 BA137   HALFLIFE 1.0000000e+038 1.0000000e+038
1.0000000e+038
 1.0000000e+038 0.00000000e+000 0.0000000e+000 CONSTANT   s
         3226 BA137M   ATWEIGHT 1.3690700e-001 1.3690700e-001 1.3690700e-
001
 1.3690700e-001 0.00000000e+000 0.0000000e+000 CONSTANT   kg/mole
         3325 BA137M   EPAREL   0.0000000e+000 0.0000000e+000
0.0000000e+000
 0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   Curies/wuf
         3272 BA137M   HALFLIFE 1.5310000e+002 1.5310000e+002
1.5310000e+002
 1.5310000e+002 0.00000000e+000 0.0000000e+000 CONSTANT   s
         3174 BH_CREEP CAP_MOD   1.0000000e+000 1.0000000e+000
1.0000000e+000
 1.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   NONE
         3172 BH_CREEP COMP_RCK 0.0000000e+000 0.0000000e+000
0.0000000e+000
 0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   Pa^-1
         3180 BH_CREEP KPT   0.0000000e+000 0.0000000e+000
0.0000000e+000
 0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   NONE
         3175 BH_CREEP PC_MAX   1.0000000e+008 1.0000000e+008
1.0000000e+008
 1.0000000e+008 0.00000000e+000 0.0000000e+000 CONSTANT   Pa
         3181 BH_CREEP PCT_A   0.0000000e+000 0.0000000e+000
0.0000000e+000
 0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   Pa
         3182 BH_CREEP PCT_EXP   0.0000000e+000 0.0000000e+000
0.0000000e+000
 0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   NONE
         3179 BH_CREEP PO_MIN   1.0132500e+005 1.0132500e+005
1.0132500e+005
 1.0132500e+005 0.00000000e+000 0.0000000e+000 CONSTANT   Pa
         3178 BH_CREEP PORE_DIS 9.4000000e-001 9.4000000e-001 9.4000000e-
001
 9.4000000e-001 0.00000000e+000 0.0000000e+000 CONSTANT   NONE
         3171 BH_CREEP POROSITY 3.2000000e-001 3.2000000e-001 3.2000000e-
001
 3.2000000e-001 0.00000000e+000 0.0000000e+000 CONSTANT   NONE
         3183 BH_CREEP PRMX_LOG -1.3500000e+001 -1.3500000e+001 -
1.5000000e+001
-1.2000000e+001 0.00000000e+000 0.0000000e+000 UNIFORM   log(m^2)
         3188 BH_CREEP PRMY_LOG -1.3500000e+001 -1.3500000e+001 -

```
1.5000000e+001
-1.2000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
         3189 BH_CREEP PRMZ_LOG -1.3500000e+001 -1.3500000e+001 -
1.5000000e+001
-1.2000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
         3173 BH_CREEP RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3176 BH_CREEP SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3177 BH_CREEP SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3138 BH_OPEN  CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3136 BH_OPEN  COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3144 BH_OPEN  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3139 BH_OPEN  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3145 BH_OPEN  PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3146 BH_OPEN  PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3143 BH_OPEN  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3142 BH_OPEN  PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3135 BH_OPEN  POROSITY  3.2000000e-001  3.2000000e-001  3.2000000e-
001
 3.2000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3134 BH_OPEN  PRMX_LOG -9.0000000e+000 -9.0000000e+000 -
9.0000000e+000
-9.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         3186 BH_OPEN  PRMY_LOG -9.0000000e+000 -9.0000000e+000 -
9.0000000e+000
-9.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         3187 BH_OPEN  PRMZ_LOG -9.0000000e+000 -9.0000000e+000 -
9.0000000e+000
-9.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         3137 BH_OPEN  RELP_MOD  5.0000000e+000  5.0000000e+000
5.0000000e+000
 5.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3140 BH_OPEN  SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3141 BH_OPEN  SAT_RGAS  0.0000000e+000  0.0000000e+000
```

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0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3162 BH_SAND  CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3160 BH_SAND  COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3168 BH_SAND  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3163 BH_SAND  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3169 BH_SAND  PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3170 BH_SAND  PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3167 BH_SAND  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3166 BH_SAND  PORE_DIS  9.4000000e-001  9.4000000e-001  9.4000000e-
001
 9.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3159 BH_SAND  POROSITY  3.2000000e-001  3.2000000e-001  3.2000000e-
001
 3.2000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3184 BH_SAND  PRMX_LOG -1.3650000e+001 -1.3650000e+001 -
1.6300000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
         3190 BH_SAND  PRMY_LOG -1.3650000e+001 -1.3650000e+001 -
1.6300000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
         3191 BH_SAND  PRMZ_LOG -1.3650000e+001 -1.3650000e+001 -
1.6300000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
         3161 BH_SAND  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3164 BH_SAND  SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3165 BH_SAND  SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3227 BI211    ATWEIGHT  2.1098700e-001  2.1098700e-001  2.1098700e-
001
 2.1098700e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3326 BI211    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3273 BI211    HALFLIFE  1.2780000e+002  1.2780000e+002
1.2780000e+002
 1.2780000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3228 BI212    ATWEIGHT  2.1199100e-001  2.1199100e-001  2.1199100e-
```

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001
 2.1199100e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3327 BI212    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3274 BI212    HALFLIFE  3.6330000e+003  3.6330000e+003
3.6330000e+003
 3.6330000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3229 BI213    ATWEIGHT  2.1299400e-001  2.1299400e-001  2.1299400e-
001
 2.1299400e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3328 BI213    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3275 BI213    HALFLIFE  2.7390000e+003  2.7390000e+003
2.7390000e+003
 2.7390000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3230 BI214    ATWEIGHT  2.1399900e-001  2.1399900e-001  2.1399900e-
001
 2.1399900e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3329 BI214    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3276 BI214    HALFLIFE  1.1940000e+003  1.1940000e+003
1.1940000e+003
 1.1940000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3259 BLOWOUT  APORO     2.4000000e-013  2.4000000e-013  2.4000000e-
013
 2.4000000e-013  0.00000000e+000 0.0000000e+000 CONSTANT     m^2
         3245 BLOWOUT  CEMENT    6.8950000e+003  6.8950000e+003
6.8950000e+003
 6.8950000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3420 BLOWOUT  FCE       1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3256 BLOWOUT  FGE       9.5500000e+000  9.5500000e+000
1.0000000e+000
 1.8100000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         3255 BLOWOUT  FSE       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3470 BLOWOUT  GAS_MIN   1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     mscf/day
         3250 BLOWOUT  HREPO     3.9600000e+000  3.9600000e+000
3.9600000e+000
 3.9600000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3260 BLOWOUT  INPORO    8.4900000e-001  8.4900000e-001  8.4900000e-
001
 8.4900000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3254 BLOWOUT  KGAS      1.4100000e+000  1.4100000e+000
1.4100000e+000
 1.4100000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3471 BLOWOUT  MAXFLOW   9.5040000e+005  9.5040000e+005
9.5040000e+005
 9.5040000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3472 BLOWOUT  MINFLOW   2.5920000e+005  2.5920000e+005
```

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2.5920000e+005
 2.5920000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3246 BLOWOUT  PARTDIA   2.3500000e-002  2.8000000e-003  4.0000000e-
005
 2.0000000e-001  0.00000000e+000 0.0000000e+000 LOGUNIFORM   m
         3251 BLOWOUT  PSUF      8.9465000e+004  8.9465000e+004
8.9465000e+004
 8.9465000e+004  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3456 BLOWOUT  RE_CAST   1.1400000e+002  1.1400000e+002
1.1400000e+002
 1.1400000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3253 BLOWOUT  RGAS      4.1160000e+003  4.1160000e+003
4.1160000e+003
 4.1160000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     N*m/kg/K
         3247 BLOWOUT  RHOS      2.6500000e+003  2.6500000e+003
2.6500000e+003
 2.6500000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         3248 BLOWOUT  ROOM      1.7100000e+001  1.7100000e+001
1.7100000e+001
 1.7100000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3249 BLOWOUT  RPANEL    6.0870000e+001  6.0870000e+001
6.0870000e+001
 6.0870000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3257 BLOWOUT  SUFTEN    8.0000000e-002  8.0000000e-002  8.0000000e-
002
 8.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     N/m
         3473 BLOWOUT  THCK_CAS  1.2583000e+002  1.2583000e+002
1.2583000e+002
 1.2583000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3258 BLOWOUT  TREPO     3.0000000e+002  3.0000000e+002
3.0000000e+002
 3.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     K
         3252 BLOWOUT  VISC      9.2000000e-006  9.2000000e-006  9.2000000e-
006
 9.2000000e-006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa*s
           23 BOREHOLE CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3242 BOREHOLE COLDIA    2.0320040e-001  2.0320040e-001  2.0320040e-
001
 2.0320040e-001  0.00000000e+000 0.0000000e+000 CONSTANT     m
           25 BOREHOLE COMP_RCK  2.6400000e-009  2.6400000e-009  2.6400000e-
009
 2.6400000e-009  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
           26 BOREHOLE DIAMMOD   3.1115000e-001  3.1115000e-001  3.1115000e-
001
 3.1115000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     m
           27 BOREHOLE DOMEGA    8.6300000e+000  7.8000000e+000
4.2000000e+000
 2.3000000e+001  0.0000000e+000  4.2000000e+000 CUMULATIVE   rad/s
           27 BOREHOLE DOMEGA    8.6300000e+000  7.8000000e+000
4.2000000e+000
 2.3000000e+001  1.5000000e-001  6.3000000e+000 CUMULATIVE   rad/s
           27 BOREHOLE DOMEGA    8.6300000e+000  7.8000000e+000
4.2000000e+000
 2.3000000e+001  6.5000000e-001  8.4000000e+000 CUMULATIVE   rad/s
           27 BOREHOLE DOMEGA    8.6300000e+000  7.8000000e+000
```

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4.2000000e+000
 2.3000000e+001  8.0000000e-001  1.0500000e+001 CUMULATIVE   rad/s
           27 BOREHOLE DOMEGA    8.6300000e+000  7.8000000e+000
4.2000000e+000
 2.3000000e+001  9.0000000e-001  1.2600000e+001 CUMULATIVE   rad/s
           27 BOREHOLE DOMEGA    8.6300000e+000  7.8000000e+000
4.2000000e+000
 2.3000000e+001  9.5000000e-001  1.4700000e+001 CUMULATIVE   rad/s
           27 BOREHOLE DOMEGA    8.6300000e+000  7.8000000e+000
4.2000000e+000
 2.3000000e+001  9.7000000e-001  1.6800000e+001 CUMULATIVE   rad/s
           27 BOREHOLE DOMEGA    8.6300000e+000  7.8000000e+000
4.2000000e+000
 2.3000000e+001  9.8000000e-001  1.8800000e+001 CUMULATIVE   rad/s
           27 BOREHOLE DOMEGA    8.6300000e+000  7.8000000e+000
4.2000000e+000
 2.3000000e+001  9.9000000e-001  2.0900000e+001 CUMULATIVE   rad/s
           27 BOREHOLE DOMEGA    8.6300000e+000  7.8000000e+000
4.2000000e+000
 2.3000000e+001  1.0000000e+000  2.3000000e+001 CUMULATIVE   rad/s
         3239 BOREHOLE INV_AR    1.1152000e+005  1.1152000e+005
1.1152000e+005
 1.1152000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     m^2
         3122 BOREHOLE KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3244 BOREHOLE L1        1.8288000e+002  1.8288000e+002
1.8288000e+002
 1.8288000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3243 BOREHOLE L2        4.7212000e+002  4.7212000e+002
4.7212000e+002
 4.7212000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     m
           29 BOREHOLE PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3120 BOREHOLE PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3121 BOREHOLE PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3241 BOREHOLE PIPED     1.1430020e-001  1.1430020e-001  1.1430020e-
001
 1.1430020e-001  0.00000000e+000 0.0000000e+000 CONSTANT     m
           32 BOREHOLE PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
           30 BOREHOLE PORE_DIS  9.4000000e-001  9.4000000e-001  9.4000000e-
001
 9.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           31 BOREHOLE POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           34 BOREHOLE PRMX_LOG -1.2230000e+001 -1.2500000e+001 -
1.4000000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 NORMAL       log(m^2)
           35 BOREHOLE PRMY_LOG -1.2230000e+001 -1.2500000e+001 -
```

```
1.4000000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 NORMAL       log(m^2)
           36 BOREHOLE PRMZ_LOG -1.2230000e+001 -1.2500000e+001 -
1.4000000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 NORMAL       log(m^2)
           40 BOREHOLE RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3261 BOREHOLE RHW_AR    1.5760000e+004  1.5760000e+004
1.5760000e+004
 1.5760000e+004  0.00000000e+000 0.0000000e+000 CONSTANT     m^2
         3240 BOREHOLE ROUGHP    8.0000000e-002  8.0000000e-002  8.0000000e-
002
 8.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           41 BOREHOLE SAT_RBRN  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           42 BOREHOLE SAT_RGAS  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2254 BOREHOLE TAUFAIL   1.0500000e+001  1.9600000e+000  5.0000000e-
002
 7.7000000e+001  0.00000000e+000 0.0000000e+000 LOGUNIFORM   Pa
         3414 BOREHOLE WUF       2.9600000e+000  2.9600000e+000
2.9600000e+000
 2.9600000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
           48 BRINESAL COMPRES   3.1000000e-010  3.1000000e-010  3.1000000e-
010
 3.1000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
           49 BRINESAL DNSFLUID  1.2200000e+003  1.2200000e+003
1.2200000e+003
 1.2200000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
           50 BRINESAL REF_PRES  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
           51 BRINESAL REF_TEMP  3.0015000e+002  3.0015000e+002
3.0015000e+002
 3.0015000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     K
           55 BRINESAL VISCO     2.1000000e-003  2.1000000e-003  2.1000000e-
003
 2.1000000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     Pa*s
           57 BRINESAL WTF       3.2400000e-001  3.2400000e-001  3.0700000e-
001
 3.3200000e-001  0.00000000e+000 3.0700000e-001 STUDENT      NONE
           57 BRINESAL WTF       3.2400000e-001  3.2400000e-001  3.0700000e-
001
 3.3200000e-001  0.00000000e+000 3.2700000e-001 STUDENT      NONE
           57 BRINESAL WTF       3.2400000e-001  3.2400000e-001  3.0700000e-
001
 3.3200000e-001  0.00000000e+000 3.2900000e-001 STUDENT      NONE
           57 BRINESAL WTF       3.2400000e-001  3.2400000e-001  3.0700000e-
001
 3.3200000e-001  0.00000000e+000 3.3200000e-001 STUDENT      NONE
           60 CASTILER CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           61 CASTILER COMP_RCK  5.3000000e-011  4.0000000e-011  2.0000000e-
```

```
011
 1.0000000e-010  0.00000000e+000 0.0000000e+000 TRIANGULAR   Pa^-1
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  1.0000000e+000 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.0000000e+000 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  3.0000000e+000 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  4.0000000e+000 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  5.0000000e+000 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  6.0000000e+000 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  7.0000000e+000 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  8.0000000e+000 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  9.0000000e+000 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  1.0000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  1.1000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  1.2000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  1.3000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  1.4000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  1.5000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  1.6000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  1.7000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  1.8000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
```

```
1.0000000e+000
 3.2000000e+001  3.1250000e-002  1.9000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.0000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.1000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.2000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.3000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.4000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.5000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.6000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.7000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.8000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.9000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  3.0000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  3.1000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  3.2000000e+001 DELTA        NONE
         2608 CASTILER KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           62 CASTILER PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2609 CASTILER PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2610 CASTILER PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           65 CASTILER PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
           63 CASTILER PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
```

```
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           64 CASTILER POROSITY  8.7000000e-003  8.7000000e-003  2.0000000e-
003
 1.6000000e-002  0.00000000e+000 2.0000000e-003 STUDENT      NONE
           64 CASTILER POROSITY  8.7000000e-003  8.7000000e-003  2.0000000e-
003
 1.6000000e-002  0.00000000e+000 8.0000000e-003 STUDENT      NONE
           64 CASTILER POROSITY  8.7000000e-003  8.7000000e-003  2.0000000e-
003
 1.6000000e-002  0.00000000e+000 1.6000000e-002 STUDENT      NONE
           66 CASTILER PRESSURE  1.3600000e+007  1.2700000e+007
1.1100000e+007
 1.7000000e+007  0.00000000e+000 0.0000000e+000 TRIANGULAR   Pa
           67 CASTILER PRMX_LOG -1.2100000e+001 -1.1800000e+001 -
1.4700000e+001
-9.8000000e+000  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
           68 CASTILER PRMY_LOG -1.2100000e+001 -1.1800000e+001 -
1.4700000e+001
-9.8000000e+000  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
           69 CASTILER PRMZ_LOG -1.2100000e+001 -1.1800000e+001 -
1.4700000e+001
-9.8000000e+000  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
           72 CASTILER RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           73 CASTILER SAT_IBRN  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           74 CASTILER SAT_RBRN  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           75 CASTILER SAT_RGAS  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2918 CASTILER VOLUME    4.0000000e+006  4.0000000e+006
4.0000000e+006
 4.0000000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     m^3
           76 CAVITY_1 CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           77 CAVITY_1 COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2612 CAVITY_1 KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           78 CAVITY_1 PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2613 CAVITY_1 PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2614 CAVITY_1 PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           81 CAVITY_1 PO_MIN    1.0132500e+005  1.0132500e+005
```

```
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
           79 CAVITY_1 PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           80 CAVITY_1 POROSITY  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           82 CAVITY_1 PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
           83 CAVITY_1 PRMX_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
           84 CAVITY_1 PRMY_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
           85 CAVITY_1 PRMZ_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
           88 CAVITY_1 RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3099 CAVITY_1 SAT_IBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           89 CAVITY_1 SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           90 CAVITY_1 SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           91 CAVITY_2 CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           92 CAVITY_2 COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2616 CAVITY_2 KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           93 CAVITY_2 PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2617 CAVITY_2 PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2618 CAVITY_2 PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           96 CAVITY_2 PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
           94 CAVITY_2 PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           95 CAVITY_2 POROSITY  1.0000000e+000  1.0000000e+000
```

```
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           97 CAVITY_2 PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
           98 CAVITY_2 PRMX_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
           99 CAVITY_2 PRMY_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          100 CAVITY_2 PRMZ_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          103 CAVITY_2 RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3100 CAVITY_2 SAT_IBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          104 CAVITY_2 SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          105 CAVITY_2 SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2049 CAVITY_3 CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2051 CAVITY_3 COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2620 CAVITY_3 KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2234 CAVITY_3 PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2621 CAVITY_3 PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2622 CAVITY_3 PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2623 CAVITY_3 PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2052 CAVITY_3 PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2053 CAVITY_3 POROSITY  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3101 CAVITY_3 PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2054 CAVITY_3 PRMX_LOG -1.0000000e+001 -1.0000000e+001 -
```

```
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2055 CAVITY_3 PRMY_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2056 CAVITY_3 PRMZ_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2058 CAVITY_3 RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3102 CAVITY_3 SAT_IBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2235 CAVITY_3 SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2059 CAVITY_3 SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2060 CAVITY_4 CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2062 CAVITY_4 COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2625 CAVITY_4 KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2236 CAVITY_4 PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2626 CAVITY_4 PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2627 CAVITY_4 PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2628 CAVITY_4 PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2063 CAVITY_4 PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2064 CAVITY_4 POROSITY  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3103 CAVITY_4 PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2065 CAVITY_4 PRMX_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2066 CAVITY_4 PRMY_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2067 CAVITY_4 PRMZ_LOG -1.0000000e+001 -1.0000000e+001 -
```

```
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2069 CAVITY_4 RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3104 CAVITY_4 SAT_IBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2237 CAVITY_4 SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2070 CAVITY_4 SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2994 CELLULS  FBETA     5.0000000e-001  5.0000000e-001
0.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
          838 CF       LOGSOLM   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(moles/lit
          106 CF252    ATWEIGHT  2.5208200e-001  2.5208200e-001  2.5208200e-
001
 2.5208200e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3330 CF252    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          107 CF252    HALFLIFE  8.3250000e+007  8.3250000e+007
8.3250000e+007
 8.3250000e+007  0.00000000e+000 0.0000000e+000 CONSTANT     s
          108 CF252    INVCHD    6.4000000e-005  6.4000000e-005  6.4000000e-
005
 6.4000000e-005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          109 CF252    INVRHD    5.6000000e-006  5.6000000e-006  5.6000000e-
006
 5.6000000e-006  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         2327 CL_L_T1  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2328 CL_L_T1  COMP_RCK  3.8000000e-010  3.8000000e-010  3.8000000e-
010
 3.8000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2641 CL_L_T1  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2329 CL_L_T1  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2642 CL_L_T1  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2643 CL_L_T1  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2332 CL_L_T1  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2330 CL_L_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
```

```
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2330 CL_L_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2330 CL_L_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2331 CL_L_T1  POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2333 CL_L_T1  PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2334 CL_L_T1  PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2335 CL_L_T1  PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2336 CL_L_T1  PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3021 CL_L_T1  RADN_DRZ  1.8580000e+000  1.8580000e+000
1.8580000e+000
 1.8580000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2340 CL_L_T1  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3017 CL_L_T1  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3020 CL_L_T1  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3018 CL_L_T1  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3019 CL_L_T1  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2341 CL_L_T1  SAT_IBRN  7.9000000e-001  7.9000000e-001  7.9000000e-
001
 7.9000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2342 CL_L_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2342 CL_L_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2342 CL_L_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2343 CL_L_T1  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2344 CL_L_T2  CAP_MOD   2.0000000e+000  2.0000000e+000
```

```
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2345 CL_L_T2  COMP_RCK  3.8000000e-010  3.8000000e-010  3.8000000e-
010
 3.8000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2646 CL_L_T2  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2346 CL_L_T2  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2647 CL_L_T2  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2648 CL_L_T2  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2349 CL_L_T2  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2347 CL_L_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2347 CL_L_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2347 CL_L_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2348 CL_L_T2  POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2351 CL_L_T2  PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2352 CL_L_T2  PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2353 CL_L_T2  PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3026 CL_L_T2  RADN_DRZ  1.1620000e+000  1.1620000e+000
1.1620000e+000
 1.1620000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2357 CL_L_T2  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3022 CL_L_T2  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3025 CL_L_T2  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3023 CL_L_T2  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3024 CL_L_T2  RSH_WAS   3.5000000e+000  3.5000000e+000
```

```
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2359 CL_L_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2359 CL_L_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2359 CL_L_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2360 CL_L_T2  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2361 CL_L_T3  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2362 CL_L_T3  COMP_RCK  3.8000000e-010  3.8000000e-010  3.8000000e-
010
 3.8000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2651 CL_L_T3  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2363 CL_L_T3  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2652 CL_L_T3  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2653 CL_L_T3  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2366 CL_L_T3  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2364 CL_L_T3  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2364 CL_L_T3  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2364 CL_L_T3  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2365 CL_L_T3  POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2368 CL_L_T3  PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2369 CL_L_T3  PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2370 CL_L_T3  PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3031 CL_L_T3  RADN_DRZ  1.0020000e+000  1.0020000e+000
```

```
1.0020000e+000
 1.0020000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2374 CL_L_T3  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3027 CL_L_T3  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3030 CL_L_T3  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3028 CL_L_T3  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3029 CL_L_T3  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2376 CL_L_T3  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2376 CL_L_T3  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2376 CL_L_T3  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2377 CL_L_T3  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         3070 CL_L_T4  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3071 CL_L_T4  COMP_RCK  3.8000000e-010  3.8000000e-010  3.8000000e-
010
 3.8000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3072 CL_L_T4  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3073 CL_L_T4  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3074 CL_L_T4  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3075 CL_L_T4  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3123 CL_L_T4  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3076 CL_L_T4  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         3076 CL_L_T4  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         3076 CL_L_T4  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
```

```
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         3077 CL_L_T4  POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3078 CL_L_T4  PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3079 CL_L_T4  PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3080 CL_L_T4  PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3069 CL_L_T4  RADN_DRZ  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3081 CL_L_T4  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3065 CL_L_T4  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3068 CL_L_T4  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3066 CL_L_T4  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3067 CL_L_T4  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3082 CL_L_T4  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         3082 CL_L_T4  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         3082 CL_L_T4  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         3083 CL_L_T4  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2378 CL_M_T1  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2379 CL_M_T1  COMP_RCK  4.3000000e-010  4.3000000e-010  4.3000000e-
010
 4.3000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2656 CL_M_T1  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2380 CL_M_T1  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2657 CL_M_T1  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
```

```
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2658 CL_M_T1  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2383 CL_M_T1  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2381 CL_M_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2381 CL_M_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2381 CL_M_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2382 CL_M_T1  POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2384 CL_M_T1  PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2385 CL_M_T1  PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2386 CL_M_T1  PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2387 CL_M_T1  PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3088 CL_M_T1  RADN_DRZ  1.7090000e+000  1.7090000e+000
1.7090000e+000
 1.7090000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2391 CL_M_T1  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3084 CL_M_T1  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3087 CL_M_T1  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3085 CL_M_T1  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3086 CL_M_T1  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2392 CL_M_T1  SAT_IBRN  7.9000000e-001  7.9000000e-001  7.9000000e-
001
 7.9000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2393 CL_M_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2393 CL_M_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
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```
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2393 CL_M_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2394 CL_M_T1  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2395 CL_M_T2  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2396 CL_M_T2  COMP_RCK  4.3000000e-010  4.3000000e-010  4.3000000e-
010
 4.3000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2661 CL_M_T2  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2397 CL_M_T2  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2662 CL_M_T2  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2663 CL_M_T2  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2400 CL_M_T2  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2398 CL_M_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2398 CL_M_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2398 CL_M_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2399 CL_M_T2  POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2402 CL_M_T2  PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2403 CL_M_T2  PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2404 CL_M_T2  PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3093 CL_M_T2  RADN_DRZ  1.4690000e+000  1.4690000e+000
1.4690000e+000
 1.4690000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2408 CL_M_T2  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3089 CL_M_T2  RSH_AIR   3.0900000e+000  3.0900000e+000
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3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3092 CL_M_T2  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3090 CL_M_T2  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3091 CL_M_T2  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2410 CL_M_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2410 CL_M_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2410 CL_M_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2411 CL_M_T2  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2412 CL_M_T3  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2413 CL_M_T3  COMP_RCK  4.3000000e-010  4.3000000e-010  4.3000000e-
010
 4.3000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2666 CL_M_T3  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2414 CL_M_T3  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2667 CL_M_T3  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2668 CL_M_T3  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2417 CL_M_T3  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2415 CL_M_T3  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2415 CL_M_T3  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2415 CL_M_T3  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2416 CL_M_T3  POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2419 CL_M_T3  PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
```

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2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2420 CL_M_T3  PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2421 CL_M_T3  PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3098 CL_M_T3  RADN_DRZ  1.2830000e+000  1.2830000e+000
1.2830000e+000
 1.2830000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2425 CL_M_T3  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3094 CL_M_T3  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3097 CL_M_T3  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3095 CL_M_T3  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3096 CL_M_T3  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2427 CL_M_T3  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2427 CL_M_T3  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2427 CL_M_T3  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2428 CL_M_T3  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2429 CL_M_T4  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2430 CL_M_T4  COMP_RCK  4.3000000e-010  4.3000000e-010  4.3000000e-
010
 4.3000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2671 CL_M_T4  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2431 CL_M_T4  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2672 CL_M_T4  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2673 CL_M_T4  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2434 CL_M_T4  PO_MIN    1.0132500e+005  1.0132500e+005
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```
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2432 CL_M_T4  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2432 CL_M_T4  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2432 CL_M_T4  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2433 CL_M_T4  POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2436 CL_M_T4  PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2437 CL_M_T4  PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2438 CL_M_T4  PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2923 CL_M_T4  RADN_DRZ  1.1070000e+000  1.1070000e+000
1.1070000e+000
 1.1070000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2442 CL_M_T4  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2919 CL_M_T4  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2922 CL_M_T4  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2920 CL_M_T4  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2921 CL_M_T4  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2444 CL_M_T4  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2444 CL_M_T4  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2444 CL_M_T4  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2445 CL_M_T4  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2446 CL_M_T5  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2447 CL_M_T5  COMP_RCK  4.3000000e-010  4.3000000e-010  4.3000000e-
```

```
010
 4.3000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2676 CL_M_T5  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2448 CL_M_T5  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2677 CL_M_T5  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2678 CL_M_T5  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2451 CL_M_T5  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2449 CL_M_T5  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2449 CL_M_T5  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2449 CL_M_T5  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2450 CL_M_T5  POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2453 CL_M_T5  PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2454 CL_M_T5  PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2455 CL_M_T5  PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2928 CL_M_T5  RADN_DRZ  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2459 CL_M_T5  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2924 CL_M_T5  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2927 CL_M_T5  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2925 CL_M_T5  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2926 CL_M_T5  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2461 CL_M_T5  SAT_RBRN  2.5000000e-001  2.0000000e-001
```

```
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2461 CL_M_T5  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2461 CL_M_T5  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2462 CL_M_T5  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2310 CLAY_BOT CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2311 CLAY_BOT COMP_RCK  3.8000000e-010  3.8000000e-010  3.8000000e-
010
 3.8000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2636 CLAY_BOT KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2312 CLAY_BOT PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2637 CLAY_BOT PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2638 CLAY_BOT PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2315 CLAY_BOT PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2313 CLAY_BOT PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2313 CLAY_BOT PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2313 CLAY_BOT PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2314 CLAY_BOT POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2316 CLAY_BOT PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2317 CLAY_BOT PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2318 CLAY_BOT PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2319 CLAY_BOT PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2323 CLAY_BOT RELP_MOD  4.0000000e+000  4.0000000e+000
```

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4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2324 CLAY_BOT SAT_IBRN  7.9000000e-001  7.9000000e-001  7.9000000e-
001
 7.9000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2325 CLAY_BOT SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2325 CLAY_BOT SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2325 CLAY_BOT SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2326 CLAY_BOT SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         3000 CLAY_RUS CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3001 CLAY_RUS COMP_RCK  4.7000000e-010  4.7000000e-010  4.7000000e-
010
 4.7000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3002 CLAY_RUS KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3003 CLAY_RUS PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3004 CLAY_RUS PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3005 CLAY_RUS PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3131 CLAY_RUS PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3006 CLAY_RUS PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         3006 CLAY_RUS PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         3006 CLAY_RUS PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         3007 CLAY_RUS POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3008 CLAY_RUS PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3009 CLAY_RUS PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3010 CLAY_RUS PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
```

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2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3011 CLAY_RUS PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3012 CLAY_RUS RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2996 CLAY_RUS RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2999 CLAY_RUS RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2997 CLAY_RUS RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2998 CLAY_RUS RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3013 CLAY_RUS SAT_IBRN  7.9000000e-001  7.9000000e-001  7.9000000e-
001
 7.9000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3014 CLAY_RUS SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         3014 CLAY_RUS SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         3014 CLAY_RUS SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         3015 CLAY_RUS SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         3231 CM243    ATWEIGHT  2.4306100e-001  2.4306100e-001  2.4306100e-
001
 2.4306100e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3366 CM243    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3277 CM243    HALFLIFE  8.9940000e+008  8.9940000e+008
8.9940000e+008
 8.9940000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3410 CM243    INVCHD    1.8200000e-001  1.8200000e-001  1.8200000e-
001
 1.8200000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3411 CM243    INVRHD    2.3100000e-001  2.3100000e-001  2.3100000e-
001
 2.3100000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          110 CM244    ATWEIGHT  2.4406300e-001  2.4406300e-001  2.4406300e-
001
 2.4406300e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3331 CM244    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          111 CM244    HALFLIFE  5.7150000e+008  5.7150000e+008
```

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5.7150000e+008
 5.7150000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     s
          112 CM244    INVCHD    4.8200000e+003  4.8200000e+003
4.8200000e+003
 4.8200000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          113 CM244    INVRHD    1.0500000e+002  1.0500000e+002
1.0500000e+002
 1.0500000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3232 CM245    ATWEIGHT  2.4506500e-001  2.4506500e-001  2.4506500e-
001
 2.4506500e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3367 CM245    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3278 CM245    HALFLIFE  2.6820000e+011  2.6820000e+011
2.6820000e+011
 2.6820000e+011  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3412 CM245    INVCHD    1.3900000e-002  1.3900000e-002  1.3900000e-
002
 1.3900000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3413 CM245    INVRHD    1.0900000e-002  1.0900000e-002  1.0900000e-
002
 1.0900000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3233 CM248    ATWEIGHT  2.4807200e-001  2.4807200e-001  2.4807200e-
001
 2.4807200e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3368 CM248    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          115 CM248    HALFLIFE  1.0700000e+013  1.0700000e+013
1.0700000e+013
 1.0700000e+013  0.00000000e+000 0.0000000e+000 CONSTANT     s
         2265 CM248    INVCHD    1.4900000e-001  1.4900000e-001  1.4900000e-
001
 1.4900000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         2266 CM248    INVRHD    2.5900000e-003  2.5900000e-003  2.5900000e-
003
 2.5900000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3051 CONC_MON CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3052 CONC_MON COMP_RCK  6.0000000e-011  6.0000000e-011  6.0000000e-
011
 6.0000000e-011  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3053 CONC_MON KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3054 CONC_MON PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3055 CONC_MON PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3056 CONC_MON PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3124 CONC_MON PO_MIN    1.0132500e+005  1.0132500e+005
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1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3057 CONC_MON PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         3057 CONC_MON PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         3057 CONC_MON PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         3058 CONC_MON POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3114 CONC_MON PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3059 CONC_MON PRMX_LOG -1.4000000e+001 -1.4000000e+001 -
1.4000000e+001
-1.4000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         3060 CONC_MON PRMY_LOG -1.4000000e+001 -1.4000000e+001 -
1.4000000e+001
-1.4000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         3061 CONC_MON PRMZ_LOG -1.4000000e+001 -1.4000000e+001 -
1.4000000e+001
-1.4000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         3050 CONC_MON RADN_DRZ  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3062 CONC_MON RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3046 CONC_MON RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3049 CONC_MON RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3047 CONC_MON RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3048 CONC_MON RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3115 CONC_MON SAT_IBRN  9.9999990e-001  9.9999990e-001  9.9999990e-
001
 9.9999990e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3063 CONC_MON SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         3063 CONC_MON SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         3063 CONC_MON SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         3064 CONC_MON SAT_RGAS  2.0000000e-001  2.0000000e-001
```

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0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         3514 CONC_PCS CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3515 CONC_PCS COMP_RCK  6.0000000e-011  6.0000000e-011  6.0000000e-
011
 6.0000000e-011  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3516 CONC_PCS COMPRES   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3517 CONC_PCS KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3518 CONC_PCS PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3519 CONC_PCS PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3520 CONC_PCS PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3521 CONC_PCS PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3522 CONC_PCS PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         3522 CONC_PCS PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         3522 CONC_PCS PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         3523 CONC_PCS POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3524 CONC_PCS PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3525 CONC_PCS PRMX_LOG -1.8816000e+001 -1.8749600e+001 -
2.0699000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3526 CONC_PCS PRMY_LOG -1.8816000e+001 -1.8749600e+001 -
2.0699000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3527 CONC_PCS PRMZ_LOG -1.8816000e+001 -1.8749600e+001 -
2.0699000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3528 CONC_PCS REF_PRES  1.0100000e+005  1.0100000e+005
1.0100000e+005
 1.0100000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3529 CONC_PCS RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3530 CONC_PCS SAT_IBRN  9.9999990e-001  9.9999990e-001  9.9999990e-
```

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001
 9.9999990e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3531 CONC_PCS SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         3531 CONC_PCS SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         3531 CONC_PCS SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         3532 CONC_PCS SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         3150 CONC_PLG CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3148 CONC_PLG COMP_RCK  3.8000000e-010  3.8000000e-010  3.8000000e-
010
 3.8000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3156 CONC_PLG KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3151 CONC_PLG PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3157 CONC_PLG PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3158 CONC_PLG PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3155 CONC_PLG PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3154 CONC_PLG PORE_DIS  9.4000000e-001  9.4000000e-001  9.4000000e-
001
 9.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3147 CONC_PLG POROSITY  3.2000000e-001  3.2000000e-001  3.2000000e-
001
 3.2000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3185 CONC_PLG PRMX_LOG -1.8000000e+001 -1.8000000e+001 -
1.9000000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
         3192 CONC_PLG PRMY_LOG -1.8000000e+001 -1.8000000e+001 -
1.9000000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
         3193 CONC_PLG PRMZ_LOG -1.8000000e+001 -1.8000000e+001 -
1.9000000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
         3149 CONC_PLG RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3152 CONC_PLG SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3153 CONC_PLG SAT_RGAS  0.0000000e+000  0.0000000e+000
```

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0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2463 CONC_T1  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2464 CONC_T1  COMP_RCK  6.0000000e-011  6.0000000e-011  6.0000000e-
011
 6.0000000e-011  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2681 CONC_T1  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2465 CONC_T1  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2682 CONC_T1  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2683 CONC_T1  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2468 CONC_T1  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2466 CONC_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2466 CONC_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2466 CONC_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2467 CONC_T1  POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2469 CONC_T1  PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2470 CONC_T1  PRMX_LOG -1.8816000e+001 -1.8749600e+001 -
2.0699000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2471 CONC_T1  PRMY_LOG -1.8816000e+001 -1.8749600e+001 -
2.0699000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2472 CONC_T1  PRMZ_LOG -1.8816000e+001 -1.8749600e+001 -
2.0699000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3040 CONC_T1  RADN_DRZ  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2476 CONC_T1  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3036 CONC_T1  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3039 CONC_T1  RSH_EXH   2.3000000e+000  2.3000000e+000
```

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2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3037 CONC_T1  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3038 CONC_T1  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2477 CONC_T1  SAT_IBRN  9.9999990e-001  9.9999990e-001  9.9999990e-
001
 9.9999990e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2478 CONC_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2478 CONC_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2478 CONC_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2479 CONC_T1  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2480 CONC_T2  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2481 CONC_T2  COMP_RCK  6.0000000e-011  6.0000000e-011  6.0000000e-
011
 6.0000000e-011  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2686 CONC_T2  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2482 CONC_T2  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2687 CONC_T2  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2688 CONC_T2  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2808 CONC_T2  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2483 CONC_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2483 CONC_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2483 CONC_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2484 CONC_T2  POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2485 CONC_T2  PRESSURE  1.0132500e+005  1.0132500e+005
```

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1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2486 CONC_T2  PRMX_LOG -1.4000000e+001 -1.4000000e+001 -
1.4000000e+001
-1.4000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2487 CONC_T2  PRMY_LOG -1.4000000e+001 -1.4000000e+001 -
1.4000000e+001
-1.4000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2488 CONC_T2  PRMZ_LOG -1.4000000e+001 -1.4000000e+001 -
1.4000000e+001
-1.4000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         3045 CONC_T2  RADN_DRZ  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2492 CONC_T2  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3041 CONC_T2  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3044 CONC_T2  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3042 CONC_T2  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3043 CONC_T2  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2493 CONC_T2  SAT_IBRN  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2494 CONC_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2494 CONC_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2494 CONC_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2495 CONC_T2  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
          841 CS       LOGSOLM   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(moles/lit
          116 CS137    ATWEIGHT  1.3690700e-001  1.3690700e-001  1.3690700e-
001
 1.3690700e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3369 CS137    EPAREL    1.0000000e+003  1.0000000e+003
1.0000000e+003
 1.0000000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          117 CS137    HALFLIFE  9.4670000e+008  9.4670000e+008
9.4670000e+008
 9.4670000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     s
         2037 CS137    INVCHD    6.9300000e+003  6.9300000e+003
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6.9300000e+003
 6.9300000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          118 CS137    INVRHD    1.7700000e+005  1.7700000e+005
1.7700000e+005
 1.7700000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3487 CULEBRA  APOROS    2.1000000e-003  1.0000000e-003  1.0000000e-
004
 1.0000000e-002  0.00000000e+000 0.0000000e+000 LOGUNIFORM   NONE
          119 CULEBRA  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          120 CULEBRA  COMP_RCK  1.0000000e-010  1.0000000e-010  1.0000000e-
010
 1.0000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3483 CULEBRA  DISP_L    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3484 CULEBRA  DISPT_L   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
          843 CULEBRA  DNSGRAIN  2.8200000e+003  2.8200000e+003
2.8200000e+003
 2.8200000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         3486 CULEBRA  DPOROS    1.6000000e-001  1.6000000e-001  1.0000000e-
001
 2.5000000e-001  0.0000000e+000  1.0000000e-001 CUMULATIVE   NONE
         3486 CULEBRA  DPOROS    1.6000000e-001  1.6000000e-001  1.0000000e-
001
 2.5000000e-001  1.0000000e-001  1.1000000e-001 CUMULATIVE   NONE
         3486 CULEBRA  DPOROS    1.6000000e-001  1.6000000e-001  1.0000000e-
001
 2.5000000e-001  2.5000000e-001  1.2000000e-001 CUMULATIVE   NONE
         3486 CULEBRA  DPOROS    1.6000000e-001  1.6000000e-001  1.0000000e-
001
 2.5000000e-001  5.0000000e-001  1.6000000e-001 CUMULATIVE   NONE
         3486 CULEBRA  DPOROS    1.6000000e-001  1.6000000e-001  1.0000000e-
001
 2.5000000e-001  7.5000000e-001  1.8000000e-001 CUMULATIVE   NONE
         3486 CULEBRA  DPOROS    1.6000000e-001  1.6000000e-001  1.0000000e-
001
 2.5000000e-001  9.0000000e-001  1.9000000e-001 CUMULATIVE   NONE
         3486 CULEBRA  DPOROS    1.6000000e-001  1.6000000e-001  1.0000000e-
001
 2.5000000e-001  1.0000000e+000  2.5000000e-001 CUMULATIVE   NONE
         3474 CULEBRA  DTORT     1.1000000e-001  1.1000000e-001  1.1000000e-
001
 1.1000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3462 CULEBRA  ETHICK    4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
          861 CULEBRA  FTORT     1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3485 CULEBRA  HMBLKLT   2.7500000e-001  2.7500000e-001  5.0000000e-
002
 5.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      m
         2691 CULEBRA  KPT       0.0000000e+000  0.0000000e+000
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0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3418 CULEBRA  MEA_STOR  1.0000000e-005  1.0000000e-005  1.0000000e-
005
 1.0000000e-005  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3419 CULEBRA  MINP_FAC  5.0050000e+002  5.0050000e+002
1.0000000e+000
 1.0000000e+003  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
          137 CULEBRA  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2692 CULEBRA  PCT_A     2.6000000e-001  2.6000000e-001  2.6000000e-
001
 2.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2693 CULEBRA  PCT_EXP  -3.4800000e-001 -3.4800000e-001 -3.4800000e-
001
-3.4800000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          141 CULEBRA  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          139 CULEBRA  PORE_DIS  6.4360000e-001  6.4360000e-001  6.4360000e-
001
 6.4360000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          140 CULEBRA  POROSITY  1.5100000e-001  1.5100000e-001  1.5100000e-
001
 1.5100000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          142 CULEBRA  PRESSURE  9.1410000e+005  9.1410000e+005
9.1410000e+005
 9.1410000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          143 CULEBRA  PRMX_LOG -1.3112000e+001 -1.3112000e+001 -
1.3112000e+001
-1.3112000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          144 CULEBRA  PRMY_LOG -1.3112000e+001 -1.3112000e+001 -
1.3112000e+001
-1.3112000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          145 CULEBRA  PRMZ_LOG -1.3112000e+001 -1.3112000e+001 -
1.3112000e+001
-1.3112000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          148 CULEBRA  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          149 CULEBRA  SAT_IBRN  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          150 CULEBRA  SAT_RBRN  8.3630000e-002  8.3630000e-002  8.3630000e-
002
 8.3630000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          151 CULEBRA  SAT_RGAS  7.7110000e-002  7.7110000e-002  7.7110000e-
002
 7.7110000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3469 CULEBRA  SKIN_RES  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2071 CULEBRA  THICK     7.7500000e+000  7.7500000e+000
7.7500000e+000
 7.7500000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
          153 DEWYLAKE CAP_MOD   2.0000000e+000  2.0000000e+000
```

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2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          154 DEWYLAKE COMP_RCK  1.0000000e-008  1.0000000e-008  1.0000000e-
008
 1.0000000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2696 DEWYLAKE KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          156 DEWYLAKE PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2697 DEWYLAKE PCT_A     2.6000000e-001  2.6000000e-001  2.6000000e-
001
 2.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2698 DEWYLAKE PCT_EXP  -3.4800000e-001 -3.4800000e-001 -3.4800000e-
001
-3.4800000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          159 DEWYLAKE PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          157 DEWYLAKE PORE_DIS  6.4360000e-001  6.4360000e-001  6.4360000e-
001
 6.4360000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          158 DEWYLAKE POROSITY  1.4300000e-001  1.4300000e-001  3.5000000e-
002
 2.4800000e-001  0.00000000e+000 3.5000000e-002 STUDENT      NONE
          158 DEWYLAKE POROSITY  1.4300000e-001  1.4300000e-001  3.5000000e-
002
 2.4800000e-001  0.00000000e+000 5.4000000e-002 STUDENT      NONE
          158 DEWYLAKE POROSITY  1.4300000e-001  1.4300000e-001  3.5000000e-
002
 2.4800000e-001  0.00000000e+000 9.4000000e-002 STUDENT      NONE
          158 DEWYLAKE POROSITY  1.4300000e-001  1.4300000e-001  3.5000000e-
002
 2.4800000e-001  0.00000000e+000 1.1600000e-001 STUDENT      NONE
          158 DEWYLAKE POROSITY  1.4300000e-001  1.4300000e-001  3.5000000e-
002
 2.4800000e-001  0.00000000e+000 1.4900000e-001 STUDENT      NONE
          158 DEWYLAKE POROSITY  1.4300000e-001  1.4300000e-001  3.5000000e-
002
 2.4800000e-001  0.00000000e+000 2.1500000e-001 STUDENT      NONE
          158 DEWYLAKE POROSITY  1.4300000e-001  1.4300000e-001  3.5000000e-
002
 2.4800000e-001  0.00000000e+000 2.3200000e-001 STUDENT      NONE
          158 DEWYLAKE POROSITY  1.4300000e-001  1.4300000e-001  3.5000000e-
002
 2.4800000e-001  0.00000000e+000 2.4800000e-001 STUDENT      NONE
          160 DEWYLAKE PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          161 DEWYLAKE PRMX_LOG -1.6300000e+001 -1.6300000e+001 -
1.6300000e+001
-1.6300000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          162 DEWYLAKE PRMY_LOG -1.6300000e+001 -1.6300000e+001 -
1.6300000e+001
-1.6300000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          163 DEWYLAKE PRMZ_LOG -1.6300000e+001 -1.6300000e+001 -
```

```
1.6300000e+001
-1.6300000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          166 DEWYLAKE RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          167 DEWYLAKE SAL_USAT  8.3600000e-002  8.3600000e-002  8.3600000e-
002
 8.3600000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          168 DEWYLAKE SAT_IBRN  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          169 DEWYLAKE SAT_RBRN  8.3630000e-002  8.3630000e-002  8.3630000e-
002
 8.3630000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          170 DEWYLAKE SAT_RGAS  7.7110000e-002  7.7110000e-002  7.7110000e-
002
 7.7110000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          171 DRILLMUD DNSFLUID  1.2100000e+003  1.2100000e+003
1.1400000e+003
 1.3800000e+003  0.0000000e+000  1.1400000e+003 CUMULATIVE   kg/m^3
          171 DRILLMUD DNSFLUID  1.2100000e+003  1.2100000e+003
1.1400000e+003
 1.3800000e+003  9.0000000e-001  1.2600000e+003 CUMULATIVE   kg/m^3
          171 DRILLMUD DNSFLUID  1.2100000e+003  1.2100000e+003
1.1400000e+003
 1.3800000e+003  1.0000000e+000  1.3800000e+003 CUMULATIVE   kg/m^3
          172 DRILLMUD VISCO     1.1000000e-002  9.1700000e-003  5.0000000e-
003
 3.0000000e-002  0.0000000e+000  5.0000000e-003 CUMULATIVE   Pa*s
          172 DRILLMUD VISCO     1.1000000e-002  9.1700000e-003  5.0000000e-
003
 3.0000000e-002  6.0000000e-001  1.0000000e-002 CUMULATIVE   Pa*s
          172 DRILLMUD VISCO     1.1000000e-002  9.1700000e-003  5.0000000e-
003
 3.0000000e-002  8.0000000e-001  1.5000000e-002 CUMULATIVE   Pa*s
          172 DRILLMUD VISCO     1.1000000e-002  9.1700000e-003  5.0000000e-
003
 3.0000000e-002  9.2000000e-001  2.0000000e-002 CUMULATIVE   Pa*s
          172 DRILLMUD VISCO     1.1000000e-002  9.1700000e-003  5.0000000e-
003
 3.0000000e-002  9.8000000e-001  2.5000000e-002 CUMULATIVE   Pa*s
          172 DRILLMUD VISCO     1.1000000e-002  9.1700000e-003  5.0000000e-
003
 3.0000000e-002  1.0000000e+000  3.0000000e-002 CUMULATIVE   Pa*s
          173 DRILLMUD YLDSTRSS  5.9800000e+000  4.4000000e+000
2.4000000e+000
 1.9200000e+001  0.0000000e+000  2.4000000e+000 CUMULATIVE   Pa
          173 DRILLMUD YLDSTRSS  5.9800000e+000  4.4000000e+000
2.4000000e+000
 1.9200000e+001  6.0000000e-001  4.8000000e+000 CUMULATIVE   Pa
          173 DRILLMUD YLDSTRSS  5.9800000e+000  4.4000000e+000
2.4000000e+000
 1.9200000e+001  8.0000000e-001  8.6000000e+000 CUMULATIVE   Pa
          173 DRILLMUD YLDSTRSS  5.9800000e+000  4.4000000e+000
2.4000000e+000
 1.9200000e+001  9.2000000e-001  1.2400000e+001 CUMULATIVE   Pa
          173 DRILLMUD YLDSTRSS  5.9800000e+000  4.4000000e+000
```

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2.4000000e+000
 1.9200000e+001  9.8000000e-001  1.6300000e+001 CUMULATIVE   Pa
          173 DRILLMUD YLDSTRSS  5.9800000e+000  4.4000000e+000
2.4000000e+000
 1.9200000e+001  1.0000000e+000  1.9200000e+001 CUMULATIVE   Pa
          174 DRZ_0    CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          175 DRZ_0    COMP_RCK  7.4100000e-010  7.4100000e-010  7.4100000e-
010
 7.4100000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2701 DRZ_0    KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          176 DRZ_0    PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2702 DRZ_0    PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2703 DRZ_0    PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          179 DRZ_0    PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          177 DRZ_0    PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          178 DRZ_0    POROSITY  1.5650000e-002  1.2900000e-002  3.9000000e-
003
 3.2900000e-002  0.0000000e+000  3.9000000e-003 CUMULATIVE   NONE
          178 DRZ_0    POROSITY  1.5650000e-002  1.2900000e-002  3.9000000e-
003
 3.2900000e-002  5.0000000e-001  1.2900000e-002 CUMULATIVE   NONE
          178 DRZ_0    POROSITY  1.5650000e-002  1.2900000e-002  3.9000000e-
003
 3.2900000e-002  1.0000000e+000  3.2900000e-002 CUMULATIVE   NONE
          181 DRZ_0    PRMX_LOG -1.7000000e+001 -1.7000000e+001 -
1.7000000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          182 DRZ_0    PRMY_LOG -1.7000000e+001 -1.7000000e+001 -
1.7000000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          183 DRZ_0    PRMZ_LOG -1.7000000e+001 -1.7000000e+001 -
1.7000000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          186 DRZ_0    RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  3.3000000e-001  1.0000000e+000 DELTA        NONE
          186 DRZ_0    RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  2.0000000e+000 DELTA        NONE
          186 DRZ_0    RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  3.0000000e+000 DELTA        NONE
          186 DRZ_0    RELP_MOD  4.0000000e+000  4.0000000e+000
```

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1.0000000e+000
 4.0000000e+000  6.7000000e-001  4.0000000e+000 DELTA        NONE
          187 DRZ_0    SAT_IBRN  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          188 DRZ_0    SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          189 DRZ_0    SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          190 DRZ_1    CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          191 DRZ_1    COMP_RCK  7.4100000e-010  7.4100000e-010  7.4100000e-
010
 7.4100000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3116 DRZ_1    KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          193 DRZ_1    PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3128 DRZ_1    PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3129 DRZ_1    PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          196 DRZ_1    PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          194 DRZ_1    PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          195 DRZ_1    POROSITY  1.5650000e-002  1.2900000e-002  3.9000000e-
003
 3.2900000e-002  0.0000000e+000  3.9000000e-003 CUMULATIVE   NONE
          195 DRZ_1    POROSITY  1.5650000e-002  1.2900000e-002  3.9000000e-
003
 3.2900000e-002  5.0000000e-001  1.2900000e-002 CUMULATIVE   NONE
          195 DRZ_1    POROSITY  1.5650000e-002  1.2900000e-002  3.9000000e-
003
 3.2900000e-002  1.0000000e+000  3.2900000e-002 CUMULATIVE   NONE
          198 DRZ_1    PRMX_LOG -1.6000000e+001 -1.6000000e+001 -
1.9400000e+001
-1.2500000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
          199 DRZ_1    PRMY_LOG -1.6000000e+001 -1.6000000e+001 -
1.9400000e+001
-1.2500000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
          200 DRZ_1    PRMZ_LOG -1.6000000e+001 -1.6000000e+001 -
1.9400000e+001
-1.2500000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
          203 DRZ_1    RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  3.3000000e-001  1.0000000e+000 DELTA        NONE
          203 DRZ_1    RELP_MOD  4.0000000e+000  4.0000000e+000
```

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1.0000000e+000
 4.0000000e+000  0.0000000e+000  2.0000000e+000 DELTA        NONE
          203 DRZ_1    RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  3.0000000e+000 DELTA        NONE
          203 DRZ_1    RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  6.7000000e-001  4.0000000e+000 DELTA        NONE
          205 DRZ_1    SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          206 DRZ_1    SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3533 DRZ_PCS  CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3534 DRZ_PCS  COMP_RCK  7.4100000e-010  7.4100000e-010  7.4100000e-
010
 7.4100000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3535 DRZ_PCS  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3536 DRZ_PCS  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3537 DRZ_PCS  PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3538 DRZ_PCS  PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3539 DRZ_PCS  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3540 DRZ_PCS  PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3541 DRZ_PCS  POROSITY  1.5650000e-002  1.2900000e-002  3.9000000e-
003
 3.2900000e-002  0.0000000e+000  3.9000000e-003 CUMULATIVE   NONE
         3541 DRZ_PCS  POROSITY  1.5650000e-002  1.2900000e-002  3.9000000e-
003
 3.2900000e-002  5.0000000e-001  1.2900000e-002 CUMULATIVE   NONE
         3541 DRZ_PCS  POROSITY  1.5650000e-002  1.2900000e-002  3.9000000e-
003
 3.2900000e-002  1.0000000e+000  3.2900000e-002 CUMULATIVE   NONE
         3542 DRZ_PCS  PRMX_LOG -1.8816000e+001 -1.8749600e+001 -
2.0699000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3543 DRZ_PCS  PRMY_LOG -1.8816000e+001 -1.8749600e+001 -
2.0699000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3544 DRZ_PCS  PRMZ_LOG -1.8816000e+001 -1.8749600e+001 -
2.0699000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3545 DRZ_PCS  RELP_MOD  0.0000000e+000  0.0000000e+000
```

```
1.0000000e+000
 4.0000000e+000  3.3000000e-001  1.0000000e+000 DELTA        NONE
         3545 DRZ_PCS  RELP_MOD  0.0000000e+000  0.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  2.0000000e+000 DELTA        NONE
         3545 DRZ_PCS  RELP_MOD  0.0000000e+000  0.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  3.0000000e+000 DELTA        NONE
         3545 DRZ_PCS  RELP_MOD  0.0000000e+000  0.0000000e+000
1.0000000e+000
 4.0000000e+000  6.7000000e-001  4.0000000e+000 DELTA        NONE
         3546 DRZ_PCS  SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3547 DRZ_PCS  SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2496 EARTH    CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2497 EARTH    COMP_RCK  9.9000000e-009  9.9000000e-009  9.9000000e-
009
 9.9000000e-009  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2706 EARTH    KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2498 EARTH    PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2707 EARTH    PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2708 EARTH    PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2501 EARTH    PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2499 EARTH    PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2499 EARTH    PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2499 EARTH    PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2500 EARTH    POROSITY  3.2000000e-001  3.2000000e-001  3.2000000e-
001
 3.2000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2502 EARTH    PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2503 EARTH    PRMX_LOG -1.4333000e+001 -1.4000000e+001 -
1.7000000e+001
-1.2000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2504 EARTH    PRMY_LOG -1.4333000e+001 -1.4000000e+001 -
```

```
1.7000000e+001
-1.2000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2505 EARTH    PRMZ_LOG -1.4333000e+001 -1.4000000e+001 -
1.7000000e+001
-1.2000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2509 EARTH    RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3032 EARTH    RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3035 EARTH    RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3033 EARTH    RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3034 EARTH    RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2510 EARTH    SAT_IBRN  8.0000000e-001  8.0000000e-001  8.0000000e-
001
 8.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2511 EARTH    SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2511 EARTH    SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2511 EARTH    SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2512 EARTH    SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
          207 EXP_AREA CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          208 EXP_AREA COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2711 EXP_AREA KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          209 EXP_AREA PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2712 EXP_AREA PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2713 EXP_AREA PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          212 EXP_AREA PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          210 EXP_AREA PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
```

```
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          211 EXP_AREA POROSITY  1.8000000e-001  1.8000000e-001  1.8000000e-
001
 1.8000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          213 EXP_AREA PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          214 EXP_AREA PRMX_LOG -1.1000000e+001 -1.1000000e+001 -
1.1000000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          215 EXP_AREA PRMY_LOG -1.1000000e+001 -1.1000000e+001 -
1.1000000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          216 EXP_AREA PRMZ_LOG -1.1000000e+001 -1.1000000e+001 -
1.1000000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          219 EXP_AREA RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          220 EXP_AREA SAT_IBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          221 EXP_AREA SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          222 EXP_AREA SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2085 FORTYNIN CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2238 FORTYNIN COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2715 FORTYNIN KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2239 FORTYNIN PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2716 FORTYNIN PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2717 FORTYNIN PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2718 FORTYNIN PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2087 FORTYNIN PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2088 FORTYNIN POROSITY  8.2000000e-002  8.2000000e-002
0.0000000e+000
 2.4000000e-001  0.00000000e+000 0.0000000e+000 STUDENT      NONE
         2088 FORTYNIN POROSITY  8.2000000e-002  8.2000000e-002
```

```
0.0000000e+000
 2.4000000e-001  0.00000000e+000 2.0000000e-003 STUDENT      NONE
         2088 FORTYNIN POROSITY  8.2000000e-002  8.2000000e-002
0.0000000e+000
 2.4000000e-001  0.00000000e+000 2.0000000e-003 STUDENT      NONE
         2088 FORTYNIN POROSITY  8.2000000e-002  8.2000000e-002
0.0000000e+000
 2.4000000e-001  0.00000000e+000 4.0000000e-003 STUDENT      NONE
         2088 FORTYNIN POROSITY  8.2000000e-002  8.2000000e-002
0.0000000e+000
 2.4000000e-001  0.00000000e+000 9.1000000e-002 STUDENT      NONE
         2088 FORTYNIN POROSITY  8.2000000e-002  8.2000000e-002
0.0000000e+000
 2.4000000e-001  0.00000000e+000 2.3500000e-001 STUDENT      NONE
         2088 FORTYNIN POROSITY  8.2000000e-002  8.2000000e-002
0.0000000e+000
 2.4000000e-001  0.00000000e+000 2.4000000e-001 STUDENT      NONE
         2899 FORTYNIN PRMX_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2900 FORTYNIN PRMY_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2901 FORTYNIN PRMZ_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2093 FORTYNIN RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2240 FORTYNIN SAT_RBRN  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2094 FORTYNIN SAT_RGAS  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3234 FR221    ATWEIGHT  2.2101400e-001  2.2101400e-001  2.2101400e-
001
 2.2101400e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3332 FR221    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3279 FR221    HALFLIFE  2.8800000e+002  2.8800000e+002
2.8800000e+002
 2.8800000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     s
          223 GLOBAL   CLIMTIDX  1.3100000e+000  1.1700000e+000
1.0000000e+000
 2.2500000e+000  0.0000000e+000  1.0000000e+000 CUMULATIVE   NONE
          223 GLOBAL   CLIMTIDX  1.3100000e+000  1.1700000e+000
1.0000000e+000
 2.2500000e+000  7.5000000e-001  1.2500000e+000 CUMULATIVE   NONE
          223 GLOBAL   CLIMTIDX  1.3100000e+000  1.1700000e+000
1.0000000e+000
 2.2500000e+000  7.5000000e-001  1.5000000e+000 CUMULATIVE   NONE
          223 GLOBAL   CLIMTIDX  1.3100000e+000  1.1700000e+000
1.0000000e+000
 2.2500000e+000  1.0000000e+000  2.2500000e+000 CUMULATIVE   NONE
         3501 GLOBAL   FPICD     1.0000000e+000  1.0000000e+000
```

```
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3500 GLOBAL   FPICM     1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3494 GLOBAL   LAMBDAD   4.6800000e-003  4.6800000e-003  4.6800000e-
003
 4.6800000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     (km^-2)(yr^-1
         3497 GLOBAL   MINERT    1.0000000e-004  1.0000000e-004  1.0000000e-
004
 1.0000000e-004  0.00000000e+000 0.0000000e+000 CONSTANT     yr^-1
         3644 GLOBAL   ONEPLG    2.0000000e-002  2.0000000e-002  2.0000000e-
002
 2.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3417 GLOBAL   OXSTAT    5.0000000e-001  5.0000000e-001
0.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         3493 GLOBAL   PBRINE    3.0500000e-001  3.0500000e-001  1.0000000e-
002
 6.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         3495 GLOBAL   PLGPAT    0.0000000e+000  0.0000000e+000
1.0000000e+000
 3.0000000e+000  2.0000000e-002  1.0000000e+000 DELTA        NONE
         3495 GLOBAL   PLGPAT    0.0000000e+000  0.0000000e+000
1.0000000e+000
 3.0000000e+000  6.8000000e-001  2.0000000e+000 DELTA        NONE
         3495 GLOBAL   PLGPAT    0.0000000e+000  0.0000000e+000
1.0000000e+000
 3.0000000e+000  3.0000000e-001  3.0000000e+000 DELTA        NONE
         3491 GLOBAL   TA        1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     yr
         3646 GLOBAL   THREEPLG  3.0000000e-001  3.0000000e-001  3.0000000e-
001
 3.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3499 GLOBAL   TPICD     6.0000000e+002  6.0000000e+002
6.0000000e+002
 6.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     yr
         3498 GLOBAL   TPICM     6.0000000e+002  6.0000000e+002
6.0000000e+002
 6.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     yr
          225 GLOBAL   TRANSIDX  5.0000000e-001  5.0000000e-001
0.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         3645 GLOBAL   TWOPLG    6.8000000e-001  6.8000000e-001  6.8000000e-
001
 6.8000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          228 H2       VISCO     8.9338900e-006  8.9338900e-006  8.9338900e-
006
 8.9338900e-006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa*s
          229 IMPERM_Z CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          230 IMPERM_Z COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2720 IMPERM_Z KPT       0.0000000e+000  0.0000000e+000
```

```
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          231 IMPERM_Z PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2721 IMPERM_Z PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2722 IMPERM_Z PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          234 IMPERM_Z PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          232 IMPERM_Z PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          233 IMPERM_Z POROSITY  5.0000000e-003  5.0000000e-003  5.0000000e-
003
 5.0000000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          236 IMPERM_Z PRMX_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          237 IMPERM_Z PRMY_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          238 IMPERM_Z PRMZ_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          241 IMPERM_Z RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          243 IMPERM_Z SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          244 IMPERM_Z SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2097 MAGENTA  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3016 MAGENTA  COMP_RCK  2.6440000e-010  2.6440000e-010  1.1620000e-
010
 4.5530000e-010  0.00000000e+000 1.1620000e-010 STUDENT      Pa^-1
         3016 MAGENTA  COMP_RCK  2.6440000e-010  2.6440000e-010  1.1620000e-
010
 4.5530000e-010  0.00000000e+000 2.2170000e-010 STUDENT      Pa^-1
         3016 MAGENTA  COMP_RCK  2.6440000e-010  2.6440000e-010  1.1620000e-
010
 4.5530000e-010  0.00000000e+000 4.5530000e-010 STUDENT      Pa^-1
         2725 MAGENTA  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2098 MAGENTA  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2726 MAGENTA  PCT_A     2.6000000e-001  2.6000000e-001  2.6000000e-
```

```
001
 2.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2727 MAGENTA  PCT_EXP  -3.4800000e-001 -3.4800000e-001 -3.4800000e-
001
-3.4800000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2728 MAGENTA  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2099 MAGENTA  PORE_DIS  6.4360000e-001  6.4360000e-001  6.4360000e-
001
 6.4360000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2100 MAGENTA  POROSITY  1.3800000e-001  1.3800000e-001  2.7000000e-
002
 2.5200000e-001  0.00000000e+000 2.7000000e-002 STUDENT      NONE
         2100 MAGENTA  POROSITY  1.3800000e-001  1.3800000e-001  2.7000000e-
002
 2.5200000e-001  0.00000000e+000 1.0600000e-001 STUDENT      NONE
         2100 MAGENTA  POROSITY  1.3800000e-001  1.3800000e-001  2.7000000e-
002
 2.5200000e-001  0.00000000e+000 1.6600000e-001 STUDENT      NONE
         2100 MAGENTA  POROSITY  1.3800000e-001  1.3800000e-001  2.7000000e-
002
 2.5200000e-001  0.00000000e+000 2.5200000e-001 STUDENT      NONE
         2101 MAGENTA  PRESSURE  9.4650000e+005  9.4650000e+005
9.4650000e+005
 9.4650000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2102 MAGENTA  PRMX_LOG -1.5200000e+001 -1.5200000e+001 -
1.5200000e+001
-1.5200000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2103 MAGENTA  PRMY_LOG -1.5200000e+001 -1.5200000e+001 -
1.5200000e+001
-1.5200000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2104 MAGENTA  PRMZ_LOG -1.5200000e+001 -1.5200000e+001 -
1.5200000e+001
-1.5200000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2106 MAGENTA  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2241 MAGENTA  SAT_RBRN  8.3630000e-002  8.3630000e-002  8.3630000e-
002
 8.3630000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2107 MAGENTA  SAT_RGAS  7.7110000e-002  7.7110000e-002  7.7110000e-
002
 7.7110000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3235 ND143    ATWEIGHT  1.4291000e-001  1.4291000e-001  1.4291000e-
001
 1.4291000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3333 ND143    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3280 ND143    HALFLIFE  1.0000000e+038  1.0000000e+038
1.0000000e+038
 1.0000000e+038  0.00000000e+000 0.0000000e+000 CONSTANT     s
         2906 NITRATE  QINIT     2.6100000e+007  2.6100000e+007
2.6100000e+007
 2.6100000e+007  0.00000000e+000 0.0000000e+000 CONSTANT     moles
         3458 NP       CAPHUM    1.1000000e-005  1.1000000e-005  1.1000000e-
```

```
005
 1.1000000e-005  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3313 NP       CAPMIC    2.7000000e-003  2.7000000e-003  2.7000000e-
003
 2.7000000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3312 NP       CONCINT   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3439 NP       CONCMIN   2.6000000e-008  2.6000000e-008  2.6000000e-
008
 2.6000000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3314 NP       PROPMIC   1.2000000e+001  1.2000000e+001
1.2000000e+001
 1.2000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3477 NP+4     MKD_NP    3.5000000e+000  2.6000000e+000  7.0000000e-
001
 1.0000000e+001  0.00000000e+000 0.0000000e+000 LOGUNIFORM   m^3/kg
         3476 NP+5     MKD_NP    3.8000000e-002  1.4000000e-002  1.0000000e-
003
 2.0000000e-001  0.00000000e+000 0.0000000e+000 LOGUNIFORM   m^3/kg
          246 NP237    ATWEIGHT  2.3704800e-001  2.3704800e-001  2.3704800e-
001
 2.3704800e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3370 NP237    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          247 NP237    HALFLIFE  6.7530000e+013  6.7530000e+013
6.7530000e+013
 6.7530000e+013  0.00000000e+000 0.0000000e+000 CONSTANT     s
          248 NP237    INVCHD    1.1300000e+001  1.1300000e+001
1.1300000e+001
 1.1300000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          249 NP237    INVRHD    1.0100000e+000  1.0100000e+000
1.0100000e+000
 1.0100000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3236 NP239    ATWEIGHT  2.3905300e-001  2.3905300e-001  2.3905300e-
001
 2.3905300e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3334 NP239    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3281 NP239    HALFLIFE  2.0350000e+005  2.0350000e+005
2.0350000e+005
 2.0350000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     s
            7 OPS_AREA CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
            8 OPS_AREA COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2604 OPS_AREA KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
            9 OPS_AREA PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2605 OPS_AREA PCT_A     0.0000000e+000  0.0000000e+000
```

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0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2606 OPS_AREA PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           12 OPS_AREA PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
           10 OPS_AREA PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           11 OPS_AREA POROSITY  1.8000000e-001  1.8000000e-001  1.8000000e-
001
 1.8000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           13 OPS_AREA PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
           14 OPS_AREA PRMX_LOG -1.1000000e+001 -1.1000000e+001 -
1.1000000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
           15 OPS_AREA PRMY_LOG -1.1000000e+001 -1.1000000e+001 -
1.1000000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
           16 OPS_AREA PRMZ_LOG -1.1000000e+001 -1.1000000e+001 -
1.1000000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
           19 OPS_AREA RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           20 OPS_AREA SAT_IBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           21 OPS_AREA SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           22 OPS_AREA SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          250 PA231    ATWEIGHT  2.3103600e-001  2.3103600e-001  2.3103600e-
001
 2.3103600e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3371 PA231    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          251 PA231    HALFLIFE  1.0340000e+012  1.0340000e+012
1.0340000e+012
 1.0340000e+012  0.00000000e+000 0.0000000e+000 CONSTANT     s
         2267 PA231    INVCHD    1.9700000e+000  1.9700000e+000
1.9700000e+000
 1.9700000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         2268 PA231    INVRHD    6.8600000e-004  6.8600000e-004  6.8600000e-
004
 6.8600000e-004  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3237 PA233    ATWEIGHT  2.3304000e-001  2.3304000e-001  2.3304000e-
001
 2.3304000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3335 PA233    EPAREL    0.0000000e+000  0.0000000e+000
```

```
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3282 PA233    HALFLIFE  2.3330000e+006  2.3330000e+006
2.3330000e+006
 2.3330000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3197 PA234M   ATWEIGHT  2.3404300e-001  2.3404300e-001  2.3404300e-
001
 2.3404300e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3336 PA234M   EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3283 PA234M   HALFLIFE  7.0200000e+001  7.0200000e+001
7.0200000e+001
 7.0200000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     s
          252 PAN_SEAL CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          253 PAN_SEAL COMP_RCK  2.0000000e-010  2.0000000e-010  2.0000000e-
010
 2.0000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2731 PAN_SEAL KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          254 PAN_SEAL PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2732 PAN_SEAL PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2733 PAN_SEAL PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          257 PAN_SEAL PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          255 PAN_SEAL PORE_DIS  9.4000000e-001  9.4000000e-001  9.4000000e-
001
 9.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          256 PAN_SEAL POROSITY  1.5000000e-001  1.5000000e-001  1.5000000e-
001
 1.5000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          258 PAN_SEAL PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          259 PAN_SEAL PRMX_LOG -1.8045300e+001 -1.8045300e+001 -
1.8045300e+001
-1.8045300e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          260 PAN_SEAL PRMY_LOG -1.2714000e+001 -1.2714000e+001 -
1.2714000e+001
-1.2714000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          261 PAN_SEAL PRMZ_LOG -1.2714000e+001 -1.2714000e+001 -
1.2714000e+001
-1.2714000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          264 PAN_SEAL RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2734 PAN_SEAL SAT_IBRN  2.1000000e-001  2.1000000e-001  2.1000000e-
```

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001
 2.1000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          265 PAN_SEAL SAT_RBRN  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          266 PAN_SEAL SAT_RGAS  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          282 PB       LOGSOLM   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(moles/lit
         3421 PB209    ATWEIGHT  2.0898100e-001  2.0898100e-001  2.0898100e-
001
 2.0898100e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3337 PB209    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3284 PB209    HALFLIFE  1.1880000e+004  1.1880000e+004
1.1880000e+004
 1.1880000e+004  0.00000000e+000 0.0000000e+000 CONSTANT     s
          283 PB210    ATWEIGHT  2.0998400e-001  2.0998400e-001  2.0998400e-
001
 2.0998400e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3372 PB210    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          284 PB210    HALFLIFE  7.0370000e+008  7.0370000e+008
7.0370000e+008
 7.0370000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     s
          285 PB210    INVCHD    7.9000000e+000  7.9000000e+000
7.9000000e+000
 7.9000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          286 PB210    INVRHD    1.6200000e-005  1.6200000e-005  1.6200000e-
005
 1.6200000e-005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3200 PB211    ATWEIGHT  2.1098900e-001  2.1098900e-001  2.1098900e-
001
 2.1098900e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3338 PB211    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3285 PB211    HALFLIFE  2.1660000e+003  2.1660000e+003
2.1660000e+003
 2.1660000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3201 PB212    ATWEIGHT  2.1199200e-001  2.1199200e-001  2.1199200e-
001
 2.1199200e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3339 PB212    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3286 PB212    HALFLIFE  3.8300000e+004  3.8300000e+004
3.8300000e+004
 3.8300000e+004  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3202 PB214    ATWEIGHT  2.1400000e-001  2.1400000e-001  2.1400000e-
001
 2.1400000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3340 PB214    EPAREL    0.0000000e+000  0.0000000e+000
```

```
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3287 PB214    HALFLIFE  1.6080000e+003  1.6080000e+003
1.6080000e+003
 1.6080000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3429 PHUMOX3  PHUMCIM   1.1000000e+000  1.3700000e+000  6.5000000e-
002
 1.6000000e+000  0.0000000e+000  6.5000000e-002 CUMULATIVE   NONE
         3429 PHUMOX3  PHUMCIM   1.1000000e+000  1.3700000e+000  6.5000000e-
002
 1.6000000e+000  5.0000000e-001  1.3700000e+000 CUMULATIVE   NONE
         3429 PHUMOX3  PHUMCIM   1.1000000e+000  1.3700000e+000  6.5000000e-
002
 1.6000000e+000  1.0000000e+000  1.6000000e+000 CUMULATIVE   NONE
         3433 PHUMOX3  PHUMSIM   1.9000000e-001  1.9000000e-001  1.9000000e-
001
 1.9000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3430 PHUMOX4  PHUMCIM   6.3000000e+000  6.3000000e+000
6.3000000e+000
 6.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3434 PHUMOX4  PHUMSIM   6.3000000e+000  6.3000000e+000
6.3000000e+000
 6.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3431 PHUMOX5  PHUMCIM   7.4000000e-003  7.4000000e-003  7.4000000e-
003
 7.4000000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3435 PHUMOX5  PHUMSIM   9.1000000e-004  9.1000000e-004  9.1000000e-
004
 9.1000000e-004  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3432 PHUMOX6  PHUMCIM   5.1000000e-001  5.1000000e-001  5.1000000e-
001
 5.1000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3436 PHUMOX6  PHUMSIM   1.2000000e-001  1.2000000e-001  1.2000000e-
001
 1.2000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          287 PM147    ATWEIGHT  1.4691500e-001  1.4691500e-001  1.4691500e-
001
 1.4691500e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3341 PM147    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          288 PM147    HALFLIFE  8.2790000e+007  8.2790000e+007
8.2790000e+007
 8.2790000e+007  0.00000000e+000 0.0000000e+000 CONSTANT     s
         2038 PM147    INVCHD    4.1300000e-004  4.1300000e-004  4.1300000e-
004
 4.1300000e-004  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          289 PM147    INVRHD    8.0500000e-002  8.0500000e-002  8.0500000e-
002
 8.0500000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3203 PO212    ATWEIGHT  2.1198900e-001  2.1198900e-001  2.1198900e-
001
 2.1198900e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3342 PO212    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3288 PO212    HALFLIFE  3.0000000e-007  3.0000000e-007  3.0000000e-
```

007
 3.0000000e-007 0.00000000e+000 0.0000000e+000 CONSTANT   s
         3204 PO213   ATWEIGHT 2.1299300e-001 2.1299300e-001 2.1299300e-
001
 2.1299300e-001 0.00000000e+000 0.0000000e+000 CONSTANT   kg/mole
         3343 PO213   EPAREL   0.0000000e+000 0.0000000e+000
0.0000000e+000
 0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   Curies/wuf
         3289 PO213   HALFLIFE 4.2000000e-006 4.2000000e-006 4.2000000e-
006
 4.2000000e-006 0.00000000e+000 0.0000000e+000 CONSTANT   s
         3205 PO214   ATWEIGHT 2.1399500e-001 2.1399500e-001 2.1399500e-
001
 2.1399500e-001 0.00000000e+000 0.0000000e+000 CONSTANT   kg/mole
         3344 PO214   EPAREL   0.0000000e+000 0.0000000e+000
0.0000000e+000
 0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   Curies/wuf
         3290 PO214   HALFLIFE 1.6430000e-004 1.6430000e-004 1.6430000e-
004
 1.6430000e-004 0.00000000e+000 0.0000000e+000 CONSTANT   s
         3206 PO215   ATWEIGHT 2.1499900e-001 2.1499900e-001 2.1499900e-
001
 2.1499900e-001 0.00000000e+000 0.0000000e+000 CONSTANT   kg/mole
         3345 PO215   EPAREL   0.0000000e+000 0.0000000e+000
0.0000000e+000
 0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   Curies/wuf
         3291 PO215   HALFLIFE 1.7800000e-003 1.7800000e-003 1.7800000e-
003
 1.7800000e-003 0.00000000e+000 0.0000000e+000 CONSTANT   s
         3207 PO216   ATWEIGHT 2.1600200e-001 2.1600200e-001 2.1600200e-
001
 2.1600200e-001 0.00000000e+000 0.0000000e+000 CONSTANT   kg/mole
         3346 PO216   EPAREL   0.0000000e+000 0.0000000e+000
0.0000000e+000
 0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   Curies/wuf
         3292 PO216   HALFLIFE 1.5000000e-001 1.5000000e-001 1.5000000e-
001
 1.5000000e-001 0.00000000e+000 0.0000000e+000 CONSTANT   s
         3208 PO218   ATWEIGHT 2.1800900e-001 2.1800900e-001 2.1800900e-
001
 2.1800900e-001 0.00000000e+000 0.0000000e+000 CONSTANT   kg/mole
         3347 PO218   EPAREL   0.0000000e+000 0.0000000e+000
0.0000000e+000
 0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   Curies/wuf
         3293 PO218   HALFLIFE 1.8300000e+002 1.8300000e+002
1.8300000e+002
 1.8300000e+002 0.00000000e+000 0.0000000e+000 CONSTANT   s
         3459 PU   CAPHUM   1.1000000e-005 1.1000000e-005 1.1000000e-
005
 1.1000000e-005 0.00000000e+000 0.0000000e+000 CONSTANT   moles/liter
         3315 PU   CAPMIC   6.8000000e-005 6.8000000e-005 6.8000000e-
005
 6.8000000e-005 0.00000000e+000 0.0000000e+000 CONSTANT   moles/liter
         3316 PU   CONCINT   1.0000000e-009 1.0000000e-009 1.0000000e-
009
 1.0000000e-009 0.00000000e+000 0.0000000e+000 CONSTANT   moles/liter
         3440 PU   CONCMIN   2.6000000e-008 2.6000000e-008 2.6000000e-

```
008
 2.6000000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3317 PU       PROPMIC   3.0000000e-001  3.0000000e-001  3.0000000e-
001
 3.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3442 PU+3     MD0       3.0000000e-010  3.0000000e-010  3.0000000e-
010
 3.0000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     m^2/s
         3480 PU+3     MKD_PU    1.3000000e-001  9.0000000e-002  2.0000000e-
002
 4.0000000e-001  0.00000000e+000 0.0000000e+000 LOGUNIFORM   m^3/kg
         3443 PU+4     MD0       1.5300000e-010  1.5300000e-010  1.5300000e-
010
 1.5300000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     m^2/s
         3481 PU+4     MKD_PU    3.5000000e+000  2.6000000e+000  7.0000000e-
001
 1.0000000e+001  0.00000000e+000 0.0000000e+000 LOGUNIFORM   m^3/kg
          291 PU238    ATWEIGHT  2.3805000e-001  2.3805000e-001  2.3805000e-
001
 2.3805000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3373 PU238    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          292 PU238    HALFLIFE  2.7690000e+009  2.7690000e+009
2.7690000e+009
 2.7690000e+009  0.00000000e+000 0.0000000e+000 CONSTANT     s
          293 PU238    INVCHD    1.5300000e+006  1.5300000e+006
1.5300000e+006
 1.5300000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          294 PU238    INVRHD    3.4800000e+003  3.4800000e+003
3.4800000e+003
 3.4800000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3506 PU238L   INVCHD    1.5300000e+006  1.5300000e+006
1.5300000e+006
 1.5300000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3511 PU238L   INVRHD    3.4800000e+003  3.4800000e+003
3.4800000e+003
 3.4800000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          295 PU239    ATWEIGHT  2.3905200e-001  2.3905200e-001  2.3905200e-
001
 2.3905200e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3374 PU239    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          296 PU239    HALFLIFE  7.5940000e+011  7.5940000e+011
7.5940000e+011
 7.5940000e+011  0.00000000e+000 0.0000000e+000 CONSTANT     s
          297 PU239    INVCHD    7.7700000e+005  7.7700000e+005
7.7700000e+005
 7.7700000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          298 PU239    INVRHD    5.6400000e+003  5.6400000e+003
5.6400000e+003
 5.6400000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3505 PU239L   INVCHD    9.1000000e+005  9.1000000e+005
9.1000000e+005
 9.1000000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3510 PU239L   INVRHD    7.4700000e+003  7.4700000e+003
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7.4700000e+003
 7.4700000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          299 PU240    ATWEIGHT  2.4005400e-001  2.4005400e-001  2.4005400e-
001
 2.4005400e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3375 PU240    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          300 PU240    HALFLIFE  2.0630000e+011  2.0630000e+011
2.0630000e+011
 2.0630000e+011  0.00000000e+000 0.0000000e+000 CONSTANT     s
          301 PU240    INVCHD    1.3200000e+005  1.3200000e+005
1.3200000e+005
 1.3200000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          302 PU240    INVRHD    1.8200000e+003  1.8200000e+003
1.8200000e+003
 1.8200000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          303 PU241    ATWEIGHT  2.4105700e-001  2.4105700e-001  2.4105700e-
001
 2.4105700e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3348 PU241    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          304 PU241    HALFLIFE  4.5440000e+008  4.5440000e+008
4.5440000e+008
 4.5440000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     s
          305 PU241    INVCHD    5.1700000e+005  5.1700000e+005
5.1700000e+005
 5.1700000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          306 PU241    INVRHD    1.4900000e+005  1.4900000e+005
1.4900000e+005
 1.4900000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          307 PU242    ATWEIGHT  2.4205900e-001  2.4205900e-001  2.4205900e-
001
 2.4205900e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3376 PU242    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          308 PU242    HALFLIFE  1.2210000e+013  1.2210000e+013
1.2210000e+013
 1.2210000e+013  0.00000000e+000 0.0000000e+000 CONSTANT     s
          309 PU242    INVCHD    3.2700000e+001  3.2700000e+001
3.2700000e+001
 3.2700000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          310 PU242    INVRHD    5.0200000e-001  5.0200000e-001  5.0200000e-
001
 5.0200000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          311 PU244    ATWEIGHT  2.4406400e-001  2.4406400e-001  2.4406400e-
001
 2.4406400e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3377 PU244    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          312 PU244    HALFLIFE  2.6070000e+015  2.6070000e+015
2.6070000e+015
 2.6070000e+015  0.00000000e+000 0.0000000e+000 CONSTANT     s
         2269 PU244    INVCHD    1.4500000e-006  1.4500000e-006  1.4500000e-
```

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006
 1.4500000e-006  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
        2270 PU244    INVRHD    1.5600000e-003  1.5600000e-003  1.5600000e-
003
 1.5600000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         313 RA       LOGSOLM   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(moles/lit
        3209 RA223    ATWEIGHT  2.2301900e-001  2.2301900e-001  2.2301900e-
001
 2.2301900e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3349 RA223    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
        3294 RA223    HALFLIFE  9.8790000e+005  9.8790000e+005
9.8790000e+005
 9.8790000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     s
        3210 RA224    ATWEIGHT  2.2402000e-001  2.2402000e-001  2.2402000e-
001
 2.2402000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3350 RA224    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
        3295 RA224    HALFLIFE  3.1620000e+005  3.1620000e+005
3.1620000e+005
 3.1620000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     s
        3211 RA225    ATWEIGHT  2.2502400e-001  2.2502400e-001  2.2502400e-
001
 2.2502400e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3351 RA225    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
        3296 RA225    HALFLIFE  1.2790000e+006  1.2790000e+006
1.2790000e+006
 1.2790000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     s
         314 RA226    ATWEIGHT  2.2602500e-001  2.2602500e-001  2.2602500e-
001
 2.2602500e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3378 RA226    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         315 RA226    HALFLIFE  5.0490000e+010  5.0490000e+010
5.0490000e+010
 5.0490000e+010  0.00000000e+000 0.0000000e+000 CONSTANT     s
         316 RA226    INVCHD    1.0000000e+001  1.0000000e+001
1.0000000e+001
 1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         317 RA226    INVRHD    5.5500000e-005  5.5500000e-005  5.5500000e-
005
 5.5500000e-005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         318 RA228    ATWEIGHT  2.2803100e-001  2.2803100e-001  2.2803100e-
001
 2.2803100e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3352 RA228    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         319 RA228    HALFLIFE  2.1143000e+008  2.1143000e+008
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2.1143000e+008
 2.1143000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     s
         2271 RA228    INVCHD    7.6500000e+000  7.6500000e+000
7.6500000e+000
 7.6500000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         2272 RA228    INVRHD    3.3600000e-001  3.3600000e-001  3.3600000e-
001
 3.3600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3503 REFCON   ABERM     6.2850000e+005  6.2850000e+005
6.2850000e+005
 6.2850000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     m^2
         2833 REFCON   ACF_CH4   1.0000000e-002  1.0000000e-002  1.0000000e-
002
 1.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2832 REFCON   ACF_CO2   2.3100000e-001  2.3100000e-001  2.3100000e-
001
 2.3100000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2831 REFCON   ACF_H2    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2835 REFCON   ACF_H2S   1.0000000e-001  1.0000000e-001  1.0000000e-
001
 1.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2834 REFCON   ACF_N2    4.5000000e-002  4.5000000e-002  4.5000000e-
002
 4.5000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2836 REFCON   ACF_O2    1.9000000e-002  1.9000000e-002  1.9000000e-
002
 1.9000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2897 REFCON   AL2       6.9314720e-001  6.9314720e-001  6.9314720e-
001
 6.9314720e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3489 REFCON   AREA_CH   1.1150000e+005  1.1150000e+005
1.1150000e+005
 1.1150000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     m^2
         3496 REFCON   AREA_RH   1.5760000e+004  1.5760000e+004
1.5760000e+004
 1.5760000e+004  0.00000000e+000 0.0000000e+000 CONSTANT     m^2
         3488 REFCON   AREA_ZRO  4.1330000e+003  4.1330000e+003
4.1330000e+003
 4.1330000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     m^2
         3106 REFCON   ASDRUM    6.0000000e+000  6.0000000e+000
6.0000000e+000
 6.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m^2
         2890 REFCON   ATMPA     1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa/atm
         3109 REFCON   AVOGADRO  6.0221370e+023  6.0221370e+023
6.0221370e+023
 6.0221370e+023  0.00000000e+000 0.0000000e+000 CONSTANT     mole^-1
         2879 REFCON   BBLG      4.2000000e+001  4.2000000e+001
4.2000000e+001
 4.2000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     gal/bbl
         3590 REFCON   BIP_11    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3591 REFCON   BIP_12   -3.4260000e-001 -3.4260000e-001 -3.4260000e-
```

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001
-3.4260000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3592 REFCON   BIP_13   -2.2200000e-002 -2.2200000e-002 -2.2200000e-
002
-2.2200000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3593 REFCON   BIP_14    9.7800000e-002  9.7800000e-002  9.7800000e-
002
 9.7800000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3594 REFCON   BIP_15    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3595 REFCON   BIP_16    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3596 REFCON   BIP_21   -3.4260000e-001 -3.4260000e-001 -3.4260000e-
001
-3.4260000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3597 REFCON   BIP_22    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3598 REFCON   BIP_23    9.3300000e-002  9.3300000e-002  9.3300000e-
002
 9.3300000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3599 REFCON   BIP_24   -3.1500000e-002 -3.1500000e-002 -3.1500000e-
002
-3.1500000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3600 REFCON   BIP_25    9.8900000e-002  9.8900000e-002  9.8900000e-
002
 9.8900000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3601 REFCON   BIP_26    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3602 REFCON   BIP_31   -2.2200000e-002 -2.2200000e-002 -2.2200000e-
002
-2.2200000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3603 REFCON   BIP_32    9.3300000e-002  9.3300000e-002  9.3300000e-
002
 9.3300000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3604 REFCON   BIP_33    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3605 REFCON   BIP_34    2.7800000e-002  2.7800000e-002  2.7800000e-
002
 2.7800000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3606 REFCON   BIP_35    8.5000000e-002  8.5000000e-002  8.5000000e-
002
 8.5000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3607 REFCON   BIP_36    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3608 REFCON   BIP_41    9.7800000e-002  9.7800000e-002  9.7800000e-
002
 9.7800000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3609 REFCON   BIP_42   -3.1500000e-002 -3.1500000e-002 -3.1500000e-
002
-3.1500000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3610 REFCON   BIP_43    2.7800000e-002  2.7800000e-002  2.7800000e-
```

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002
 2.7800000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3611 REFCON   BIP_44    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3612 REFCON   BIP_45    1.6960000e-001  1.6960000e-001  1.6960000e-
001
 1.6960000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3613 REFCON   BIP_46   -7.8000000e-003 -7.8000000e-003 -7.8000000e-
003
-7.8000000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3614 REFCON   BIP_51    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3615 REFCON   BIP_52    9.8900000e-002  9.8900000e-002  9.8900000e-
002
 9.8900000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3616 REFCON   BIP_53    8.5000000e-002  8.5000000e-002  8.5000000e-
002
 8.5000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3617 REFCON   BIP_54    1.6960000e-001  1.6960000e-001  1.6960000e-
001
 1.6960000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3618 REFCON   BIP_55    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3619 REFCON   BIP_56    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3620 REFCON   BIP_61    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3621 REFCON   BIP_62    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3622 REFCON   BIP_63    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3623 REFCON   BIP_64   -7.8000000e-003 -7.8000000e-003 -7.8000000e-
003
-7.8000000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3624 REFCON   BIP_65    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3625 REFCON   BIP_66    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3111 REFCON   CITOBQ    3.7000000e+010  3.7000000e+010
3.7000000e+010
 3.7000000e+010  0.00000000e+000 0.0000000e+000 CONSTANT     Bq/Curies
         2882 REFCON   DARM2     9.8692330e-013  9.8692330e-013  9.8692330e-
013
 9.8692330e-013  0.00000000e+000 0.0000000e+000 CONSTANT     m^2/darcy
         2887 REFCON   DAYSEC    8.6400000e+004  8.6400000e+004
8.6400000e+004
 8.6400000e+004  0.00000000e+000 0.0000000e+000 CONSTANT     s/day
         3132 REFCON   DRROOM    6.8040000e+003  6.8040000e+003
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6.8040000e+003
 6.8040000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2883 REFCON   F3M3      2.8316850e-002  2.8316850e-002  2.8316850e-
002
 2.8316850e-002  0.00000000e+000 0.0000000e+000 CONSTANT     m^3/ft^3
         2881 REFCON   FTM       3.0480000e-001  3.0480000e-001  3.0480000e-
001
 3.0480000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     m/ft
         3647 REFCON   FVRW      1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3492 REFCON   FVW       3.8600000e-001  3.8600000e-001  3.8600000e-
001
 3.8600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2889 REFCON   GRAVACC   9.8066500e+000  9.8066500e+000
9.8066500e+000
 9.8066500e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m/s^2
         2884 REFCON   GTI3      2.3100010e+002  2.3100010e+002
2.3100010e+002
 2.3100010e+002  0.00000000e+000 0.0000000e+000 CONSTANT     in^3/gal
         3502 REFCON   HRH       5.0900000e-001  5.0900000e-001  5.0900000e-
001
 5.0900000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2886 REFCON   KGLB      2.2046230e+000  2.2046230e+000
2.2046230e+000
 2.2046230e+000  0.00000000e+000 0.0000000e+000 CONSTANT     lb/kg
         2885 REFCON   LBKG      4.5359240e-001  4.5359240e-001  4.5359240e-
001
 4.5359240e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/lb
         3582 REFCON   LHSBLANK  5.0000000e-001  5.0000000e-001
0.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         3589 REFCON   MW_CELL   2.7023000e-002  2.7023000e-002  2.7023000e-
002
 2.7023000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         2866 REFCON   MW_CH2O   3.0026280e-002  3.0026280e-002  3.0026280e-
002
 3.0026280e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3585 REFCON   MW_CH4    1.6042760e-002  1.6042760e-002  1.6042760e-
002
 1.6042760e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3584 REFCON   MW_CO2    4.4009800e-002  4.4009800e-002  4.4009800e-
002
 4.4009800e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         2865 REFCON   MW_FE     5.5847000e-002  5.5847000e-002  5.5847000e-
002
 5.5847000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         2858 REFCON   MW_H2     2.0158800e-003  2.0158800e-003  2.0158800e-
003
 2.0158800e-003  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         2864 REFCON   MW_H2O    1.8015280e-002  1.8015280e-002  1.8015280e-
002
 1.8015280e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3587 REFCON   MW_H2S    3.4081880e-002  3.4081880e-002  3.4081880e-
002
 3.4081880e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3586 REFCON   MW_N2     2.8013480e-002  2.8013480e-002  2.8013480e-
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002
 2.8013480e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3583 REFCON   MW_NACL   5.8442468e-002  5.8442468e-002  5.8442468e-
002
 5.8442468e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3588 REFCON   MW_O2     3.1998800e-002  3.1998800e-002  3.1998800e-
002
 3.1998800e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         2894 REFCON   OMEGAA    4.2747000e-001  4.2747000e-001  4.2747000e-
001
 4.2747000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2895 REFCON   OMEGAB    8.6640000e-002  8.6640000e-002  8.6640000e-
002
 8.6640000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2880 REFCON   PASCP     1.0000000e+003  1.0000000e+003
1.0000000e+003
 1.0000000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     cP/Pa*s
         2839 REFCON   PC_CH4    4.6170000e+006  4.6170000e+006
4.6170000e+006
 4.6170000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2838 REFCON   PC_CO2    7.3760000e+006  7.3760000e+006
7.3760000e+006
 7.3760000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2837 REFCON   PC_H2     2.0470000e+006  2.0470000e+006
2.0470000e+006
 2.0470000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2841 REFCON   PC_H2S    9.0070000e+006  9.0070000e+006
9.0070000e+006
 9.0070000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2840 REFCON   PC_N2     3.3940000e+006  3.3940000e+006
3.3940000e+006
 3.3940000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2842 REFCON   PC_O2     5.0800000e+006  5.0800000e+006
5.0800000e+006
 5.0800000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2896 REFCON   PI        3.1415930e+000  3.1415930e+000
3.1415930e+000
 3.1415930e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2892 REFCON   PSIPA     6.8947570e+003  6.8947570e+003
6.8947570e+003
 6.8947570e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Pa*in^2/lb
         2893 REFCON   R         8.3145100e+000  8.3145100e+000
8.3145100e+000
 8.3145100e+000  0.00000000e+000 0.0000000e+000 CONSTANT     J/mole*K
         2891 REFCON   RTK       5.5555560e-001  5.5555560e-001  5.5555560e-
001
 5.5555560e-001  0.00000000e+000 0.0000000e+000 CONSTANT     K/rankine
         3112 REFCON   SECYR     3.1688770e-008  3.1688770e-008  3.1688770e-
008
 3.1688770e-008  0.00000000e+000 0.0000000e+000 CONSTANT     yr/s
         2827 REFCON   TC_CH4    1.9063000e+002  1.9063000e+002
1.9063000e+002
 1.9063000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     K
         2826 REFCON   TC_CO2    3.0415000e+002  3.0415000e+002
3.0415000e+002
 3.0415000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     K
         2825 REFCON   TC_H2     4.3600000e+001  4.3600000e+001
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4.3600000e+001
 4.3600000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     K
         2829 REFCON   TC_H2S    3.7355000e+002  3.7355000e+002
3.7355000e+002
 3.7355000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     K
         2828 REFCON   TC_N2     1.2615000e+002  1.2615000e+002
1.2615000e+002
 1.2615000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     K
         2830 REFCON   TC_O2     1.5477000e+002  1.5477000e+002
1.5477000e+002
 1.5477000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     K
         3490 REFCON   VOLWP     4.3600000e+005  4.3600000e+005
4.3600000e+005
 4.3600000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     m^3
         3107 REFCON   VPANLEX   4.6097650e+004  4.6097650e+004
4.6097650e+004
 4.6097650e+004  0.00000000e+000 0.0000000e+000 CONSTANT     m^3
         3108 REFCON   VREPOS    4.3840608e+005  4.3840608e+005
4.3840608e+005
 4.3840608e+005  0.00000000e+000 0.0000000e+000 CONSTANT     m^3
         3105 REFCON   VROOM     3.6443780e+003  3.6443780e+003
3.6443780e+003
 3.6443780e+003  0.00000000e+000 0.0000000e+000 CONSTANT     m^3
         2888 REFCON   YRSEC     3.1556930e+007  3.1556930e+007
3.1556930e+007
 3.1556930e+007  0.00000000e+000 0.0000000e+000 CONSTANT     s/yr
         3110 REFCON   ZCINK     2.7315000e+002  2.7315000e+002
2.7315000e+002
 2.7315000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     K
         2110 REPOSIT  CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3455 REPOSIT  CLOSMOD   4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2112 REPOSIT  COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2113 REPOSIT  DCELLCHW  5.4000000e+001  5.4000000e+001
5.4000000e+001
 5.4000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2114 REPOSIT  DCELLRHW  1.7000000e+001  1.7000000e+001
1.7000000e+001
 1.7000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2115 REPOSIT  DIRNCCHW  1.3900000e+002  1.3900000e+002
1.3900000e+002
 1.3900000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2116 REPOSIT  DIRNCRHW  2.5910000e+003  2.5910000e+003
2.5910000e+003
 2.5910000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2117 REPOSIT  DIRONCHW  1.7000000e+002  1.7000000e+002
1.7000000e+002
 1.7000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2118 REPOSIT  DIRONRHW  1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2119 REPOSIT  DPLASCHW  3.4000000e+001  3.4000000e+001
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3.4000000e+001
 3.4000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2120 REPOSIT  DPLASRHW  1.5000000e+001  1.5000000e+001
1.5000000e+001
 1.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2121 REPOSIT  DPLSCCHW  2.6000000e+001  2.6000000e+001
2.6000000e+001
 2.6000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2995 REPOSIT  DPLSCRHW  3.1000000e+000  3.1000000e+000
3.1000000e+000
 3.1000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2122 REPOSIT  DRUBBCHW  1.0000000e+001  1.0000000e+001
1.0000000e+001
 1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2123 REPOSIT  DRUBBRHW  3.3000000e+000  3.3000000e+000
3.3000000e+000
 3.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2127 REPOSIT  GRATMICH  6.3420000e-010  6.3420000e-010
0.0000000e+000
 1.2684000e-009  0.00000000e+000 0.0000000e+000 UNIFORM      moles/(kg*s)
         2128 REPOSIT  GRATMICI  4.9150000e-009  4.9150000e-009  3.1710000e-
010
 9.5129000e-009  0.00000000e+000 0.0000000e+000 UNIFORM      moles/(kg*s)
         2736 REPOSIT  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2242 REPOSIT  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2737 REPOSIT  PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2738 REPOSIT  PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2739 REPOSIT  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2129 REPOSIT  PORE_DIS  3.2500000e+000  2.8900000e+000
1.4400000e+000
 5.7800000e+000  0.0000000e+000  1.4400000e+000 CUMULATIVE   NONE
         2129 REPOSIT  PORE_DIS  3.2500000e+000  2.8900000e+000
1.4400000e+000
 5.7800000e+000  5.0000000e-001  2.8900000e+000 CUMULATIVE   NONE
         2129 REPOSIT  PORE_DIS  3.2500000e+000  2.8900000e+000
1.4400000e+000
 5.7800000e+000  1.0000000e+000  5.7800000e+000 CUMULATIVE   NONE
         2130 REPOSIT  POROSITY  8.4800000e-001  8.4800000e-001  8.4800000e-
001
 8.4800000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2131 REPOSIT  PRMX_LOG -1.26198000e+001-1.26198000e+001-
1.26198000e+00
1-1.26198000e+001 0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2132 REPOSIT  PRMY_LOG -1.26198000e+001-1.26198000e+001-
1.26198000e+00
1-1.26198000e+001 0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2133 REPOSIT  PRMZ_LOG -1.26198000e+001-1.26198000e+001-
```

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1.26198000e+00
1-1.26198000e+001 0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2824 REPOSIT  PROBDEG   2.0000000e+000  2.0000000e+000
0.0000000e+000
 2.0000000e+000  5.0000000e-001  0.0000000e+000 DELTA        NONE
         2824 REPOSIT  PROBDEG   2.0000000e+000  2.0000000e+000
0.0000000e+000
 2.0000000e+000  2.5000000e-001  1.0000000e+000 DELTA        NONE
         2824 REPOSIT  PROBDEG   2.0000000e+000  2.0000000e+000
0.0000000e+000
 2.0000000e+000  2.5000000e-001  2.0000000e+000 DELTA        NONE
         2135 REPOSIT  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2740 REPOSIT  SAT_IBRN  1.5000000e-002  1.5000000e-002  1.5000000e-
002
 1.5000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2741 REPOSIT  SAT_RBRN  2.7600000e-001  2.7600000e-001
0.0000000e+000
 5.5200000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2137 REPOSIT  SAT_RGAS  7.5000000e-002  7.5000000e-002
0.0000000e+000
 1.5000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2141 REPOSIT  VOLCHW    1.6900000e+005  1.6900000e+005
1.6900000e+005
 1.6900000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     m^3
         2142 REPOSIT  VOLRHW    7.0800000e+003  7.0800000e+003
7.0800000e+003
 7.0800000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     m^3
         3212 RN219    ATWEIGHT  2.1900900e-001  2.1900900e-001  2.1900900e-
001
 2.1900900e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3353 RN219    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3297 RN219    HALFLIFE  3.9600000e+000  3.9600000e+000
3.9600000e+000
 3.9600000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3213 RN220    ATWEIGHT  2.2001100e-001  2.2001100e-001  2.2001100e-
001
 2.2001100e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3354 RN220    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3298 RN220    HALFLIFE  5.5600000e+001  5.5600000e+001
5.5600000e+001
 5.5600000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3214 RN222    ATWEIGHT  2.2201800e-001  2.2201800e-001  2.2201800e-
001
 2.2201800e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3355 RN222    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3299 RN222    HALFLIFE  3.3040000e+005  3.3040000e+005
3.3040000e+005
 3.3040000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     s
         2819 S_ANH_AB BKLINK    2.7100000e-001  2.7100000e-001  2.7100000e-
```

```
001
 2.7100000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          520 S_ANH_AB CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          521 S_ANH_AB COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 1.0900000e-011 STUDENT      Pa^-1
          521 S_ANH_AB COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 1.0900000e-011 STUDENT      Pa^-1
          521 S_ANH_AB COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 3.3700000e-011 STUDENT      Pa^-1
          521 S_ANH_AB COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 2.7500000e-010 STUDENT      Pa^-1
         1661 S_ANH_AB DNSGRAIN  2.7500000e+003  2.7500000e+003
2.7500000e+003
 2.7500000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2158 S_ANH_AB DPHIMAX   2.3900000e-001  2.3900000e-001  2.3900000e-
001
 2.3900000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2820 S_ANH_AB EXPKLINK -3.4100000e-001 -3.4100000e-001 -3.4100000e-
001
-3.4100000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2812 S_ANH_AB IFRX      1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2815 S_ANH_AB IFRY      1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2818 S_ANH_AB IFRZ      0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2159 S_ANH_AB KMAXLOG  -9.0000000e+000 -9.0000000e+000 -
9.0000000e+000
-9.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2773 S_ANH_AB KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          522 S_ANH_AB PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2774 S_ANH_AB PCT_A     2.6000000e-001  2.6000000e-001  2.6000000e-
001
 2.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2775 S_ANH_AB PCT_EXP  -3.4800000e-001 -3.4800000e-001 -3.4800000e-
001
-3.4800000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          524 S_ANH_AB PF_DELTA  3.8000000e+006  3.8000000e+006
3.8000000e+006
 3.8000000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          526 S_ANH_AB PI_DELTA  2.0000000e+005  2.0000000e+005
2.0000000e+005
 2.0000000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          529 S_ANH_AB PO_MIN    1.0132500e+005  1.0132500e+005
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1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          527 S_ANH_AB PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 4.9053000e-001 STUDENT      NONE
          527 S_ANH_AB PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 5.5775000e-001 STUDENT      NONE
          527 S_ANH_AB PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 6.5200000e-001 STUDENT      NONE
          527 S_ANH_AB PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 6.5500000e-001 STUDENT      NONE
          527 S_ANH_AB PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 6.6452000e-001 STUDENT      NONE
          527 S_ANH_AB PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 8.4178000e-001 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 6.0000000e-003 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 7.0000000e-003 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 8.0000000e-003 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 8.0000000e-003 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 9.0000000e-003 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 9.0000000e-003 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.0000000e-002 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.0000000e-002 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.0000000e-002 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.1000000e-002 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.3000000e-002 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.3000000e-002 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
```

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003
 1.7000000e-002  0.00000000e+000 1.4000000e-002 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.4000000e-002 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.5000000e-002 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.7000000e-002 STUDENT      NONE
          531 S_ANH_AB PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-2.1000000e+001 STUDENT      log(m^2)
          531 S_ANH_AB PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9200000e+001 STUDENT      log(m^2)
          531 S_ANH_AB PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9100000e+001 STUDENT      log(m^2)
          531 S_ANH_AB PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8800000e+001 STUDENT      log(m^2)
          531 S_ANH_AB PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8100000e+001 STUDENT      log(m^2)
          531 S_ANH_AB PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.7100000e+001 STUDENT      log(m^2)
          532 S_ANH_AB PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-2.1000000e+001 STUDENT      log(m^2)
          532 S_ANH_AB PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9200000e+001 STUDENT      log(m^2)
          532 S_ANH_AB PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9100000e+001 STUDENT      log(m^2)
          532 S_ANH_AB PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8800000e+001 STUDENT      log(m^2)
          532 S_ANH_AB PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8100000e+001 STUDENT      log(m^2)
          532 S_ANH_AB PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.7100000e+001 STUDENT      log(m^2)
          533 S_ANH_AB PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-2.1000000e+001 STUDENT      log(m^2)
          533 S_ANH_AB PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9200000e+001 STUDENT      log(m^2)
          533 S_ANH_AB PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9100000e+001 STUDENT      log(m^2)
          533 S_ANH_AB PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
```

```
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8800000e+001 STUDENT      log(m^2)
          533 S_ANH_AB PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8100000e+001 STUDENT      log(m^2)
          533 S_ANH_AB PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.7100000e+001 STUDENT      log(m^2)
          536 S_ANH_AB RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  5.0000000e-001  1.0000000e+000 DELTA        NONE
          536 S_ANH_AB RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  2.0000000e+000 DELTA        NONE
          536 S_ANH_AB RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  3.0000000e+000 DELTA        NONE
          536 S_ANH_AB RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  5.0000000e-001  4.0000000e+000 DELTA        NONE
          537 S_ANH_AB SAT_IBRN  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          538 S_ANH_AB SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 7.7846000e-003 STUDENT      NONE
          538 S_ANH_AB SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 6.8842000e-002 STUDENT      NONE
          538 S_ANH_AB SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 6.9860000e-002 STUDENT      NONE
          538 S_ANH_AB SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 7.2620000e-002 STUDENT      NONE
          538 S_ANH_AB SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 1.0861000e-001 STUDENT      NONE
          538 S_ANH_AB SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 1.7401000e-001 STUDENT      NONE
          539 S_ANH_AB SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3980000e-
002
 1.9719000e-001  0.00000000e+000 1.3980000e-002 STUDENT      NONE
          539 S_ANH_AB SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3980000e-
002
 1.9719000e-001  0.00000000e+000 2.5200000e-002 STUDENT      NONE
          539 S_ANH_AB SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3980000e-
002
 1.9719000e-001  0.00000000e+000 3.2180000e-002 STUDENT      NONE
          539 S_ANH_AB SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3980000e-
002
 1.9719000e-001  0.00000000e+000 7.7730000e-002 STUDENT      NONE
          539 S_ANH_AB SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3980000e-
002
 1.9719000e-001  0.00000000e+000 1.1637000e-001 STUDENT      NONE
          539 S_ANH_AB SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3980000e-
```

```
002
 1.9719000e-001  0.00000000e+000 1.9719000e-001 STUDENT      NONE
          540 S_HALITE CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          541 S_HALITE COMP_RCK  9.7500000e-011  9.7500000e-011  2.9400000e-
012
 1.9200000e-010  0.00000000e+000 0.0000000e+000 UNIFORM      Pa^-1
         2778 S_HALITE KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          542 S_HALITE PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2779 S_HALITE PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2780 S_HALITE PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          545 S_HALITE PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          543 S_HALITE PORE_DIS  2.9000000e+000  7.0000000e-001  2.0000000e-
001
 1.0000000e+001  0.0000000e+000  2.0000000e-001 CUMULATIVE   NONE
          543 S_HALITE PORE_DIS  2.9000000e+000  7.0000000e-001  2.0000000e-
001
 1.0000000e+001  5.0000000e-001  7.0000000e-001 CUMULATIVE   NONE
          543 S_HALITE PORE_DIS  2.9000000e+000  7.0000000e-001  2.0000000e-
001
 1.0000000e+001  1.0000000e+000  1.0000000e+001 CUMULATIVE   NONE
          544 S_HALITE POROSITY  1.2800000e-002  1.0000000e-002  1.0000000e-
003
 3.0000000e-002  0.0000000e+000  1.0000000e-003 CUMULATIVE   NONE
          544 S_HALITE POROSITY  1.2800000e-002  1.0000000e-002  1.0000000e-
003
 3.0000000e-002  5.0000000e-001  1.0000000e-002 CUMULATIVE   NONE
          544 S_HALITE POROSITY  1.2800000e-002  1.0000000e-002  1.0000000e-
003
 3.0000000e-002  1.0000000e+000  3.0000000e-002 CUMULATIVE   NONE
          546 S_HALITE PRESSURE  1.2470000e+007  1.2470000e+007
1.1040000e+007
 1.3890000e+007  0.00000000e+000 0.0000000e+000 UNIFORM      Pa
          547 S_HALITE PRMX_LOG -2.2500000e+001 -2.2500000e+001 -
2.4000000e+001
-2.1000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
          548 S_HALITE PRMY_LOG -2.2500000e+001 -2.2500000e+001 -
2.4000000e+001
-2.1000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
          549 S_HALITE PRMZ_LOG -2.2500000e+001 -2.2500000e+001 -
2.4000000e+001
-2.1000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
          553 S_HALITE RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  3.3000000e-001  1.0000000e+000 DELTA        NONE
          553 S_HALITE RELP_MOD  4.0000000e+000  4.0000000e+000
```

```
1.0000000e+000
 4.0000000e+000  0.0000000e+000  2.0000000e+000 DELTA        NONE
          553 S_HALITE RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  3.0000000e+000 DELTA        NONE
          553 S_HALITE RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  6.7000000e-001  4.0000000e+000 DELTA        NONE
          554 S_HALITE SAT_IBRN  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          555 S_HALITE SAT_RBRN  3.0000000e-001  3.0000000e-001
0.0000000e+000
 6.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
          556 S_HALITE SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2904 S_MB138  BKLINK    2.7100000e-001  2.7100000e-001  2.7100000e-
001
 2.7100000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          559 S_MB138  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          560 S_MB138  COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 1.0900000e-011 STUDENT      Pa^-1
          560 S_MB138  COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 1.0900000e-011 STUDENT      Pa^-1
          560 S_MB138  COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 3.3700000e-011 STUDENT      Pa^-1
          560 S_MB138  COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 2.7500000e-010 STUDENT      Pa^-1
         1743 S_MB138  DNSGRAIN  2.7500000e+003  2.7500000e+003
2.7500000e+003
 2.7500000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2169 S_MB138  DPHIMAX   3.9000000e-002  3.9000000e-002  3.9000000e-
002
 3.9000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2902 S_MB138  EXPKLINK -3.4100000e-001 -3.4100000e-001 -3.4100000e-
001
-3.4100000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2810 S_MB138  IFRX      1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2813 S_MB138  IFRY      1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2816 S_MB138  IFRZ      0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2170 S_MB138  KMAXLOG  -9.0000000e+000 -9.0000000e+000 -
9.0000000e+000
-9.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2783 S_MB138  KPT       0.0000000e+000  0.0000000e+000
```

```
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          561 S_MB138  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2784 S_MB138  PCT_A     2.6000000e-001  2.6000000e-001  2.6000000e-
001
 2.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2785 S_MB138  PCT_EXP  -3.4800000e-001 -3.4800000e-001 -3.4800000e-
001
-3.4800000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          563 S_MB138  PF_DELTA  3.8000000e+006  3.8000000e+006
3.8000000e+006
 3.8000000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          565 S_MB138  PI_DELTA  2.0000000e+005  2.0000000e+005
2.0000000e+005
 2.0000000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          568 S_MB138  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          566 S_MB138  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 4.9053000e-001 STUDENT      NONE
          566 S_MB138  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 5.5775000e-001 STUDENT      NONE
          566 S_MB138  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 6.5200000e-001 STUDENT      NONE
          566 S_MB138  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 6.5500000e-001 STUDENT      NONE
          566 S_MB138  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 6.6452000e-001 STUDENT      NONE
          566 S_MB138  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 8.4178000e-001 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 6.0000000e-003 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 7.0000000e-003 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 8.0000000e-003 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 8.0000000e-003 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 9.0000000e-003 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 9.0000000e-003 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
```

```
003
 1.7000000e-002  0.00000000e+000 1.0000000e-002 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.0000000e-002 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.0000000e-002 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.1000000e-002 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.3000000e-002 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.3000000e-002 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.4000000e-002 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.4000000e-002 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.5000000e-002 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.7000000e-002 STUDENT      NONE
          569 S_MB138  PRESSURE  1.1630000e+007  1.1630000e+007
9.3800000e+006
 1.2940000e+007  0.00000000e+000 9.3800000e+006 STUDENT      Pa
          569 S_MB138  PRESSURE  1.1630000e+007  1.1630000e+007
9.3800000e+006
 1.2940000e+007  0.00000000e+000 1.1110000e+007 STUDENT      Pa
          569 S_MB138  PRESSURE  1.1630000e+007  1.1630000e+007
9.3800000e+006
 1.2940000e+007  0.00000000e+000 1.2270000e+007 STUDENT      Pa
          569 S_MB138  PRESSURE  1.1630000e+007  1.1630000e+007
9.3800000e+006
 1.2940000e+007  0.00000000e+000 1.2430000e+007 STUDENT      Pa
          569 S_MB138  PRESSURE  1.1630000e+007  1.1630000e+007
9.3800000e+006
 1.2940000e+007  0.00000000e+000 1.2940000e+007 STUDENT      Pa
          570 S_MB138  PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-2.1000000e+001 STUDENT      log(m^2)
          570 S_MB138  PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9200000e+001 STUDENT      log(m^2)
          570 S_MB138  PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9100000e+001 STUDENT      log(m^2)
          570 S_MB138  PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8800000e+001 STUDENT      log(m^2)
          570 S_MB138  PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
```

```
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8100000e+001 STUDENT      log(m^2)
          570 S_MB138  PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.7100000e+001 STUDENT      log(m^2)
          571 S_MB138  PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-2.1000000e+001 STUDENT      log(m^2)
          571 S_MB138  PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9200000e+001 STUDENT      log(m^2)
          571 S_MB138  PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9100000e+001 STUDENT      log(m^2)
          571 S_MB138  PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8800000e+001 STUDENT      log(m^2)
          571 S_MB138  PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8100000e+001 STUDENT      log(m^2)
          571 S_MB138  PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.7100000e+001 STUDENT      log(m^2)
          572 S_MB138  PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-2.1000000e+001 STUDENT      log(m^2)
          572 S_MB138  PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9200000e+001 STUDENT      log(m^2)
          572 S_MB138  PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9100000e+001 STUDENT      log(m^2)
          572 S_MB138  PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8800000e+001 STUDENT      log(m^2)
          572 S_MB138  PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8100000e+001 STUDENT      log(m^2)
          572 S_MB138  PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.7100000e+001 STUDENT      log(m^2)
          575 S_MB138  RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  5.0000000e-001  1.0000000e+000 DELTA        NONE
          575 S_MB138  RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  2.0000000e+000 DELTA        NONE
          575 S_MB138  RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  3.0000000e+000 DELTA        NONE
          575 S_MB138  RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  5.0000000e-001  4.0000000e+000 DELTA        NONE
          576 S_MB138  SAT_IBRN  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          577 S_MB138  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
```

```
003
 1.7401000e-001  0.00000000e+000 7.7846000e-003 STUDENT      NONE
          577 S_MB138  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 6.8842000e-002 STUDENT      NONE
          577 S_MB138  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 6.9860000e-002 STUDENT      NONE
          577 S_MB138  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 7.2620000e-002 STUDENT      NONE
          577 S_MB138  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 1.0861000e-001 STUDENT      NONE
          577 S_MB138  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 1.7401000e-001 STUDENT      NONE
          578 S_MB138  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 1.3981000e-002 STUDENT      NONE
          578 S_MB138  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 2.5201000e-002 STUDENT      NONE
          578 S_MB138  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 3.2177000e-002 STUDENT      NONE
          578 S_MB138  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 7.7729000e-002 STUDENT      NONE
          578 S_MB138  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 1.1637000e-001 STUDENT      NONE
          578 S_MB138  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 1.9719000e-001 STUDENT      NONE
         2905 S_MB139  BKLINK    2.7100000e-001  2.7100000e-001  2.7100000e-
001
 2.7100000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          579 S_MB139  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          580 S_MB139  COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 1.0900000e-011 STUDENT      Pa^-1
          580 S_MB139  COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 1.0900000e-011 STUDENT      Pa^-1
          580 S_MB139  COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 3.3700000e-011 STUDENT      Pa^-1
          580 S_MB139  COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 2.7500000e-010 STUDENT      Pa^-1
         1784 S_MB139  DNSGRAIN  2.7500000e+003  2.7500000e+003
2.7500000e+003
 2.7500000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2177 S_MB139  DPHIMAX   3.9000000e-002  3.9000000e-002  3.9000000e-
```

```
002
 3.9000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2903 S_MB139  EXPKLINK -3.4100000e-001 -3.4100000e-001 -3.4100000e-
001
-3.4100000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2811 S_MB139  IFRX      1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2814 S_MB139  IFRY      1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2817 S_MB139  IFRZ      0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2178 S_MB139  KMAXLOG  -9.0000000e+000 -9.0000000e+000 -
9.0000000e+000
-9.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2788 S_MB139  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          582 S_MB139  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2789 S_MB139  PCT_A     2.6000000e-001  2.6000000e-001  2.6000000e-
001
 2.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2790 S_MB139  PCT_EXP  -3.4800000e-001 -3.4800000e-001 -3.4800000e-
001
-3.4800000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2180 S_MB139  PF_DELTA  3.8000000e+006  3.8000000e+006
3.8000000e+006
 3.8000000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          586 S_MB139  PI_DELTA  2.0000000e+005  2.0000000e+005
2.0000000e+005
 2.0000000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          589 S_MB139  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          587 S_MB139  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 4.9053000e-001 STUDENT      NONE
          587 S_MB139  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 5.5775000e-001 STUDENT      NONE
          587 S_MB139  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 6.5200000e-001 STUDENT      NONE
          587 S_MB139  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 6.5500000e-001 STUDENT      NONE
          587 S_MB139  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 6.6452000e-001 STUDENT      NONE
          587 S_MB139  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 8.4178000e-001 STUDENT      NONE
          588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
```

```
003
 1.7000000e-002  0.00000000e+000 6.0000000e-003 STUDENT      NONE
          588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 7.0000000e-003 STUDENT      NONE
          588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 8.0000000e-003 STUDENT      NONE
          588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 8.0000000e-003 STUDENT      NONE
          588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 9.0000000e-003 STUDENT      NONE
          588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 9.0000000e-003 STUDENT      NONE
          588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.0000000e-002 STUDENT      NONE
          588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.0000000e-002 STUDENT      NONE
          588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.0000000e-002 STUDENT      NONE
          588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.1000000e-002 STUDENT      NONE
          588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.3000000e-002 STUDENT      NONE
          588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.3000000e-002 STUDENT      NONE
          588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.4000000e-002 STUDENT      NONE
          588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.4000000e-002 STUDENT      NONE
          588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.5000000e-002 STUDENT      NONE
          588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.7000000e-002 STUDENT      NONE
          590 S_MB139  PRESSURE  1.1630000e+007  1.1630000e+007
9.3800000e+006
 1.2940000e+007  0.00000000e+000 9.3800000e+006 STUDENT      Pa
          590 S_MB139  PRESSURE  1.1630000e+007  1.1630000e+007
9.3800000e+006
 1.2940000e+007  0.00000000e+000 1.1110000e+007 STUDENT      Pa
          590 S_MB139  PRESSURE  1.1630000e+007  1.1630000e+007
9.3800000e+006
 1.2940000e+007  0.00000000e+000 1.2270000e+007 STUDENT      Pa
          590 S_MB139  PRESSURE  1.1630000e+007  1.1630000e+007
```

```
9.3800000e+006
 1.2940000e+007  0.00000000e+000 1.2430000e+007 STUDENT      Pa
          590 S_MB139  PRESSURE  1.1630000e+007  1.1630000e+007
9.3800000e+006
 1.2940000e+007  0.00000000e+000 1.2940000e+007 STUDENT      Pa
          591 S_MB139  PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-2.1000000e+001 STUDENT      log(m^2)
          591 S_MB139  PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9200000e+001 STUDENT      log(m^2)
          591 S_MB139  PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9100000e+001 STUDENT      log(m^2)
          591 S_MB139  PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8800000e+001 STUDENT      log(m^2)
          591 S_MB139  PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8100000e+001 STUDENT      log(m^2)
          591 S_MB139  PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.7100000e+001 STUDENT      log(m^2)
          592 S_MB139  PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-2.1000000e+001 STUDENT      log(m^2)
          592 S_MB139  PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9200000e+001 STUDENT      log(m^2)
          592 S_MB139  PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9100000e+001 STUDENT      log(m^2)
          592 S_MB139  PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8800000e+001 STUDENT      log(m^2)
          592 S_MB139  PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8100000e+001 STUDENT      log(m^2)
          592 S_MB139  PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.7100000e+001 STUDENT      log(m^2)
          593 S_MB139  PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-2.1000000e+001 STUDENT      log(m^2)
          593 S_MB139  PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9200000e+001 STUDENT      log(m^2)
          593 S_MB139  PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9100000e+001 STUDENT      log(m^2)
          593 S_MB139  PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8800000e+001 STUDENT      log(m^2)
          593 S_MB139  PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8100000e+001 STUDENT      log(m^2)
          593 S_MB139  PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
```

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2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.7100000e+001 STUDENT      log(m^2)
          596 S_MB139  RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  5.0000000e-001  1.0000000e+000 DELTA        NONE
          596 S_MB139  RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  2.0000000e+000 DELTA        NONE
          596 S_MB139  RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  3.0000000e+000 DELTA        NONE
          596 S_MB139  RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  5.0000000e-001  4.0000000e+000 DELTA        NONE
          597 S_MB139  SAT_IBRN  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          598 S_MB139  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 7.7846000e-003 STUDENT      NONE
          598 S_MB139  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 6.8842000e-002 STUDENT      NONE
          598 S_MB139  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 6.9860000e-002 STUDENT      NONE
          598 S_MB139  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 7.2620000e-002 STUDENT      NONE
          598 S_MB139  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 1.0861000e-001 STUDENT      NONE
          598 S_MB139  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 1.7401000e-001 STUDENT      NONE
          599 S_MB139  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 1.3981000e-002 STUDENT      NONE
          599 S_MB139  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 2.5201000e-002 STUDENT      NONE
          599 S_MB139  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 3.2177000e-002 STUDENT      NONE
          599 S_MB139  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 7.7729000e-002 STUDENT      NONE
          599 S_MB139  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 1.1637000e-001 STUDENT      NONE
          599 S_MB139  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 1.9719000e-001 STUDENT      NONE
         2513 SALT_T1  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2514 SALT_T1  COMP_RCK  8.0000000e-011  8.0000000e-011  8.0000000e-
```

```
011
 8.0000000e-011  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2939 SALT_T1  CUMPROB   5.0000000e-001  5.0000000e-001
0.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2744 SALT_T1  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2515 SALT_T1  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2745 SALT_T1  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2746 SALT_T1  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2942 SALT_T1  PMLT_HI  -1.2265200e+001 -1.2265200e+001 -
1.2265200e+001
-1.2265200e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2941 SALT_T1  PMLT_LO  -1.7301000e+001 -1.7301000e+001 -
1.7301000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2940 SALT_T1  PMLT_MD  -1.4782500e+001 -1.4782500e+001 -
1.4782500e+001
-1.4782500e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2518 SALT_T1  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2516 SALT_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2516 SALT_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2516 SALT_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2517 SALT_T1  POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2519 SALT_T1  PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2938 SALT_T1  RADN_DRZ  1.8140000e+000  1.8140000e+000
1.8140000e+000
 1.8140000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2526 SALT_T1  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2934 SALT_T1  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2937 SALT_T1  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2935 SALT_T1  RSH_SAL   1.8000000e+000  1.8000000e+000
```

```
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2936 SALT_T1  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2527 SALT_T1  SAT_IBRN  3.2000000e-001  3.2000000e-001  3.2000000e-
001
 3.2000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2528 SALT_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2528 SALT_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2528 SALT_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2529 SALT_T1  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2530 SALT_T2  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2531 SALT_T2  COMP_RCK  8.0000000e-011  8.0000000e-011  8.0000000e-
011
 8.0000000e-011  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2749 SALT_T2  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2532 SALT_T2  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2750 SALT_T2  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2751 SALT_T2  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2950 SALT_T2  PMLT_HI  -1.2265200e+001 -1.2265200e+001 -
1.2265200e+001
-1.2265200e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2949 SALT_T2  PMLT_LO  -1.7301000e+001 -1.7301000e+001 -
1.7301000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2948 SALT_T2  PMLT_MD  -1.4782500e+001 -1.4782500e+001 -
1.4782500e+001
-1.4782500e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2535 SALT_T2  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2533 SALT_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2533 SALT_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2533 SALT_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
```

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001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2534 SALT_T2  POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2947 SALT_T2  RADN_DRZ  1.1100000e+000  1.1100000e+000
1.1100000e+000
 1.1100000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2543 SALT_T2  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2943 SALT_T2  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2946 SALT_T2  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2944 SALT_T2  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2945 SALT_T2  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2545 SALT_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2545 SALT_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2545 SALT_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2546 SALT_T2  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2547 SALT_T3  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2548 SALT_T3  COMP_RCK  8.0000000e-011  8.0000000e-011  8.0000000e-
011
 8.0000000e-011  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2754 SALT_T3  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2549 SALT_T3  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2755 SALT_T3  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2756 SALT_T3  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2958 SALT_T3  PMLT_HI  -1.2265200e+001 -1.2265200e+001 -
1.2265200e+001
-1.2265200e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2957 SALT_T3  PMLT_LO  -1.7301000e+001 -1.7301000e+001 -
```

```
1.7301000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2956 SALT_T3  PMLT_MD  -1.4782500e+001 -1.4782500e+001 -
1.4782500e+001
-1.4782500e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2552 SALT_T3  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2550 SALT_T3  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2550 SALT_T3  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2550 SALT_T3  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2551 SALT_T3  POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2955 SALT_T3  RADN_DRZ  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2560 SALT_T3  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2951 SALT_T3  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2954 SALT_T3  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2952 SALT_T3  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2953 SALT_T3  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2562 SALT_T3  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2562 SALT_T3  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2562 SALT_T3  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2563 SALT_T3  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2564 SALT_T4  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2565 SALT_T4  COMP_RCK  8.0000000e-011  8.0000000e-011  8.0000000e-
011
 8.0000000e-011  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2759 SALT_T4  KPT       0.0000000e+000  0.0000000e+000
```

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0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2566 SALT_T4  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2760 SALT_T4  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2761 SALT_T4  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2966 SALT_T4  PMLT_HI  -1.3950800e+001 -1.3950800e+001 -
1.3950800e+001
-1.3950800e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2965 SALT_T4  PMLT_LO  -2.2876100e+001 -2.2876100e+001 -
2.2876100e+001
-2.2876100e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2964 SALT_T4  PMLT_MD  -1.7165600e+001 -1.7165600e+001 -
1.7165600e+001
-1.7165600e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2569 SALT_T4  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2567 SALT_T4  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2567 SALT_T4  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2567 SALT_T4  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2568 SALT_T4  POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2963 SALT_T4  RADN_DRZ  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2577 SALT_T4  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2959 SALT_T4  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2962 SALT_T4  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2960 SALT_T4  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2961 SALT_T4  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2579 SALT_T4  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2579 SALT_T4  SAT_RBRN  2.5000000e-001  2.0000000e-001
```

```
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2579 SALT_T4  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2580 SALT_T4  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2581 SALT_T5  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2582 SALT_T5  COMP_RCK  8.0000000e-011  8.0000000e-011  8.0000000e-
011
 8.0000000e-011  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2764 SALT_T5  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2583 SALT_T5  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2765 SALT_T5  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2766 SALT_T5  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2974 SALT_T5  PMLT_HI  -1.5426000e+001 -1.5426000e+001 -
1.5426000e+001
-1.5426000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2973 SALT_T5  PMLT_LO  -2.2876100e+001 -2.2876100e+001 -
2.2876100e+001
-2.2876100e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2972 SALT_T5  PMLT_MD  -1.9278200e+001 -1.9278200e+001 -
1.9278200e+001
-1.9278200e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         3125 SALT_T5  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2809 SALT_T5  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2809 SALT_T5  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2809 SALT_T5  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2585 SALT_T5  POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2971 SALT_T5  RADN_DRZ  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2594 SALT_T5  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2967 SALT_T5  RSH_AIR   3.0900000e+000  3.0900000e+000
```

```
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2970 SALT_T5  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2968 SALT_T5  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2969 SALT_T5  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2596 SALT_T5  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2596 SALT_T5  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2596 SALT_T5  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2597 SALT_T5  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2983 SALT_T6  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2984 SALT_T6  COMP_RCK  8.0000000e-011  8.0000000e-011  8.0000000e-
011
 8.0000000e-011  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2985 SALT_T6  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2986 SALT_T6  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2987 SALT_T6  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2988 SALT_T6  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2982 SALT_T6  PMLT_HI  -1.7667600e+001 -1.7667600e+001 -
1.7667600e+001
-1.7667600e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2981 SALT_T6  PMLT_LO  -2.2876100e+001 -2.2876100e+001 -
2.2876100e+001
-2.2876100e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2980 SALT_T6  PMLT_MD  -2.0271600e+001 -2.0271600e+001 -
2.0271600e+001
-2.0271600e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         3126 SALT_T6  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2989 SALT_T6  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2989 SALT_T6  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
```

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001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2989 SALT_T6  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2990 SALT_T6  POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2979 SALT_T6  RADN_DRZ  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2991 SALT_T6  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2975 SALT_T6  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2978 SALT_T6  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2976 SALT_T6  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2977 SALT_T6  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2992 SALT_T6  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2992 SALT_T6  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2992 SALT_T6  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2993 SALT_T6  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
          336 SANTAROS CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          337 SANTAROS COMP_RCK  1.0000000e-008  1.0000000e-008  1.0000000e-
008
 1.0000000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2768 SANTAROS KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          339 SANTAROS PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2769 SANTAROS PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2770 SANTAROS PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          342 SANTAROS PO_MIN    1.0132500e+005  1.0132500e+005
```

```
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          340 SANTAROS PORE_DIS  6.4360000e-001  6.4360000e-001  6.4360000e-
001
 6.4360000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          341 SANTAROS POROSITY  1.7500000e-001  1.7500000e-001  1.7500000e-
001
 1.7500000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          343 SANTAROS PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          344 SANTAROS PRMX_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          345 SANTAROS PRMY_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          346 SANTAROS PRMZ_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          349 SANTAROS RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          350 SANTAROS SAT_IBRN  8.3630000e-002  8.3630000e-002  8.3630000e-
002
 8.3630000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          351 SANTAROS SAT_RBRN  8.3630000e-002  8.3630000e-002  8.3630000e-
002
 8.3630000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          352 SANTAROS SAT_RGAS  7.7110000e-002  7.7110000e-002  7.7110000e-
002
 7.7110000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3133 SHFT_DRZ PRMX_LOG -1.5333330e+001 -1.5000000e+001 -
1.7000000e+001
-1.4000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3562 SHFTL_T1 COMP_POR  4.2800000e-009  4.2800000e-009  4.2800000e-
009
 4.2800000e-009  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3563 SHFTL_T1 KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3564 SHFTL_T1 PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3565 SHFTL_T1 PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3566 SHFTL_T1 PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3567 SHFTL_T1 PO_MIN    1.0100000e+005  1.0100000e+005
1.0100000e+005
 1.0100000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3568 SHFTL_T1 POROSITY  1.1300000e-001  1.1300000e-001  1.1300000e-
001
 1.1300000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3569 SHFTL_T1 PRMX_LOG -1.8000000e+001 -1.8200000e+001 -
```

```
2.0000000e+001
-1.6500000e+001  0.0000000e+000 -2.0000000e+001 CUMULATIVE   log(m^2)
         3569 SHFTL_T1 PRMX_LOG -1.8000000e+001 -1.8200000e+001 -
2.0000000e+001
-1.6500000e+001  1.0000000e-002 -1.9500000e+001 CUMULATIVE   log(m^2)
         3569 SHFTL_T1 PRMX_LOG -1.8000000e+001 -1.8200000e+001 -
2.0000000e+001
-1.6500000e+001  1.0000000e-001 -1.9000000e+001 CUMULATIVE   log(m^2)
         3569 SHFTL_T1 PRMX_LOG -1.8000000e+001 -1.8200000e+001 -
2.0000000e+001
-1.6500000e+001  3.0700000e-001 -1.8500000e+001 CUMULATIVE   log(m^2)
         3569 SHFTL_T1 PRMX_LOG -1.8000000e+001 -1.8200000e+001 -
2.0000000e+001
-1.6500000e+001  6.3700000e-001 -1.8000000e+001 CUMULATIVE   log(m^2)
         3569 SHFTL_T1 PRMX_LOG -1.8000000e+001 -1.8200000e+001 -
2.0000000e+001
-1.6500000e+001  8.7300000e-001 -1.7500000e+001 CUMULATIVE   log(m^2)
         3569 SHFTL_T1 PRMX_LOG -1.8000000e+001 -1.8200000e+001 -
2.0000000e+001
-1.6500000e+001  9.9300000e-001 -1.7000000e+001 CUMULATIVE   log(m^2)
         3569 SHFTL_T1 PRMX_LOG -1.8000000e+001 -1.8200000e+001 -
2.0000000e+001
-1.6500000e+001  1.0000000e+000 -1.6500000e+001 CUMULATIVE   log(m^2)
         3570 SHFTL_T1 RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3571 SHFTL_T1 SAT_IBRN  5.3400000e-001  5.3400000e-001  5.3400000e-
001
 5.3400000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3572 SHFTL_T2 COMP_POR  4.2800000e-009  4.2800000e-009  4.2800000e-
009
 4.2800000e-009  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3573 SHFTL_T2 KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3574 SHFTL_T2 PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3575 SHFTL_T2 PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3576 SHFTL_T2 PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3577 SHFTL_T2 PO_MIN    1.0100000e+005  1.0100000e+005
1.0100000e+005
 1.0100000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3578 SHFTL_T2 POROSITY  1.1300000e-001  1.1300000e-001  1.1300000e-
001
 1.1300000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3579 SHFTL_T2 PRMX_LOG -1.9800000e+001 -2.0100000e+001 -
2.2500000e+001
-1.8000000e+001  0.0000000e+000 -2.2500000e+001 CUMULATIVE   log(m^2)
         3579 SHFTL_T2 PRMX_LOG -1.9800000e+001 -2.0100000e+001 -
2.2500000e+001
-1.8000000e+001  2.0000000e-002 -2.2000000e+001 CUMULATIVE   log(m^2)
         3579 SHFTL_T2 PRMX_LOG -1.9800000e+001 -2.0100000e+001 -
```

```
2.2500000e+001
-1.8000000e+001  8.0000000e-002 -2.1500000e+001 CUMULATIVE   log(m^2)
         3579 SHFTL_T2 PRMX_LOG -1.9800000e+001 -2.0100000e+001 -
2.2500000e+001
-1.8000000e+001  1.7000000e-001 -2.1000000e+001 CUMULATIVE   log(m^2)
         3579 SHFTL_T2 PRMX_LOG -1.9800000e+001 -2.0100000e+001 -
2.2500000e+001
-1.8000000e+001  3.0500000e-001 -2.0500000e+001 CUMULATIVE   log(m^2)
         3579 SHFTL_T2 PRMX_LOG -1.9800000e+001 -2.0100000e+001 -
2.2500000e+001
-1.8000000e+001  5.2500000e-001 -2.0000000e+001 CUMULATIVE   log(m^2)
         3579 SHFTL_T2 PRMX_LOG -1.9800000e+001 -2.0100000e+001 -
2.2500000e+001
-1.8000000e+001  7.0000000e-001 -1.9500000e+001 CUMULATIVE   log(m^2)
         3579 SHFTL_T2 PRMX_LOG -1.9800000e+001 -2.0100000e+001 -
2.2500000e+001
-1.8000000e+001  8.6500000e-001 -1.9000000e+001 CUMULATIVE   log(m^2)
         3579 SHFTL_T2 PRMX_LOG -1.9800000e+001 -2.0100000e+001 -
2.2500000e+001
-1.8000000e+001  9.6500000e-001 -1.8500000e+001 CUMULATIVE   log(m^2)
         3579 SHFTL_T2 PRMX_LOG -1.9800000e+001 -2.0100000e+001 -
2.2500000e+001
-1.8000000e+001  1.0000000e+000 -1.8000000e+001 CUMULATIVE   log(m^2)
         3580 SHFTL_T2 RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3581 SHFTL_T2 SAT_IBRN  5.3400000e-001  5.3400000e-001  5.3400000e-
001
 5.3400000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3550 SHFTU    COMP_POR  2.0500000e-008  2.0500000e-008  2.0500000e-
008
 2.0500000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3551 SHFTU    KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3552 SHFTU    PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3553 SHFTU    PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3554 SHFTU    PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3555 SHFTU    PO_MIN    1.0100000e+005  1.0100000e+005
1.0100000e+005
 1.0100000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3556 SHFTU    POROSITY  2.9100000e-001  2.9100000e-001  2.9100000e-
001
 2.9100000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3557 SHFTU    PRMX_LOG -1.8200000e+001 -1.8300000e+001 -
2.0500000e+001
-1.6500000e+001  0.0000000e+000 -2.0500000e+001 CUMULATIVE   log(m^2)
         3557 SHFTU    PRMX_LOG -1.8200000e+001 -1.8300000e+001 -
2.0500000e+001
-1.6500000e+001  3.0000000e-002 -2.0000000e+001 CUMULATIVE   log(m^2)
         3557 SHFTU    PRMX_LOG -1.8200000e+001 -1.8300000e+001 -
```

```
2.0500000e+001
-1.6500000e+001  1.1000000e-001 -1.9500000e+001 CUMULATIVE   log(m^2)
         3557 SHFTU    PRMX_LOG -1.8200000e+001 -1.8300000e+001 -
2.0500000e+001
-1.6500000e+001  2.4000000e-001 -1.9000000e+001 CUMULATIVE   log(m^2)
         3557 SHFTU    PRMX_LOG -1.8200000e+001 -1.8300000e+001 -
2.0500000e+001
-1.6500000e+001  4.3000000e-001 -1.8500000e+001 CUMULATIVE   log(m^2)
         3557 SHFTU    PRMX_LOG -1.8200000e+001 -1.8300000e+001 -
2.0500000e+001
-1.6500000e+001  6.5000000e-001 -1.8000000e+001 CUMULATIVE   log(m^2)
         3557 SHFTU    PRMX_LOG -1.8200000e+001 -1.8300000e+001 -
2.0500000e+001
-1.6500000e+001  8.9000000e-001 -1.7500000e+001 CUMULATIVE   log(m^2)
         3557 SHFTU    PRMX_LOG -1.8200000e+001 -1.8300000e+001 -
2.0500000e+001
-1.6500000e+001  9.9000000e-001 -1.7000000e+001 CUMULATIVE   log(m^2)
         3557 SHFTU    PRMX_LOG -1.8200000e+001 -1.8300000e+001 -
2.0500000e+001
-1.6500000e+001  1.0000000e+000 -1.6500000e+001 CUMULATIVE   log(m^2)
         3558 SHFTU    RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3559 SHFTU    SAT_IBRN  7.9600000e-001  7.9600000e-001  7.9600000e-
001
 7.9600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3560 SHFTU    SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         3560 SHFTU    SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         3560 SHFTU    SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         3561 SHFTU    SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
          514 SM147    ATWEIGHT  1.4691500e-001  1.4691500e-001  1.4691500e-
001
 1.4691500e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3379 SM147    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          515 SM147    HALFLIFE  3.3770000e+018  3.3770000e+018
3.3770000e+018
 3.3770000e+018  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3263 SOLAM3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
         3263 SOLAM3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
         3263 SOLAM3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
         3263 SOLAM3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
```

```
2.0000000e+000
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
         3263 SOLAM3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
         3263 SOLAM3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
         3263 SOLAM3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
         3263 SOLAM3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
         3263 SOLAM3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.0000000e+000  1.4000000e+000 CUMULATIVE   moles/liter
         3262 SOLAM3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
         3262 SOLAM3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
         3262 SOLAM3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
         3262 SOLAM3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
         3262 SOLAM3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
         3262 SOLAM3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
         3262 SOLAM3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
         3262 SOLAM3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
         3262 SOLAM3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.0000000e+000  1.4000000e+000 CUMULATIVE   moles/liter
         3402 SOLMOD3  SOLCIM    1.3000000e-008  1.3000000e-008  1.3000000e-
008
 1.3000000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3628 SOLMOD3  SOLCOC    1.7700000e-007  1.7700000e-007  1.7700000e-
007
 1.7700000e-007  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3629 SOLMOD3  SOLCOH    1.6900000e-007  1.6900000e-007  1.6900000e-
007
 1.6900000e-007  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3406 SOLMOD3  SOLSIM    1.2000000e-007  1.2000000e-007  1.2000000e-
007
 1.2000000e-007  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3630 SOLMOD3  SOLSOC    3.0700000e-007  3.0700000e-007  3.0700000e-
```

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007
 3.0700000e-007  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3631 SOLMOD3  SOLSOH    3.0700000e-007  3.0700000e-007  3.0700000e-
007
 3.0700000e-007  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3403 SOLMOD4  SOLCIM    4.1000000e-008  4.1000000e-008  4.1000000e-
008
 4.1000000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3632 SOLMOD4  SOLCOC    5.8400000e-009  5.8400000e-009  5.8400000e-
009
 5.8400000e-009  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3633 SOLMOD4  SOLCOH    2.4700000e-008  2.4700000e-008  2.4700000e-
008
 2.4700000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3407 SOLMOD4  SOLSIM    1.3000000e-008  1.3000000e-008  1.3000000e-
008
 1.3000000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3634 SOLMOD4  SOLSOC    1.2400000e-008  1.2400000e-008  1.2400000e-
008
 1.2400000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3635 SOLMOD4  SOLSOH    1.1900000e-008  1.1900000e-008  1.1900000e-
008
 1.1900000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3404 SOLMOD5  SOLCIM    4.8000000e-007  4.8000000e-007  4.8000000e-
007
 4.8000000e-007  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3636 SOLMOD5  SOLCOC    2.1300000e-005  2.1300000e-005  2.1300000e-
005
 2.1300000e-005  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3637 SOLMOD5  SOLCOH    5.0800000e-006  5.0800000e-006  5.0800000e-
006
 5.0800000e-006  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3408 SOLMOD5  SOLSIM    2.4000000e-007  2.4000000e-007  2.4000000e-
007
 2.4000000e-007  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3638 SOLMOD5  SOLSOC    9.7200000e-007  9.7200000e-007  9.7200000e-
007
 9.7200000e-007  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3639 SOLMOD5  SOLSOH    1.0200000e-006  1.0200000e-006  1.0200000e-
006
 1.0200000e-006  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3405 SOLMOD6  SOLCIM    2.7000000e-005  8.8000000e-006  8.8000000e-
007
 8.8000000e-005  0.0000000e+000  8.8000000e-007 CUMULATIVE   moles/liter
         3405 SOLMOD6  SOLCIM    2.7000000e-005  8.8000000e-006  8.8000000e-
007
 8.8000000e-005  5.0000000e-001  8.8000000e-006 CUMULATIVE   moles/liter
         3405 SOLMOD6  SOLCIM    2.7000000e-005  8.8000000e-006  8.8000000e-
007
 8.8000000e-005  1.0000000e+000  8.8000000e-005 CUMULATIVE   moles/liter
         3640 SOLMOD6  SOLCOC    8.8000000e-006  8.8000000e-006  8.8000000e-
006
 8.8000000e-006  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3641 SOLMOD6  SOLCOH    8.8000000e-006  8.8000000e-006  8.8000000e-
006
 8.8000000e-006  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3409 SOLMOD6  SOLSIM    2.6000000e-005  8.7000000e-006  8.7000000e-
```

```
007
 8.7000000e-005  0.0000000e+000  8.7000000e-007 CUMULATIVE   moles/liter
         3409 SOLMOD6  SOLSIM    2.6000000e-005  8.7000000e-006  8.7000000e-
007
 8.7000000e-005  5.0000000e-001  8.7000000e-006 CUMULATIVE   moles/liter
         3409 SOLMOD6  SOLSIM    2.6000000e-005  8.7000000e-006  8.7000000e-
007
 8.7000000e-005  1.0000000e+000  8.7000000e-005 CUMULATIVE   moles/liter
         3642 SOLMOD6  SOLSOC    8.7000000e-006  8.7000000e-006  8.7000000e-
006
 8.7000000e-006  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3643 SOLMOD6  SOLSOH    8.7000000e-006  8.7000000e-006  8.7000000e-
006
 8.7000000e-006  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3264 SOLPU3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
         3264 SOLPU3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
         3264 SOLPU3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
         3264 SOLPU3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
         3264 SOLPU3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
         3264 SOLPU3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
         3264 SOLPU3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
         3264 SOLPU3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
         3264 SOLPU3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.0000000e+000  1.4000000e+000 CUMULATIVE   moles/liter
         3265 SOLPU3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
         3265 SOLPU3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
         3265 SOLPU3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
         3265 SOLPU3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
         3265 SOLPU3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
         3265 SOLPU3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
```

```
2.0000000e+000
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
         3265 SOLPU3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
         3265 SOLPU3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
         3265 SOLPU3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.0000000e+000  1.4000000e+000 CUMULATIVE   moles/liter
         3389 SOLPU4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
         3389 SOLPU4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
         3389 SOLPU4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
         3389 SOLPU4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
         3389 SOLPU4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
         3389 SOLPU4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
         3389 SOLPU4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
         3389 SOLPU4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
         3389 SOLPU4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.0000000e+000  1.4000000e+000 CUMULATIVE   moles/liter
         3266 SOLPU4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
         3266 SOLPU4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
         3266 SOLPU4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
         3266 SOLPU4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
         3266 SOLPU4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
         3266 SOLPU4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
         3266 SOLPU4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
```

```
2.0000000e+000
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
         3266 SOLPU4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
         3266 SOLPU4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.0000000e+000  1.4000000e+000 CUMULATIVE   moles/liter
         3627 SOLTH4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
         3627 SOLTH4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
         3627 SOLTH4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
         3627 SOLTH4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
         3627 SOLTH4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
         3627 SOLTH4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
         3627 SOLTH4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
         3627 SOLTH4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
         3627 SOLTH4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.0000000e+000  1.4000000e+000 CUMULATIVE   moles/liter
         3393 SOLTH4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
         3393 SOLTH4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
         3393 SOLTH4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
         3393 SOLTH4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
         3393 SOLTH4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
         3393 SOLTH4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
         3393 SOLTH4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
         3393 SOLTH4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
```

```
2.0000000e+000
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
         3393 SOLTH4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.0000000e+000  1.4000000e+000 CUMULATIVE   moles/liter
         3626 SOLU4    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
         3626 SOLU4    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
         3626 SOLU4    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
         3626 SOLU4    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
         3626 SOLU4    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
         3626 SOLU4    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
         3626 SOLU4    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
         3626 SOLU4    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
         3626 SOLU4    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.0000000e+000  1.4000000e+000 CUMULATIVE   moles/liter
         3390 SOLU4    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
         3390 SOLU4    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
         3390 SOLU4    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
         3390 SOLU4    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
         3390 SOLU4    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
         3390 SOLU4    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
         3390 SOLU4    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
         3390 SOLU4    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
         3390 SOLU4    SOLSIM    1.8000000e-001 -9.0000000e-002 -
```

```
2.0000000e+000
 1.4000000e+000  1.0000000e+000  1.4000000e+000 CUMULATIVE   moles/liter
         3392 SOLU6    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
         3392 SOLU6    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
         3392 SOLU6    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
         3392 SOLU6    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
         3392 SOLU6    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
         3392 SOLU6    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
         3392 SOLU6    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
         3392 SOLU6    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
         3392 SOLU6    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.0000000e+000  1.4000000e+000 CUMULATIVE   moles/liter
         3391 SOLU6    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
         3391 SOLU6    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
         3391 SOLU6    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
         3391 SOLU6    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
         3391 SOLU6    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
         3391 SOLU6    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
         3391 SOLU6    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
         3391 SOLU6    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
         3391 SOLU6    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.0000000e+000  1.4000000e+000 CUMULATIVE   moles/liter
         1659 SR       LOGSOLM   0.0000000e+000  0.0000000e+000
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```
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(moles/lit
          516 SR90     ATWEIGHT  8.9908000e-002  8.9908000e-002  8.9908000e-
002
 8.9908000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3380 SR90     EPAREL    1.0000000e+003  1.0000000e+003
1.0000000e+003
 1.0000000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          517 SR90     HALFLIFE  9.1900000e+008  9.1900000e+008
9.1900000e+008
 9.1900000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     s
         2039 SR90     INVCHD    2.8200000e+004  2.8200000e+004
2.8200000e+004
 2.8200000e+004  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          518 SR90     INVRHD    1.1800000e+005  1.1800000e+005
1.1800000e+005
 1.1800000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         2907 STEEL    CORRMCO2  1.5850000e-014  1.5850000e-014
0.0000000e+000
 3.1700000e-014  0.00000000e+000 0.0000000e+000 UNIFORM      m/s
         2908 STEEL    CORRWCO2  1.0318000e-013  1.0318000e-013
0.0000000e+000
 2.0635000e-013  0.00000000e+000 0.0000000e+000 UNIFORM      m/s
         2910 STEEL    HUMCORR   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m/s
         2898 STEEL    STOIFX    1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2909 SULFATE  QINIT     6.5900000e+006  6.5900000e+006
6.5900000e+006
 6.5900000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     moles
         2183 TAMARISK CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2243 TAMARISK COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2793 TAMARISK KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2244 TAMARISK PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2794 TAMARISK PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2795 TAMARISK PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2796 TAMARISK PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2185 TAMARISK PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2186 TAMARISK POROSITY  6.4000000e-002  6.4000000e-002
```

```
0.0000000e+000
 2.1700000e-001  0.00000000e+000 0.0000000e+000 STUDENT      NONE
         2186 TAMARISK POROSITY  6.4000000e-002  6.4000000e-002
0.0000000e+000
 2.1700000e-001  0.00000000e+000 2.0000000e-003 STUDENT      NONE
         2186 TAMARISK POROSITY  6.4000000e-002  6.4000000e-002
0.0000000e+000
 2.1700000e-001  0.00000000e+000 2.0000000e-003 STUDENT      NONE
         2186 TAMARISK POROSITY  6.4000000e-002  6.4000000e-002
0.0000000e+000
 2.1700000e-001  0.00000000e+000 3.0000000e-003 STUDENT      NONE
         2186 TAMARISK POROSITY  6.4000000e-002  6.4000000e-002
0.0000000e+000
 2.1700000e-001  0.00000000e+000 1.0000000e-002 STUDENT      NONE
         2186 TAMARISK POROSITY  6.4000000e-002  6.4000000e-002
0.0000000e+000
 2.1700000e-001  0.00000000e+000 2.1300000e-001 STUDENT      NONE
         2186 TAMARISK POROSITY  6.4000000e-002  6.4000000e-002
0.0000000e+000
 2.1700000e-001  0.00000000e+000 2.1700000e-001 STUDENT      NONE
         2914 TAMARISK PRMX_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2915 TAMARISK PRMY_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2916 TAMARISK PRMZ_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2191 TAMARISK RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2245 TAMARISK SAT_RBRN  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2192 TAMARISK SAT_RGAS  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3461 TH       CAPHUM    1.1000000e-005  1.1000000e-005  1.1000000e-
005
 1.1000000e-005  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3318 TH       CAPMIC    1.9000000e-003  1.9000000e-003  1.9000000e-
003
 1.9000000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3319 TH       CONCINT   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3437 TH       CONCMIN   2.6000000e-008  2.6000000e-008  2.6000000e-
008
 2.6000000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3320 TH       PROPMIC   3.1000000e+000  3.1000000e+000
3.1000000e+000
 3.1000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3449 TH+4     MD0       1.5300000e-010  1.5300000e-010  1.5300000e-
010
 1.5300000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     m^2/s
         3478 TH+4     MKD_TH    3.5000000e+000  2.6000000e+000  7.0000000e-
```

```
001
 1.0000000e+001  0.00000000e+000 0.0000000e+000 LOGUNIFORM   m^3/kg
         3216 TH227    ATWEIGHT  2.2702800e-001  2.2702800e-001  2.2702800e-
001
 2.2702800e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3356 TH227    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3300 TH227    HALFLIFE  1.6170000e+006  1.6170000e+006
1.6170000e+006
 1.6170000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3217 TH228    ATWEIGHT  2.2802900e-001  2.2802900e-001  2.2802900e-
001
 2.2802900e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3357 TH228    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3301 TH228    HALFLIFE  6.0370000e+007  6.0370000e+007
6.0370000e+007
 6.0370000e+007  0.00000000e+000 0.0000000e+000 CONSTANT     s
          603 TH229    ATWEIGHT  2.2903200e-001  2.2903200e-001  2.2903200e-
001
 2.2903200e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3381 TH229    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          604 TH229    HALFLIFE  2.3160000e+011  2.3160000e+011
2.3160000e+011
 2.3160000e+011  0.00000000e+000 0.0000000e+000 CONSTANT     s
          605 TH229    INVCHD    6.1200000e+000  6.1200000e+000
6.1200000e+000
 6.1200000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          606 TH229    INVRHD    1.8300000e-001  1.8300000e-001  1.8300000e-
001
 1.8300000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          607 TH230    ATWEIGHT  2.3003300e-001  2.3003300e-001  2.3003300e-
001
 2.3003300e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3382 TH230    EPAREL    1.0000000e+001  1.0000000e+001
1.0000000e+001
 1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          608 TH230    HALFLIFE  2.4300000e+012  2.4300000e+012
2.4300000e+012
 2.4300000e+012  0.00000000e+000 0.0000000e+000 CONSTANT     s
          609 TH230    INVCHD    2.2600000e-001  2.2600000e-001  2.2600000e-
001
 2.2600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          610 TH230    INVRHD    7.2400000e-003  7.2400000e-003  7.2400000e-
003
 7.2400000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3508 TH230L   INVCHD    6.3500000e+000  6.3500000e+000
6.3500000e+000
 6.3500000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3513 TH230L   INVRHD    1.9000000e-001  1.9000000e-001  1.9000000e-
001
 1.9000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3218 TH231    ATWEIGHT  2.3103600e-001  2.3103600e-001  2.3103600e-
```

```
001
 2.3103600e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3358 TH231    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3302 TH231    HALFLIFE  9.1870000e+004  9.1870000e+004
9.1870000e+004
 9.1870000e+004  0.00000000e+000 0.0000000e+000 CONSTANT     s
          611 TH232    ATWEIGHT  2.3203800e-001  2.3203800e-001  2.3203800e-
001
 2.3203800e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3383 TH232    EPAREL    1.0000000e+001  1.0000000e+001
1.0000000e+001
 1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          612 TH232    HALFLIFE  4.4340000e+017  4.4340000e+017
4.4340000e+017
 4.4340000e+017  0.00000000e+000 0.0000000e+000 CONSTANT     s
          613 TH232    INVCHD    6.6300000e+000  6.6300000e+000
6.6300000e+000
 6.6300000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          614 TH232    INVRHD    2.9100000e-001  2.9100000e-001  2.9100000e-
001
 2.9100000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3219 TH234    ATWEIGHT  2.3404400e-001  2.3404400e-001  2.3404400e-
001
 2.3404400e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3359 TH234    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3303 TH234    HALFLIFE  2.0820000e+006  2.0820000e+006
2.0820000e+006
 2.0820000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3196 TL207    ATWEIGHT  2.0697700e-001  2.0697700e-001  2.0697700e-
001
 2.0697700e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3360 TL207    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3304 TL207    HALFLIFE  2.8620000e+002  2.8620000e+002
2.8620000e+002
 2.8620000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3460 U        CAPHUM    1.1000000e-005  1.1000000e-005  1.1000000e-
005
 1.1000000e-005  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3308 U        CAPMIC    2.1000000e-003  2.1000000e-003  2.1000000e-
003
 2.1000000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3307 U        CONCINT   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3438 U        CONCMIN   2.6000000e-008  2.6000000e-008  2.6000000e-
008
 2.6000000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3309 U        PROPMIC   2.1000000e-003  2.1000000e-003  2.1000000e-
003
 2.1000000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3446 U+4      MD0       1.5300000e-010  1.5300000e-010  1.5300000e-
```

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010
 1.5300000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     m^2/s
         3479 U+4      MKD_U     3.5000000e+000  2.6000000e+000  7.0000000e-
001
 1.0000000e+001  0.00000000e+000 0.0000000e+000 LOGUNIFORM   m^3/kg
         3448 U+6      MD0       4.2600000e-010  4.2600000e-010  4.2600000e-
010
 4.2600000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     m^2/s
         3475 U+6      MKD_U     3.1000000e-003  7.7000000e-004  3.0000000e-
005
 2.0000000e-002  0.00000000e+000 0.0000000e+000 LOGUNIFORM   m^3/kg
          632 U233     ATWEIGHT  2.3304000e-001  2.3304000e-001  2.3304000e-
001
 2.3304000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3384 U233     EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          633 U233     HALFLIFE  5.0020000e+012  5.0020000e+012
5.0020000e+012
 5.0020000e+012  0.00000000e+000 0.0000000e+000 CONSTANT     s
          634 U233     INVCHD    1.4300000e+003  1.4300000e+003
1.4300000e+003
 1.4300000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          635 U233     INVRHD    4.3800000e+001  4.3800000e+001
4.3800000e+001
 4.3800000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          636 U234     ATWEIGHT  2.3404100e-001  2.3404100e-001  2.3404100e-
001
 2.3404100e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3385 U234     EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          637 U234     HALFLIFE  7.7160000e+012  7.7160000e+012
7.7160000e+012
 7.7160000e+012  0.00000000e+000 0.0000000e+000 CONSTANT     s
          638 U234     INVCHD    3.6400000e+002  3.6400000e+002
3.6400000e+002
 3.6400000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          639 U234     INVRHD    2.3500000e+001  2.3500000e+001
2.3500000e+001
 2.3500000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3507 U234L    INVCHD    1.7900000e+003  1.7900000e+003
1.7900000e+003
 1.7900000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3512 U234L    INVRHD    6.7300000e+001  6.7300000e+001
6.7300000e+001
 6.7300000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          640 U235     ATWEIGHT  2.3504400e-001  2.3504400e-001  2.3504400e-
001
 2.3504400e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3386 U235     EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          641 U235     HALFLIFE  2.2210000e+016  2.2210000e+016
2.2210000e+016
 2.2210000e+016  0.00000000e+000 0.0000000e+000 CONSTANT     s
          642 U235     INVCHD    1.3800000e+000  1.3800000e+000
```

```
1.3800000e+000
 1.3800000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          643 U235     INVRHD    9.7900000e-001  9.7900000e-001  9.7900000e-
001
 9.7900000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          644 U236     ATWEIGHT  2.3604600e-001  2.3604600e-001  2.3604600e-
001
 2.3604600e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3387 U236     EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          645 U236     HALFLIFE  7.3890000e+014  7.3890000e+014
7.3890000e+014
 7.3890000e+014  0.00000000e+000 0.0000000e+000 CONSTANT     s
         2216 U236     INVCHD    2.6000000e-001  2.6000000e-001  2.6000000e-
001
 2.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          646 U236     INVRHD    1.4800000e+000  1.4800000e+000
1.4800000e+000
 1.4800000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          647 U238     ATWEIGHT  2.3805100e-001  2.3805100e-001  2.3805100e-
001
 2.3805100e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3388 U238     EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          648 U238     HALFLIFE  1.4100000e+017  1.4100000e+017
1.4100000e+017
 1.4100000e+017  0.00000000e+000 0.0000000e+000 CONSTANT     s
          649 U238     INVCHD    2.4600000e+001  2.4600000e+001
2.4600000e+001
 2.4600000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          650 U238     INVRHD    1.3100000e+002  1.3100000e+002
1.3100000e+002
 1.3100000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         2217 UNNAMED  CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2218 UNNAMED  COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2799 UNNAMED  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2247 UNNAMED  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2800 UNNAMED  PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2801 UNNAMED  PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2802 UNNAMED  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2219 UNNAMED  PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
```

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001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2220 UNNAMED  POROSITY  1.8100000e-001  1.8100000e-001  2.0000000e-
003
 2.7300000e-001  0.00000000e+000 2.0000000e-003 STUDENT      NONE
         2220 UNNAMED  POROSITY  1.8100000e-001  1.8100000e-001  2.0000000e-
003
 2.7300000e-001  0.00000000e+000 2.6800000e-001 STUDENT      NONE
         2220 UNNAMED  POROSITY  1.8100000e-001  1.8100000e-001  2.0000000e-
003
 2.7300000e-001  0.00000000e+000 2.7300000e-001 STUDENT      NONE
         2911 UNNAMED  PRMX_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2912 UNNAMED  PRMY_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2913 UNNAMED  PRMZ_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2225 UNNAMED  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2248 UNNAMED  SAT_RBRN  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2226 UNNAMED  SAT_RGAS  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          651 WAS_AREA ABSROUGH  2.5000000e-002  2.5000000e-002  1.0000000e-
002
 4.0000000e-002  0.00000000e+000 0.0000000e+000 UNIFORM      m
          652 WAS_AREA CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3454 WAS_AREA CLOSMOD   4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          653 WAS_AREA COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2041 WAS_AREA DCELLCHW  5.8000000e+001  5.8000000e+001
5.8000000e+001
 5.8000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2274 WAS_AREA DCELLRHW  4.5000000e+000  4.5000000e+000
4.5000000e+000
 4.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         1992 WAS_AREA DIRNCCHW  1.7000000e+002  1.7000000e+002
1.7000000e+002
 1.7000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         1993 WAS_AREA DIRNCRHW  4.8000000e+002  4.8000000e+002
4.8000000e+002
 4.8000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2040 WAS_AREA DIRONCHW  1.1000000e+002  1.1000000e+002
1.1000000e+002
 1.1000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2044 WAS_AREA DIRONRHW  1.1000000e+002  1.1000000e+002
```

```
1.1000000e+002
 1.1000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2043 WAS_AREA DPLASCHW  4.2000000e+001  4.2000000e+001
4.2000000e+001
 4.2000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2275 WAS_AREA DPLASRHW  4.9000000e+000  4.9000000e+000
4.9000000e+000
 4.9000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         1995 WAS_AREA DPLSCCHW  1.6000000e+001  1.6000000e+001
1.6000000e+001
 1.6000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2228 WAS_AREA DPLSCRHW  1.4000000e+000  1.4000000e+000
1.4000000e+000
 1.4000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2042 WAS_AREA DRUBBCHW  1.4000000e+001  1.4000000e+001
1.4000000e+001
 1.4000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2046 WAS_AREA DRUBBRHW  3.1000000e+000  3.1000000e+000
3.1000000e+000
 3.1000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
          656 WAS_AREA GRATMICH  6.3420000e-010  6.3420000e-010
0.0000000e+000
 1.2684000e-009  0.00000000e+000 0.0000000e+000 UNIFORM      moles/(kg*s)
          657 WAS_AREA GRATMICI  4.9150000e-009  4.9150000e-009  3.1710000e-
010
 9.5129000e-009  0.00000000e+000 0.0000000e+000 UNIFORM      moles/(kg*s)
         2804 WAS_AREA KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          658 WAS_AREA PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2805 WAS_AREA PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2806 WAS_AREA PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          661 WAS_AREA PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          659 WAS_AREA PORE_DIS  3.2500000e+000  2.8900000e+000
1.4400000e+000
 5.7800000e+000  0.0000000e+000  1.4400000e+000 CUMULATIVE   NONE
          659 WAS_AREA PORE_DIS  3.2500000e+000  2.8900000e+000
1.4400000e+000
 5.7800000e+000  5.0000000e-001  2.8900000e+000 CUMULATIVE   NONE
          659 WAS_AREA PORE_DIS  3.2500000e+000  2.8900000e+000
1.4400000e+000
 5.7800000e+000  1.0000000e+000  5.7800000e+000 CUMULATIVE   NONE
          660 WAS_AREA POROSITY  8.4800000e-001  8.4800000e-001  8.4800000e-
001
 8.4800000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          662 WAS_AREA PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          663 WAS_AREA PRMX_LOG -1.2619800e+001 -1.2619800e+001 -
```

```
1.2619800e+001
-1.2619800e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          664 WAS_AREA PRMY_LOG -1.2619800e+001 -1.2619800e+001 -
1.2619800e+001
-1.2619800e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          665 WAS_AREA PRMZ_LOG -1.2619800e+001 -1.2619800e+001 -
1.2619800e+001
-1.2619800e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2823 WAS_AREA PROBDEG   2.0000000e+000  2.0000000e+000
0.0000000e+000
 2.0000000e+000  5.0000000e-001  0.0000000e+000 DELTA        NONE
         2823 WAS_AREA PROBDEG   2.0000000e+000  2.0000000e+000
0.0000000e+000
 2.0000000e+000  2.5000000e-001  1.0000000e+000 DELTA        NONE
         2823 WAS_AREA PROBDEG   2.0000000e+000  2.0000000e+000
0.0000000e+000
 2.0000000e+000  2.5000000e-001  2.0000000e+000 DELTA        NONE
         3549 WAS_AREA PTHRESH   8.0000000e+006  8.0000000e+006
8.0000000e+006
 8.0000000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          668 WAS_AREA RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          669 WAS_AREA SAT_IBRN  1.5000000e-002  1.5000000e-002  1.5000000e-
002
 1.5000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          670 WAS_AREA SAT_RBRN  2.7600000e-001  2.7600000e-001
0.0000000e+000
 5.5200000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
          671 WAS_AREA SAT_RGAS  7.5000000e-002  7.5000000e-002
0.0000000e+000
 1.5000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2231 WAS_AREA SAT_WICK  5.0000000e-001  5.0000000e-001
0.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2232 WAS_AREA VOLCHW    1.6900000e+005  1.6900000e+005
1.6900000e+005
 1.6900000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     m^3
         2233 WAS_AREA VOLRHW    7.0800000e+003  7.0800000e+003
7.0800000e+003
 7.0800000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     m^3
         3548 WAS_AREA VOLSPALL  2.2500000e+000  2.2500000e+000  5.0000000e-
001
 4.0000000e+000  0.00000000e+000 0.0000000e+000 UNIFORM      m^3
         3198 Y90      ATWEIGHT  8.9907000e-002  8.9907000e-002  8.9907000e-
002
 8.9907000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3361 Y90      EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3305 Y90      HALFLIFE  2.3040000e+005  2.3040000e+005
2.3040000e+005
 2.3040000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3199 ZR90     ATWEIGHT  8.9905000e-002  8.9905000e-002  8.9905000e-
002
 8.9905000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3362 ZR90     EPAREL    0.0000000e+000  0.0000000e+000
```

```
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3306 ZR90     HALFLIFE  1.0000000e+038  1.0000000e+038
1.0000000e+038
 1.0000000e+038  0.00000000e+000 0.0000000e+000 CONSTANT     s

$




$ libcra1_cusp
%CMS-I-LIBIS, library is PACMS2:[CMS_CRA1.CRA1_CUSP]
%CMS-S-LIBSET, library set
$ cfe cusp_cra1_s5_m_t3000.inp
Your CMS library list consists of:
  PACMS2:[CMS_CRA1.CRA1_CUSP]

%CMS-S-FETCHED, generation 2 of element
PACMS2:[CMS_CRA1.CRA1_CUSP]CUSP_CRA1_S5_
M_T3000.INP fetched
$ type cusp_cra1_s5_m_t3000.inp
!   J. Stein: May 05/2003 Modified to account for CRA BRAGFLO grid.
!   Changes include element numbers from CCA/PAVT to TBM to CRA and
subdividing
!   the repository into 3 regions instead of 4.
!
!   Intrusion
!
TINTR          3000.0
PARTDIA    BLOWOUT:PARTDIA

!   Properties

TAUFAIL    BOREHOLE:TAUFAIL

DIAMMOD    BOREHOLE:DIAMMOD
DOMEGA     BOREHOLE:DOMEGA
DNSFLUID   DRILLMUD:DNSFLUID
VISCO      DRILLMUD:VISCO
YLDSTRSS   DRILLMUD:YLDSTRSS
ABSROUGH   WAS_AREA:ABSROUGH

!
!   BRAGFLO
!
! Multiple hits (max of 10, 0 thru 9)
!
! NHIT_0   is associated with the hit that
!           CUTTINGS used for BRAGFLO properties
!

INTR_0   CAVITY_1       <

INTR_1   1434 1435 1436 1437 1438 1439 <

INTR_2   1428 1429 1430 1431 1432 1433  <
```

```
INTR_3   2225  <

INTR_4   2244  <

INTR_5   1168  <

INTR_6   1417  <

INTR_7   DRZ_0  <

!
!   Spallings
!

MODEL4

! Properties for Model 4

PTHRESH   WAS_AREA:PTHRESH
RNDSPALL  SPALLMOD:RNDSPALL
REPPRES   1428 1429 1430 1431 1432 1433 <

$ cfe cusp_cra1_template.inp
Your CMS library list consists of:
  PACMS2:[CMS_CRA1.CRA1_CUSP]

%CMS-S-FETCHED, generation 1 of element
PACMS2:[CMS_CRA1.CRA1_CUSP]CUSP_CRA1_TEM
PLATE.INP fetched
$ type cusp_cra1_template.inp
!!  WIPP PA TBM
!!
!!  Template file for PRE_CUSP Ingres SDB interface
!!

  MODEL_DATA
!!
!!  =wipp::my_database:calc_name
!!
=wipp::wipp_copy:epa_test

!
!    The following input variables are hard wired and are related to the
!    repository model J. W. Berglund paper
!
! PR_MAX  <>The maximum pressure allowed by model
 PR_MAX            15.0E6

! PR_MIN  <>The minimum pressure allowed by model
 PR_MIN             0.0E6

! PE_MAX  <>The maximum permeability allowed by model
 PE_MAX           1.0E-12

! PE_MIN  <>The minimum permeability allowed by model
 PE_MIN           1.0E-17
```

```
! PCUT    <> Pressure (pa) which defines the border between the
!                      erosion phase and the blowout phase
 PCUT               8.0E6

! PGAS    <> Pressure (pa) whick defines the border between the gas
!                      erosion phase and the stuck pipe phase
 PGAS              10.0E6

! KCRIT   <> Permeability which defines the border between the blowout
!                      phase and the gas erosion/stuck pipe phase
 KCRIT            1.0E-16



!
! Properties relative to the model (repository) <<<<<<<<<<<<<<<<<<<<<<<
!
! DELTR   <>  Delta radius for derivative in stress calculation
 DELTR            0.00001

! ITER    <> Number of iterations to solve for Reynolds number
 ITER         1

! FGE     <>  Gravity  effectiveness factor
 BLOWOUT:FGE

! FSE     <>  Strength effectiveness factor
 BLOWOUT:FSE

! FCE     <>  Cementation  effectiveness factor
 BLOWOUT:FCE

! CEMCEM  <>  Cementation stress
 BLOWOUT:CEMENT

! SUFTEN  <> Surface tension (N/N)
 BLOWOUT:SUFTEN



! Properities of the gas (Hydrogen) the repository <<<<<<<<<<<<<<<<<<<<<<<
!
! KGAS    <> Ratio of Specific Heats
 BLOWOUT:KGAS

! RGAS    <> Gas Constant for Hydrogen
 BLOWOUT:RGAS

! VISC    <> Hydrogen viscosity
 BLOWOUT:VISC

! PSUF    <> Surface presure (Pa)
 BLOWOUT:PSUF
```

```
! Properities to do with the repository <<<<<<<<<<<<<<<<<<<<<<<<
!
! TREPO   <> Temperature of repository (K)
 BLOWOUT:TREPO

! DEPTH   <> Distance from repository depth to depth where casing
!                       is set (m)
 BLOWOUT            716.0

! FLWCNST <> Percent volume of material that is carried by drilling
!                       mud (unitless)
 FLWCNST             0.05

! HREPO   <> Height of repository at burial time      (4m)
 BLOWOUT:HREPO

! RPANEL  <> The equivalent radius of 1 panel     (910.0m**2)
 BLOWOUT:RPANEL

! ROOM    <> The equivalent radius of 1 room     (11,640m**2)
 BLOWOUT:ROOM

! RHOS    <> Waste particle density                (kg/m**3)
 BLOWOUT:RHOS


! Variables to do with drilling <<<<<<<<<<<<<<<<<<<<<<<<

! L1      <> Collar Length (m)
 BOREHOLE:L1

! L2      <> Drill pipe length (m)
 BOREHOLE:L2

! COLDIA  <> Collar diameter (m)
 BOREHOLE:COLDIA

! PIPED   <> Drill pipe diameter (m)
 BOREHOLE:PIPED

! ROUGHP  <> Friction factor (unitless)
 BOREHOLE:ROUGHP

!
! APORO   <> A constant in equation to determine permeability as a
!                       function of porosity
 BLOWOUT:APORO

! NPORO   <> N constant in equation to determine permeability as a
!                       function of porosity
 BLOWOUT              0.0
!
! END_OF_MODEL_INPUT
!


  RADIONUCLIDE_DATA
```

```
!GEOMETRY

 BOREHOLE:INV_AR

 BOREHOLE:RHW_AR

 BOREHOLE:WUF

!MATERIAL
 OUT_MAT      BOREHOLE

!REPOSITORY_TYPE

REP_NAME    WIPP
REP_GEOLogy HALITE

RADWASte_type  CONtact_handled

!RADIOISOTOPE_chains

!
!  chain1/chain2 from U234  & down are the same:
!  (It is required that both chains are input)

!         \/      \/      \/      \/      \/       \/      \/

CHAIN1    PU242   U238    TH234   PA234M  U234    TH230   RA226
          RN222   PO218   PB214   BI214   PO214   PB210   <

CHAIN2    PU238   U234    TH230   RA226   RN222   PO218
          PB214   BI214   PO214   PB210   <

!  chain3/chain4 from PU239 & down are the same:

CHAIN3    AM243   NP239   PU239   U235    TH231   PA231   AC227
          TH227   RA223   RN219   PO215   PB211   BI211   TL207   <

CHAIN4    CM243   PU239   U235    TH231   PA231   AC227   TH227
          RA223   RN219   PO215   PB211   BI211   TL207   PB209   <

!  chain5/chain6 from U236  & down are the same:

CHAIN5    CF252   CM248   PU244   PU240   U236    TH232   RA228
          AC228   TH228   RA224   RN220   PO216   PB212   BI212
          PO212   <

CHAIN6    CM244   PU240   U236    TH232   RA228   AC228   TH228
          RA224   RN220   PO216   PB212   BI212   PO212   <


CHAIN7    CM245   PU241   AM241   NP237   PA233   U233    TH229
          RA225   AC225   FR221   AT217   BI213   PO213    <

CHAIN8    CS137   BA137M  <
```

```
CHAIN9    PM147   SM147   ND143   <

CHAIN10   SR90    Y90     ZR90    <

!          ^       ^       ^       ^       ^       ^       ^


SAVE    AM241  AM243  CF252  CM243  CM244  CM245  CM248  CS137
        NP237  PA231  PB210  PM147  PU238  PU239  PU240  PU241
        PU242  PU244  RA226  RA228  SR90   TH229  TH230  TH232
        U233   U234   U235   U236   U238  <


  TABLULAR_DATA

!
! Example of how the radioisotope data is input:
!
!...1st Line: Radionuclide (an asterisk in column 1 followed
!                       by radionuclide name, ex; *AC225 )
!...2nd & 3rd line
!
!...Field#1 Atomic Weight       (Kg/Mole) AWT    [REAL] (3(11x,1pe14.6))
!...Field#2 Half-Life            (Years)  HALFY  [REAL]         "
!...Field#3 Activity Conversion  (Ci/Kg)  AWTCNV [REAL]         "
!...Field#4 EPA Release Limit     (Ci)    EPAREL [REAL]         "
!...Field#5 Inventory             (Ci)    INVCHD [REAL]         "
!...Field#6 Inventory             (Ci)    INVRHD [REAL]         "
!
!*PU241
!xxxaaaaaaaaeeeeeeeeeeeeeeeexxxaaaaaaaaeeeeeeeeeeeeeeeexxxaaaaaaaaeeeeeeeeeeeeeeee
!   AWT       2.410000E-01   HALFY     1.439900E+01   ACTCNV    1.030000E+05
!   EPAREL    1.000000E+07   INVCHD    1.930000E+06   INVRHD    0.000000E+00
!
!
<TABLE_INPUTS
<GENERATE_RADIO>
END_TABLES>
!
! END_OF_RADIOISOTOPE_INPUT
!
$ cfe ms_cusp_cra1.inp
Your CMS library list consists of:
  PACMS2:[CMS_CRA1.CRA1_MS]

%CMS-S-FETCHED, generation 2 of element
PACMS2:[CMS_CRA1.CRA1_MS]MS_CUSP_CRA1.IN
P fetched
$ type ms_cusp_cra1.inp
!==========================================================================
!
!   FILETYPE: MATSET input file for Cuttings_S
!   ANALYSTS: Joel D. Miller
!   DATE:     06/20/97
!   PURPOSE:  WIPP PA C97
!
!==========================================================================
```

```
!
*PRINT_ASSIGNED_VALUES
!
*HEADING
 TITLE, CUSP MATSET INPUT FILE
 SCALE, LOCAL
 SCENARIO, ALL
!
*UNITS=SI
!
*CREATE_blocks
 BLOCK_IDS=2,3,4,5
!
*RETRIEVE
 COORD, DIM=3, NAMES=X,Y,Z
!
! ...Define region names
 MATERIAL, 1=BLOWOUT, 2=BOREHOLE, 3=DRILLMUD, 4=WAS_AREA, 5=SPALLMOD
!
!1...Define BLOWOUT  property names
 PROPERTY, MATerial=BLOWOUT, NAMES=PARTDIA
!
!2...Define BOREHOLE property names
 PROPERTY, MATerial=BOREHOLE, NAMES=DIAMMOD, DOMEGA, TAUFAIL
!
!3...Define DRILLMUD property names
 PROPERTY, MATerial=DRILLMUD, NAMES=DNSFLUID, VISCO, YLDSTRSS
!
!
!4...Define WAS_AREA property names
 PROPERTY, MATerial=WAS_AREA, NAMES=ABSROUGH, PTHRESH, VOLSPALL
!
!5...Define SPALLMOD property names
 PROPERTY, MATerial=SPALLMOD, NAMES=RNDSPALL
!
!
SET*VALUES
!
!#### Assign values to material property names not   ####
!#### found in the Secondary Database (PROPERTY.SDB) ####
!
PROPERTY   MATERIAL=SPALLMOD,    NAMES*VALUE: RNDSPALL=0.5
!========================================================================
*END


$ libcra1_cusp
%CMS-I-LIBIS, library is PACMS2:[CMS_CRA1.CRA1_CUSP]
%CMS-S-LIBSET, library set
-CMS-I-SUPERSEDE, library list superseded
$ cfe cusp_cra1.sdb
Your CMS library list consists of:
  PACMS2:[CMS_CRA1.CRA1_CUSP]

%CMS-I-FILEXISTS, file already exists, EPA:[ROOT.PFSALTE]CUSP_CRA1.SDB;2
created
%CMS-S-FETCHED, generation 2 of element
```

```
PACMS2:[CMS_CRA1.CRA1_CUSP]CUSP_CRA1.SDB
fetched
$ type cusp_cra1.sdb
value
         3220 AC225    ATWEIGHT  2.2502300e-001  2.2502300e-001  2.2502300e-
001
 2.2502300e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3321 AC225    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3267 AC225    HALFLIFE  8.6400000e+005  8.6400000e+005
8.6400000e+005
 8.6400000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3221 AC227    ATWEIGHT  2.2702800e-001  2.2702800e-001  2.2702800e-
001
 2.2702800e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3364 AC227    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3268 AC227    HALFLIFE  6.8710000e+008  6.8710000e+008
6.8710000e+008
 6.8710000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3222 AC228    ATWEIGHT  2.2803100e-001  2.2803100e-001  2.2803100e-
001
 2.2803100e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3322 AC228    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3269 AC228    HALFLIFE  2.2070000e+004  2.2070000e+004
2.2070000e+004
 2.2070000e+004  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3457 AM       CAPHUM    1.1000000e-005  1.1000000e-005  1.1000000e-
005
 1.1000000e-005  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3447 AM       CAPMIC    1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3310 AM       CONCINT   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3441 AM       CONCMIN   2.6000000e-008  2.6000000e-008  2.6000000e-
008
 2.6000000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3311 AM       PROPMIC   3.6000000e+000  3.6000000e+000
3.6000000e+000
 3.6000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3444 AM+3     MD0       3.0000000e-010  3.0000000e-010  3.0000000e-
010
 3.0000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     m^2/s
         3482 AM+3     MKD_AM    1.3000000e-001  9.0000000e-002  2.0000000e-
002
 4.0000000e-001  0.00000000e+000 0.0000000e+000 LOGUNIFORM   m^3/kg
            2 AM241    ATWEIGHT  2.4105700e-001  2.4105700e-001  2.4105700e-
001
 2.4105700e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3363 AM241    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
```

```
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
            3 AM241    HALFLIFE  1.3640000e+010  1.3640000e+010
1.3640000e+010
 1.3640000e+010  0.00000000e+000 0.0000000e+000 CONSTANT     s
            4 AM241    INVCHD    4.7800000e+005  4.7800000e+005
4.7800000e+005
 4.7800000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
            5 AM241    INVRHD    3.9600000e+004  3.9600000e+004
3.9600000e+004
 3.9600000e+004  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3504 AM241L   INVCHD    4.9500000e+005  4.9500000e+005
4.9500000e+005
 4.9500000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3509 AM241L   INVRHD    4.4600000e+004  4.4600000e+004
4.4600000e+004
 4.4600000e+004  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3223 AM243    ATWEIGHT  2.4306100e-001  2.4306100e-001  2.4306100e-
001
 2.4306100e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3365 AM243    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
            6 AM243    HALFLIFE  2.3290000e+011  2.3290000e+011
2.3290000e+011
 2.3290000e+011  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3415 AM243    INVCHD    3.3400000e+001  3.3400000e+001
3.3400000e+001
 3.3400000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3416 AM243    INVRHD    7.9800000e-001  7.9800000e-001  7.9800000e-
001
 7.9800000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         2276 ASPHALT  CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2277 ASPHALT  COMP_RCK  3.0000000e-010  3.0000000e-010  3.0000000e-
010
 3.0000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3238 ASPHALT  DNSGRAIN  2.0222000e+003  2.0222000e+003
2.0222000e+003
 2.0222000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2599 ASPHALT  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2278 ASPHALT  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2600 ASPHALT  PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2601 ASPHALT  PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2281 ASPHALT  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2279 ASPHALT  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
```

```
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2279 ASPHALT  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2279 ASPHALT  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2280 ASPHALT  POROSITY  1.0000000e-002  1.0000000e-002  1.0000000e-
002
 1.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2282 ASPHALT  PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2283 ASPHALT  PRMX_LOG -1.9667000e+001 -2.0000000e+001 -
2.1000000e+001
-1.8000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2284 ASPHALT  PRMY_LOG -1.9667000e+001 -2.0000000e+001 -
2.1000000e+001
-1.8000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2285 ASPHALT  PRMZ_LOG -1.9667000e+001 -2.0000000e+001 -
2.1000000e+001
-1.8000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2933 ASPHALT  RADN_DRZ  1.6290000e+000  1.6290000e+000
1.6290000e+000
 1.6290000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2289 ASPHALT  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2929 ASPHALT  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2932 ASPHALT  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2930 ASPHALT  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2931 ASPHALT  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2290 ASPHALT  SAT_IBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2291 ASPHALT  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2291 ASPHALT  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2291 ASPHALT  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2292 ASPHALT  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         3224 AT217    ATWEIGHT  2.1700500e-001  2.1700500e-001  2.1700500e-
001
```

```
 2.1700500e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3323 AT217    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3270 AT217    HALFLIFE  3.2300000e-002  3.2300000e-002  3.2300000e-
002
 3.2300000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3225 BA137    ATWEIGHT  1.3690600e-001  1.3690600e-001  1.3690600e-
001
 1.3690600e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3324 BA137    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3271 BA137    HALFLIFE  1.0000000e+038  1.0000000e+038
1.0000000e+038
 1.0000000e+038  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3226 BA137M   ATWEIGHT  1.3690700e-001  1.3690700e-001  1.3690700e-
001
 1.3690700e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3325 BA137M   EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3272 BA137M   HALFLIFE  1.5310000e+002  1.5310000e+002
1.5310000e+002
 1.5310000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3174 BH_CREEP CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3172 BH_CREEP COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3180 BH_CREEP KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3175 BH_CREEP PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3181 BH_CREEP PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3182 BH_CREEP PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3179 BH_CREEP PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3178 BH_CREEP PORE_DIS  9.4000000e-001  9.4000000e-001  9.4000000e-
001
 9.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3171 BH_CREEP POROSITY  3.2000000e-001  3.2000000e-001  3.2000000e-
001
 3.2000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3183 BH_CREEP PRMX_LOG -1.3500000e+001 -1.3500000e+001 -
1.5000000e+001
-1.2000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
         3188 BH_CREEP PRMY_LOG -1.3500000e+001 -1.3500000e+001 -
1.5000000e+001
```

```
-1.2000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
         3189 BH_CREEP PRMZ_LOG -1.3500000e+001 -1.3500000e+001 -
1.5000000e+001
-1.2000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
         3173 BH_CREEP RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3176 BH_CREEP SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3177 BH_CREEP SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3138 BH_OPEN  CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3136 BH_OPEN  COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3144 BH_OPEN  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3139 BH_OPEN  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3145 BH_OPEN  PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3146 BH_OPEN  PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3143 BH_OPEN  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3142 BH_OPEN  PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3135 BH_OPEN  POROSITY  3.2000000e-001  3.2000000e-001  3.2000000e-
001
 3.2000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3134 BH_OPEN  PRMX_LOG -9.0000000e+000 -9.0000000e+000 -
9.0000000e+000
-9.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         3186 BH_OPEN  PRMY_LOG -9.0000000e+000 -9.0000000e+000 -
9.0000000e+000
-9.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         3187 BH_OPEN  PRMZ_LOG -9.0000000e+000 -9.0000000e+000 -
9.0000000e+000
-9.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         3137 BH_OPEN  RELP_MOD  5.0000000e+000  5.0000000e+000
5.0000000e+000
 5.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3140 BH_OPEN  SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3141 BH_OPEN  SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
```

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 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3162 BH_SAND  CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3160 BH_SAND  COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3168 BH_SAND  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3163 BH_SAND  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3169 BH_SAND  PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3170 BH_SAND  PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3167 BH_SAND  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3166 BH_SAND  PORE_DIS  9.4000000e-001  9.4000000e-001  9.4000000e-
001
 9.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3159 BH_SAND  POROSITY  3.2000000e-001  3.2000000e-001  3.2000000e-
001
 3.2000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3184 BH_SAND  PRMX_LOG -1.3650000e+001 -1.3650000e+001 -
1.6300000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
         3190 BH_SAND  PRMY_LOG -1.3650000e+001 -1.3650000e+001 -
1.6300000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
         3191 BH_SAND  PRMZ_LOG -1.3650000e+001 -1.3650000e+001 -
1.6300000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
         3161 BH_SAND  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3164 BH_SAND  SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3165 BH_SAND  SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3227 BI211    ATWEIGHT  2.1098700e-001  2.1098700e-001  2.1098700e-
001
 2.1098700e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3326 BI211    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3273 BI211    HALFLIFE  1.2780000e+002  1.2780000e+002
1.2780000e+002
 1.2780000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3228 BI212    ATWEIGHT  2.1199100e-001  2.1199100e-001  2.1199100e-
001
```

```
 2.1199100e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3327 BI212    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3274 BI212    HALFLIFE  3.6330000e+003  3.6330000e+003
3.6330000e+003
 3.6330000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3229 BI213    ATWEIGHT  2.1299400e-001  2.1299400e-001  2.1299400e-
001
 2.1299400e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3328 BI213    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3275 BI213    HALFLIFE  2.7390000e+003  2.7390000e+003
2.7390000e+003
 2.7390000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3230 BI214    ATWEIGHT  2.1399900e-001  2.1399900e-001  2.1399900e-
001
 2.1399900e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3329 BI214    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3276 BI214    HALFLIFE  1.1940000e+003  1.1940000e+003
1.1940000e+003
 1.1940000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3259 BLOWOUT  APORO     2.4000000e-013  2.4000000e-013  2.4000000e-
013
 2.4000000e-013  0.00000000e+000 0.0000000e+000 CONSTANT     m^2
         3245 BLOWOUT  CEMENT    6.8950000e+003  6.8950000e+003
6.8950000e+003
 6.8950000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3420 BLOWOUT  FCE       1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3256 BLOWOUT  FGE       9.5500000e+000  9.5500000e+000
1.0000000e+000
 1.8100000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         3255 BLOWOUT  FSE       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3470 BLOWOUT  GAS_MIN   1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     mscf/day
         3250 BLOWOUT  HREPO     3.9600000e+000  3.9600000e+000
3.9600000e+000
 3.9600000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3260 BLOWOUT  INPORO    8.4900000e-001  8.4900000e-001  8.4900000e-
001
 8.4900000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3254 BLOWOUT  KGAS      1.4100000e+000  1.4100000e+000
1.4100000e+000
 1.4100000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3471 BLOWOUT  MAXFLOW   9.5040000e+005  9.5040000e+005
9.5040000e+005
 9.5040000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3472 BLOWOUT  MINFLOW   2.5920000e+005  2.5920000e+005
2.5920000e+005
```

```
 2.5920000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     s
        3246 BLOWOUT  PARTDIA   2.3500000e-002  2.8000000e-003  4.0000000e-
005
 2.0000000e-001  0.00000000e+000 0.0000000e+000 LOGUNIFORM   m
        3251 BLOWOUT  PSUF      8.9465000e+004  8.9465000e+004
8.9465000e+004
 8.9465000e+004  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        3456 BLOWOUT  RE_CAST   1.1400000e+002  1.1400000e+002
1.1400000e+002
 1.1400000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     m
        3253 BLOWOUT  RGAS      4.1160000e+003  4.1160000e+003
4.1160000e+003
 4.1160000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     N*m/kg/K
        3247 BLOWOUT  RHOS      2.6500000e+003  2.6500000e+003
2.6500000e+003
 2.6500000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
        3248 BLOWOUT  ROOM      1.7100000e+001  1.7100000e+001
1.7100000e+001
 1.7100000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     m
        3249 BLOWOUT  RPANEL    6.0870000e+001  6.0870000e+001
6.0870000e+001
 6.0870000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     m
        3257 BLOWOUT  SUFTEN    8.0000000e-002  8.0000000e-002  8.0000000e-
002
 8.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     N/m
        3473 BLOWOUT  THCK_CAS  1.2583000e+002  1.2583000e+002
1.2583000e+002
 1.2583000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     m
        3258 BLOWOUT  TREPO     3.0000000e+002  3.0000000e+002
3.0000000e+002
 3.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     K
        3252 BLOWOUT  VISC      9.2000000e-006  9.2000000e-006  9.2000000e-
006
 9.2000000e-006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa*s
          23 BOREHOLE CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3242 BOREHOLE COLDIA    2.0320040e-001  2.0320040e-001  2.0320040e-
001
 2.0320040e-001  0.00000000e+000 0.0000000e+000 CONSTANT     m
          25 BOREHOLE COMP_RCK  2.6400000e-009  2.6400000e-009  2.6400000e-
009
 2.6400000e-009  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
          26 BOREHOLE DIAMMOD   3.1115000e-001  3.1115000e-001  3.1115000e-
001
 3.1115000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     m
          27 BOREHOLE DOMEGA    8.6300000e+000  7.8000000e+000
4.2000000e+000
 2.3000000e+001  0.0000000e+000  4.2000000e+000 CUMULATIVE   rad/s
          27 BOREHOLE DOMEGA    8.6300000e+000  7.8000000e+000
4.2000000e+000
 2.3000000e+001  1.5000000e-001  6.3000000e+000 CUMULATIVE   rad/s
          27 BOREHOLE DOMEGA    8.6300000e+000  7.8000000e+000
4.2000000e+000
 2.3000000e+001  6.5000000e-001  8.4000000e+000 CUMULATIVE   rad/s
          27 BOREHOLE DOMEGA    8.6300000e+000  7.8000000e+000
4.2000000e+000
```

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 2.3000000e+001  8.0000000e-001  1.0500000e+001 CUMULATIVE   rad/s
           27 BOREHOLE DOMEGA    8.6300000e+000  7.8000000e+000
4.2000000e+000
 2.3000000e+001  9.0000000e-001  1.2600000e+001 CUMULATIVE   rad/s
           27 BOREHOLE DOMEGA    8.6300000e+000  7.8000000e+000
4.2000000e+000
 2.3000000e+001  9.5000000e-001  1.4700000e+001 CUMULATIVE   rad/s
           27 BOREHOLE DOMEGA    8.6300000e+000  7.8000000e+000
4.2000000e+000
 2.3000000e+001  9.7000000e-001  1.6800000e+001 CUMULATIVE   rad/s
           27 BOREHOLE DOMEGA    8.6300000e+000  7.8000000e+000
4.2000000e+000
 2.3000000e+001  9.8000000e-001  1.8800000e+001 CUMULATIVE   rad/s
           27 BOREHOLE DOMEGA    8.6300000e+000  7.8000000e+000
4.2000000e+000
 2.3000000e+001  9.9000000e-001  2.0900000e+001 CUMULATIVE   rad/s
           27 BOREHOLE DOMEGA    8.6300000e+000  7.8000000e+000
4.2000000e+000
 2.3000000e+001  1.0000000e+000  2.3000000e+001 CUMULATIVE   rad/s
         3239 BOREHOLE INV_AR    1.1152000e+005  1.1152000e+005
1.1152000e+005
 1.1152000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     m^2
         3122 BOREHOLE KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3244 BOREHOLE L1        1.8288000e+002  1.8288000e+002
1.8288000e+002
 1.8288000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3243 BOREHOLE L2        4.7212000e+002  4.7212000e+002
4.7212000e+002
 4.7212000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     m
           29 BOREHOLE PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3120 BOREHOLE PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3121 BOREHOLE PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3241 BOREHOLE PIPED     1.1430020e-001  1.1430020e-001  1.1430020e-
001
 1.1430020e-001  0.00000000e+000 0.0000000e+000 CONSTANT     m
           32 BOREHOLE PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
           30 BOREHOLE PORE_DIS  9.4000000e-001  9.4000000e-001  9.4000000e-
001
 9.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           31 BOREHOLE POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           34 BOREHOLE PRMX_LOG -1.2230000e+001 -1.2500000e+001 -
1.4000000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 NORMAL       log(m^2)
           35 BOREHOLE PRMY_LOG -1.2230000e+001 -1.2500000e+001 -
1.4000000e+001
```

```
-1.1000000e+001  0.00000000e+000 0.0000000e+000 NORMAL       log(m^2)
           36 BOREHOLE PRMZ_LOG -1.2230000e+001 -1.2500000e+001 -
1.4000000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 NORMAL       log(m^2)
           40 BOREHOLE RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3261 BOREHOLE RHW_AR    1.5760000e+004  1.5760000e+004
1.5760000e+004
 1.5760000e+004  0.00000000e+000 0.0000000e+000 CONSTANT     m^2
         3240 BOREHOLE ROUGHP    8.0000000e-002  8.0000000e-002  8.0000000e-
002
 8.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           41 BOREHOLE SAT_RBRN  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           42 BOREHOLE SAT_RGAS  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2254 BOREHOLE TAUFAIL   1.0500000e+001  1.9600000e+000  5.0000000e-
002
 7.7000000e+001  0.00000000e+000 0.0000000e+000 LOGUNIFORM   Pa
         3414 BOREHOLE WUF       2.9600000e+000  2.9600000e+000
2.9600000e+000
 2.9600000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
           48 BRINESAL COMPRES   3.1000000e-010  3.1000000e-010  3.1000000e-
010
 3.1000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
           49 BRINESAL DNSFLUID  1.2200000e+003  1.2200000e+003
1.2200000e+003
 1.2200000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
           50 BRINESAL REF_PRES  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
           51 BRINESAL REF_TEMP  3.0015000e+002  3.0015000e+002
3.0015000e+002
 3.0015000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     K
           55 BRINESAL VISCO     2.1000000e-003  2.1000000e-003  2.1000000e-
003
 2.1000000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     Pa*s
           57 BRINESAL WTF       3.2400000e-001  3.2400000e-001  3.0700000e-
001
 3.3200000e-001  0.00000000e+000 3.0700000e-001 STUDENT      NONE
           57 BRINESAL WTF       3.2400000e-001  3.2400000e-001  3.0700000e-
001
 3.3200000e-001  0.00000000e+000 3.2700000e-001 STUDENT      NONE
           57 BRINESAL WTF       3.2400000e-001  3.2400000e-001  3.0700000e-
001
 3.3200000e-001  0.00000000e+000 3.2900000e-001 STUDENT      NONE
           57 BRINESAL WTF       3.2400000e-001  3.2400000e-001  3.0700000e-
001
 3.3200000e-001  0.00000000e+000 3.3200000e-001 STUDENT      NONE
           60 CASTILER CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           61 CASTILER COMP_RCK  5.3000000e-011  4.0000000e-011  2.0000000e-
011
```

```
 1.0000000e-010  0.00000000e+000 0.0000000e+000 TRIANGULAR   Pa^-1
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  1.0000000e+000 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.0000000e+000 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  3.0000000e+000 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  4.0000000e+000 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  5.0000000e+000 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  6.0000000e+000 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  7.0000000e+000 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  8.0000000e+000 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  9.0000000e+000 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  1.0000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  1.1000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  1.2000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  1.3000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  1.4000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  1.5000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  1.6000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  1.7000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  1.8000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
```

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 3.2000000e+001  3.1250000e-002  1.9000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.0000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.1000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.2000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.3000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.4000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.5000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.6000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.7000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.8000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  2.9000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  3.0000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  3.1000000e+001 DELTA        NONE
         3194 CASTILER GRIDFLO   1.6000000e+001  1.6000000e+001
1.0000000e+000
 3.2000000e+001  3.1250000e-002  3.2000000e+001 DELTA        NONE
         2608 CASTILER KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           62 CASTILER PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2609 CASTILER PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2610 CASTILER PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           65 CASTILER PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
           63 CASTILER PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
```

```
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           64 CASTILER POROSITY  8.7000000e-003  8.7000000e-003  2.0000000e-
003
 1.6000000e-002  0.00000000e+000 2.0000000e-003 STUDENT      NONE
           64 CASTILER POROSITY  8.7000000e-003  8.7000000e-003  2.0000000e-
003
 1.6000000e-002  0.00000000e+000 8.0000000e-003 STUDENT      NONE
           64 CASTILER POROSITY  8.7000000e-003  8.7000000e-003  2.0000000e-
003
 1.6000000e-002  0.00000000e+000 1.6000000e-002 STUDENT      NONE
           66 CASTILER PRESSURE  1.3600000e+007  1.2700000e+007
1.1100000e+007
 1.7000000e+007  0.00000000e+000 0.0000000e+000 TRIANGULAR   Pa
           67 CASTILER PRMX_LOG -1.2100000e+001 -1.1800000e+001 -
1.4700000e+001
-9.8000000e+000  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
           68 CASTILER PRMY_LOG -1.2100000e+001 -1.1800000e+001 -
1.4700000e+001
-9.8000000e+000  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
           69 CASTILER PRMZ_LOG -1.2100000e+001 -1.1800000e+001 -
1.4700000e+001
-9.8000000e+000  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
           72 CASTILER RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           73 CASTILER SAT_IBRN  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           74 CASTILER SAT_RBRN  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           75 CASTILER SAT_RGAS  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2918 CASTILER VOLUME    4.0000000e+006  4.0000000e+006
4.0000000e+006
 4.0000000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     m^3
           76 CAVITY_1 CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           77 CAVITY_1 COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2612 CAVITY_1 KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           78 CAVITY_1 PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2613 CAVITY_1 PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2614 CAVITY_1 PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           81 CAVITY_1 PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
```

```
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
           79 CAVITY_1 PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           80 CAVITY_1 POROSITY  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           82 CAVITY_1 PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
           83 CAVITY_1 PRMX_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
           84 CAVITY_1 PRMY_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
           85 CAVITY_1 PRMZ_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
           88 CAVITY_1 RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3099 CAVITY_1 SAT_IBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           89 CAVITY_1 SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           90 CAVITY_1 SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           91 CAVITY_2 CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           92 CAVITY_2 COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2616 CAVITY_2 KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           93 CAVITY_2 PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2617 CAVITY_2 PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2618 CAVITY_2 PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           96 CAVITY_2 PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
           94 CAVITY_2 PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           95 CAVITY_2 POROSITY  1.0000000e+000  1.0000000e+000
1.0000000e+000
```

```
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           97 CAVITY_2 PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
           98 CAVITY_2 PRMX_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
           99 CAVITY_2 PRMY_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          100 CAVITY_2 PRMZ_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          103 CAVITY_2 RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3100 CAVITY_2 SAT_IBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          104 CAVITY_2 SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          105 CAVITY_2 SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2049 CAVITY_3 CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2051 CAVITY_3 COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2620 CAVITY_3 KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2234 CAVITY_3 PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2621 CAVITY_3 PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2622 CAVITY_3 PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2623 CAVITY_3 PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2052 CAVITY_3 PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2053 CAVITY_3 POROSITY  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3101 CAVITY_3 PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2054 CAVITY_3 PRMX_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
```

```
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2055 CAVITY_3 PRMY_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2056 CAVITY_3 PRMZ_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2058 CAVITY_3 RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3102 CAVITY_3 SAT_IBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2235 CAVITY_3 SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2059 CAVITY_3 SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2060 CAVITY_4 CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2062 CAVITY_4 COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2625 CAVITY_4 KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2236 CAVITY_4 PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2626 CAVITY_4 PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2627 CAVITY_4 PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2628 CAVITY_4 PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2063 CAVITY_4 PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2064 CAVITY_4 POROSITY  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3103 CAVITY_4 PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2065 CAVITY_4 PRMX_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2066 CAVITY_4 PRMY_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2067 CAVITY_4 PRMZ_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
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-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2069 CAVITY_4 RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3104 CAVITY_4 SAT_IBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2237 CAVITY_4 SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2070 CAVITY_4 SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2994 CELLULS  FBETA     5.0000000e-001  5.0000000e-001
0.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
          838 CF       LOGSOLM   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(moles/lit
          106 CF252    ATWEIGHT  2.5208200e-001  2.5208200e-001  2.5208200e-
001
 2.5208200e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3330 CF252    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          107 CF252    HALFLIFE  8.3250000e+007  8.3250000e+007
8.3250000e+007
 8.3250000e+007  0.00000000e+000 0.0000000e+000 CONSTANT     s
          108 CF252    INVCHD    6.4000000e-005  6.4000000e-005  6.4000000e-
005
 6.4000000e-005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          109 CF252    INVRHD    5.6000000e-006  5.6000000e-006  5.6000000e-
006
 5.6000000e-006  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         2327 CL_L_T1  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2328 CL_L_T1  COMP_RCK  3.8000000e-010  3.8000000e-010  3.8000000e-
010
 3.8000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2641 CL_L_T1  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2329 CL_L_T1  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2642 CL_L_T1  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2643 CL_L_T1  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2332 CL_L_T1  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2330 CL_L_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
```

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 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2330 CL_L_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2330 CL_L_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2331 CL_L_T1  POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2333 CL_L_T1  PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2334 CL_L_T1  PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2335 CL_L_T1  PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2336 CL_L_T1  PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3021 CL_L_T1  RADN_DRZ  1.8580000e+000  1.8580000e+000
1.8580000e+000
 1.8580000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2340 CL_L_T1  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3017 CL_L_T1  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3020 CL_L_T1  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3018 CL_L_T1  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3019 CL_L_T1  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2341 CL_L_T1  SAT_IBRN  7.9000000e-001  7.9000000e-001  7.9000000e-
001
 7.9000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2342 CL_L_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2342 CL_L_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2342 CL_L_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2343 CL_L_T1  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2344 CL_L_T2  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
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 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2345 CL_L_T2  COMP_RCK  3.8000000e-010  3.8000000e-010  3.8000000e-
010
 3.8000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2646 CL_L_T2  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2346 CL_L_T2  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2647 CL_L_T2  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2648 CL_L_T2  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2349 CL_L_T2  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2347 CL_L_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2347 CL_L_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2347 CL_L_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2348 CL_L_T2  POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2351 CL_L_T2  PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2352 CL_L_T2  PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2353 CL_L_T2  PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3026 CL_L_T2  RADN_DRZ  1.1620000e+000  1.1620000e+000
1.1620000e+000
 1.1620000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2357 CL_L_T2  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3022 CL_L_T2  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3025 CL_L_T2  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3023 CL_L_T2  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3024 CL_L_T2  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
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 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2359 CL_L_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2359 CL_L_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2359 CL_L_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2360 CL_L_T2  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2361 CL_L_T3  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2362 CL_L_T3  COMP_RCK  3.8000000e-010  3.8000000e-010  3.8000000e-
010
 3.8000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2651 CL_L_T3  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2363 CL_L_T3  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2652 CL_L_T3  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2653 CL_L_T3  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2366 CL_L_T3  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2364 CL_L_T3  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2364 CL_L_T3  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2364 CL_L_T3  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2365 CL_L_T3  POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2368 CL_L_T3  PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2369 CL_L_T3  PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2370 CL_L_T3  PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3031 CL_L_T3  RADN_DRZ  1.0020000e+000  1.0020000e+000
1.0020000e+000
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 1.0020000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2374 CL_L_T3  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3027 CL_L_T3  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3030 CL_L_T3  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3028 CL_L_T3  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3029 CL_L_T3  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2376 CL_L_T3  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2376 CL_L_T3  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2376 CL_L_T3  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2377 CL_L_T3  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         3070 CL_L_T4  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3071 CL_L_T4  COMP_RCK  3.8000000e-010  3.8000000e-010  3.8000000e-
010
 3.8000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3072 CL_L_T4  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3073 CL_L_T4  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3074 CL_L_T4  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3075 CL_L_T4  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3123 CL_L_T4  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3076 CL_L_T4  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         3076 CL_L_T4  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         3076 CL_L_T4  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
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 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
        3077 CL_L_T4  POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3078 CL_L_T4  PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
        3079 CL_L_T4  PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
        3080 CL_L_T4  PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
        3069 CL_L_T4  RADN_DRZ  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3081 CL_L_T4  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3065 CL_L_T4  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
        3068 CL_L_T4  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
        3066 CL_L_T4  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
        3067 CL_L_T4  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
        3082 CL_L_T4  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
        3082 CL_L_T4  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
        3082 CL_L_T4  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
        3083 CL_L_T4  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
        2378 CL_M_T1  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        2379 CL_M_T1  COMP_RCK  4.3000000e-010  4.3000000e-010  4.3000000e-
010
 4.3000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
        2656 CL_M_T1  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        2380 CL_M_T1  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        2657 CL_M_T1  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
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 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2658 CL_M_T1  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2383 CL_M_T1  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2381 CL_M_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2381 CL_M_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2381 CL_M_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2382 CL_M_T1  POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2384 CL_M_T1  PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2385 CL_M_T1  PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2386 CL_M_T1  PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2387 CL_M_T1  PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3088 CL_M_T1  RADN_DRZ  1.7090000e+000  1.7090000e+000
1.7090000e+000
 1.7090000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2391 CL_M_T1  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3084 CL_M_T1  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3087 CL_M_T1  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3085 CL_M_T1  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3086 CL_M_T1  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2392 CL_M_T1  SAT_IBRN  7.9000000e-001  7.9000000e-001  7.9000000e-
001
 7.9000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2393 CL_M_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2393 CL_M_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
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 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2393 CL_M_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2394 CL_M_T1  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2395 CL_M_T2  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2396 CL_M_T2  COMP_RCK  4.3000000e-010  4.3000000e-010  4.3000000e-
010
 4.3000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2661 CL_M_T2  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2397 CL_M_T2  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2662 CL_M_T2  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2663 CL_M_T2  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2400 CL_M_T2  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2398 CL_M_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2398 CL_M_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2398 CL_M_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2399 CL_M_T2  POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2402 CL_M_T2  PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2403 CL_M_T2  PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2404 CL_M_T2  PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3093 CL_M_T2  RADN_DRZ  1.4690000e+000  1.4690000e+000
1.4690000e+000
 1.4690000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2408 CL_M_T2  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3089 CL_M_T2  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
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 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3092 CL_M_T2  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3090 CL_M_T2  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3091 CL_M_T2  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2410 CL_M_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2410 CL_M_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2410 CL_M_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2411 CL_M_T2  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2412 CL_M_T3  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2413 CL_M_T3  COMP_RCK  4.3000000e-010  4.3000000e-010  4.3000000e-
010
 4.3000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2666 CL_M_T3  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2414 CL_M_T3  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2667 CL_M_T3  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2668 CL_M_T3  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2417 CL_M_T3  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2415 CL_M_T3  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2415 CL_M_T3  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2415 CL_M_T3  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2416 CL_M_T3  POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2419 CL_M_T3  PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
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-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2420 CL_M_T3  PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2421 CL_M_T3  PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3098 CL_M_T3  RADN_DRZ  1.2830000e+000  1.2830000e+000
1.2830000e+000
 1.2830000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2425 CL_M_T3  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3094 CL_M_T3  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3097 CL_M_T3  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3095 CL_M_T3  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3096 CL_M_T3  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2427 CL_M_T3  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2427 CL_M_T3  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2427 CL_M_T3  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2428 CL_M_T3  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2429 CL_M_T4  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2430 CL_M_T4  COMP_RCK  4.3000000e-010  4.3000000e-010  4.3000000e-
010
 4.3000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2671 CL_M_T4  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2431 CL_M_T4  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2672 CL_M_T4  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2673 CL_M_T4  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2434 CL_M_T4  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
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 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2432 CL_M_T4  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2432 CL_M_T4  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2432 CL_M_T4  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2433 CL_M_T4  POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2436 CL_M_T4  PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2437 CL_M_T4  PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2438 CL_M_T4  PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2923 CL_M_T4  RADN_DRZ  1.1070000e+000  1.1070000e+000
1.1070000e+000
 1.1070000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2442 CL_M_T4  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2919 CL_M_T4  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2922 CL_M_T4  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2920 CL_M_T4  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2921 CL_M_T4  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2444 CL_M_T4  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2444 CL_M_T4  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2444 CL_M_T4  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2445 CL_M_T4  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2446 CL_M_T5  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2447 CL_M_T5  COMP_RCK  4.3000000e-010  4.3000000e-010  4.3000000e-
010
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 4.3000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2676 CL_M_T5  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2448 CL_M_T5  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2677 CL_M_T5  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2678 CL_M_T5  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2451 CL_M_T5  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2449 CL_M_T5  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2449 CL_M_T5  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2449 CL_M_T5  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2450 CL_M_T5  POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2453 CL_M_T5  PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2454 CL_M_T5  PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2455 CL_M_T5  PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2928 CL_M_T5  RADN_DRZ  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2459 CL_M_T5  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2924 CL_M_T5  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2927 CL_M_T5  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2925 CL_M_T5  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2926 CL_M_T5  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2461 CL_M_T5  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
```

```
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2461 CL_M_T5  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2461 CL_M_T5  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2462 CL_M_T5  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2310 CLAY_BOT CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2311 CLAY_BOT COMP_RCK  3.8000000e-010  3.8000000e-010  3.8000000e-
010
 3.8000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2636 CLAY_BOT KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2312 CLAY_BOT PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2637 CLAY_BOT PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2638 CLAY_BOT PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2315 CLAY_BOT PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2313 CLAY_BOT PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2313 CLAY_BOT PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2313 CLAY_BOT PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2314 CLAY_BOT POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2316 CLAY_BOT PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2317 CLAY_BOT PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2318 CLAY_BOT PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2319 CLAY_BOT PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2323 CLAY_BOT RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
```

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 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        2324 CLAY_BOT SAT_IBRN  7.9000000e-001  7.9000000e-001  7.9000000e-
001
 7.9000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        2325 CLAY_BOT SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
        2325 CLAY_BOT SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
        2325 CLAY_BOT SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
        2326 CLAY_BOT SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
        3000 CLAY_RUS CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3001 CLAY_RUS COMP_RCK  4.7000000e-010  4.7000000e-010  4.7000000e-
010
 4.7000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
        3002 CLAY_RUS KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3003 CLAY_RUS PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        3004 CLAY_RUS PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        3005 CLAY_RUS PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3131 CLAY_RUS PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        3006 CLAY_RUS PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
        3006 CLAY_RUS PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
        3006 CLAY_RUS PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
        3007 CLAY_RUS POROSITY  2.4000000e-001  2.4000000e-001  2.4000000e-
001
 2.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3008 CLAY_RUS PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        3009 CLAY_RUS PRMX_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
        3010 CLAY_RUS PRMY_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
```

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-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3011 CLAY_RUS PRMZ_LOG -1.8867000e+001 -1.8301000e+001 -
2.1000000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3012 CLAY_RUS RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2996 CLAY_RUS RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2999 CLAY_RUS RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2997 CLAY_RUS RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2998 CLAY_RUS RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3013 CLAY_RUS SAT_IBRN  7.9000000e-001  7.9000000e-001  7.9000000e-
001
 7.9000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3014 CLAY_RUS SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         3014 CLAY_RUS SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         3014 CLAY_RUS SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         3015 CLAY_RUS SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         3231 CM243    ATWEIGHT  2.4306100e-001  2.4306100e-001  2.4306100e-
001
 2.4306100e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3366 CM243    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3277 CM243    HALFLIFE  8.9940000e+008  8.9940000e+008
8.9940000e+008
 8.9940000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3410 CM243    INVCHD    1.8200000e-001  1.8200000e-001  1.8200000e-
001
 1.8200000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3411 CM243    INVRHD    2.3100000e-001  2.3100000e-001  2.3100000e-
001
 2.3100000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          110 CM244    ATWEIGHT  2.4406300e-001  2.4406300e-001  2.4406300e-
001
 2.4406300e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3331 CM244    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          111 CM244    HALFLIFE  5.7150000e+008  5.7150000e+008
5.7150000e+008
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5.7150000e+008 0.00000000e+000 0.0000000e+000 CONSTANT s
112 CM244 INVCHD 4.8200000e+003 4.8200000e+003
4.8200000e+003
4.8200000e+003 0.00000000e+000 0.0000000e+000 CONSTANT Curies
113 CM244 INVRHD 1.0500000e+002 1.0500000e+002
1.0500000e+002
1.0500000e+002 0.00000000e+000 0.0000000e+000 CONSTANT Curies
3232 CM245 ATWEIGHT 2.4506500e-001 2.4506500e-001 2.4506500e-001
2.4506500e-001 0.00000000e+000 0.0000000e+000 CONSTANT kg/mole
3367 CM245 EPAREL 1.0000000e+002 1.0000000e+002
1.0000000e+002
1.0000000e+002 0.00000000e+000 0.0000000e+000 CONSTANT Curies/wuf
3278 CM245 HALFLIFE 2.6820000e+011 2.6820000e+011
2.6820000e+011
2.6820000e+011 0.00000000e+000 0.0000000e+000 CONSTANT s
3412 CM245 INVCHD 1.3900000e-002 1.3900000e-002 1.3900000e-002
1.3900000e-002 0.00000000e+000 0.0000000e+000 CONSTANT Curies
3413 CM245 INVRHD 1.0900000e-002 1.0900000e-002 1.0900000e-002
1.0900000e-002 0.00000000e+000 0.0000000e+000 CONSTANT Curies
3233 CM248 ATWEIGHT 2.4807200e-001 2.4807200e-001 2.4807200e-001
2.4807200e-001 0.00000000e+000 0.0000000e+000 CONSTANT kg/mole
3368 CM248 EPAREL 1.0000000e+002 1.0000000e+002
1.0000000e+002
1.0000000e+002 0.00000000e+000 0.0000000e+000 CONSTANT Curies/wuf
115 CM248 HALFLIFE 1.0700000e+013 1.0700000e+013
1.0700000e+013
1.0700000e+013 0.00000000e+000 0.0000000e+000 CONSTANT s
2265 CM248 INVCHD 1.4900000e-001 1.4900000e-001 1.4900000e-001
1.4900000e-001 0.00000000e+000 0.0000000e+000 CONSTANT Curies
2266 CM248 INVRHD 2.5900000e-003 2.5900000e-003 2.5900000e-003
2.5900000e-003 0.00000000e+000 0.0000000e+000 CONSTANT Curies
3051 CONC_MON CAP_MOD 2.0000000e+000 2.0000000e+000
2.0000000e+000
2.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT NONE
3052 CONC_MON COMP_RCK 6.0000000e-011 6.0000000e-011 6.0000000e-011
6.0000000e-011 0.00000000e+000 0.0000000e+000 CONSTANT Pa^-1
3053 CONC_MON KPT 0.0000000e+000 0.0000000e+000
0.0000000e+000
0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT NONE
3054 CONC_MON PC_MAX 1.0000000e+008 1.0000000e+008
1.0000000e+008
1.0000000e+008 0.00000000e+000 0.0000000e+000 CONSTANT Pa
3055 CONC_MON PCT_A 5.6000000e-001 5.6000000e-001 5.6000000e-001
5.6000000e-001 0.00000000e+000 0.0000000e+000 CONSTANT Pa
3056 CONC_MON PCT_EXP -3.4600000e-001 -3.4600000e-001 -3.4600000e-001
-3.4600000e-001 0.00000000e+000 0.0000000e+000 CONSTANT NONE
3124 CONC_MON PO_MIN 1.0132500e+005 1.0132500e+005
1.0132500e+005

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 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3057 CONC_MON PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         3057 CONC_MON PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         3057 CONC_MON PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         3058 CONC_MON POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3114 CONC_MON PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3059 CONC_MON PRMX_LOG -1.4000000e+001 -1.4000000e+001 -
1.4000000e+001
-1.4000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         3060 CONC_MON PRMY_LOG -1.4000000e+001 -1.4000000e+001 -
1.4000000e+001
-1.4000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         3061 CONC_MON PRMZ_LOG -1.4000000e+001 -1.4000000e+001 -
1.4000000e+001
-1.4000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         3050 CONC_MON RADN_DRZ  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3062 CONC_MON RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3046 CONC_MON RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3049 CONC_MON RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3047 CONC_MON RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3048 CONC_MON RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3115 CONC_MON SAT_IBRN  9.9999990e-001  9.9999990e-001  9.9999990e-
001
 9.9999990e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3063 CONC_MON SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         3063 CONC_MON SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         3063 CONC_MON SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         3064 CONC_MON SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
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 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         3514 CONC_PCS CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3515 CONC_PCS COMP_RCK  6.0000000e-011  6.0000000e-011  6.0000000e-
011
 6.0000000e-011  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3516 CONC_PCS COMPRES   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3517 CONC_PCS KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3518 CONC_PCS PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3519 CONC_PCS PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3520 CONC_PCS PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3521 CONC_PCS PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3522 CONC_PCS PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         3522 CONC_PCS PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         3522 CONC_PCS PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         3523 CONC_PCS POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3524 CONC_PCS PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3525 CONC_PCS PRMX_LOG -1.8816000e+001 -1.8749600e+001 -
2.0699000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3526 CONC_PCS PRMY_LOG -1.8816000e+001 -1.8749600e+001 -
2.0699000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3527 CONC_PCS PRMZ_LOG -1.8816000e+001 -1.8749600e+001 -
2.0699000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3528 CONC_PCS REF_PRES  1.0100000e+005  1.0100000e+005
1.0100000e+005
 1.0100000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3529 CONC_PCS RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3530 CONC_PCS SAT_IBRN  9.9999990e-001  9.9999990e-001  9.9999990e-
001
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```
 9.9999990e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3531 CONC_PCS SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         3531 CONC_PCS SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         3531 CONC_PCS SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         3532 CONC_PCS SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         3150 CONC_PLG CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3148 CONC_PLG COMP_RCK  3.8000000e-010  3.8000000e-010  3.8000000e-
010
 3.8000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3156 CONC_PLG KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3151 CONC_PLG PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3157 CONC_PLG PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3158 CONC_PLG PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3155 CONC_PLG PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3154 CONC_PLG PORE_DIS  9.4000000e-001  9.4000000e-001  9.4000000e-
001
 9.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3147 CONC_PLG POROSITY  3.2000000e-001  3.2000000e-001  3.2000000e-
001
 3.2000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3185 CONC_PLG PRMX_LOG -1.8000000e+001 -1.8000000e+001 -
1.9000000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
         3192 CONC_PLG PRMY_LOG -1.8000000e+001 -1.8000000e+001 -
1.9000000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
         3193 CONC_PLG PRMZ_LOG -1.8000000e+001 -1.8000000e+001 -
1.9000000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
         3149 CONC_PLG RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3152 CONC_PLG SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3153 CONC_PLG SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
```

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 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2463 CONC_T1  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2464 CONC_T1  COMP_RCK  6.0000000e-011  6.0000000e-011  6.0000000e-
011
 6.0000000e-011  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2681 CONC_T1  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2465 CONC_T1  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2682 CONC_T1  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2683 CONC_T1  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2468 CONC_T1  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2466 CONC_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2466 CONC_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2466 CONC_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2467 CONC_T1  POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2469 CONC_T1  PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2470 CONC_T1  PRMX_LOG -1.8816000e+001 -1.8749600e+001 -
2.0699000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2471 CONC_T1  PRMY_LOG -1.8816000e+001 -1.8749600e+001 -
2.0699000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2472 CONC_T1  PRMZ_LOG -1.8816000e+001 -1.8749600e+001 -
2.0699000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3040 CONC_T1  RADN_DRZ  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2476 CONC_T1  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3036 CONC_T1  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3039 CONC_T1  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
```

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 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3037 CONC_T1  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3038 CONC_T1  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2477 CONC_T1  SAT_IBRN  9.9999990e-001  9.9999990e-001  9.9999990e-
001
 9.9999990e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2478 CONC_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2478 CONC_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2478 CONC_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2479 CONC_T1  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2480 CONC_T2  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2481 CONC_T2  COMP_RCK  6.0000000e-011  6.0000000e-011  6.0000000e-
011
 6.0000000e-011  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2686 CONC_T2  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2482 CONC_T2  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2687 CONC_T2  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2688 CONC_T2  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2808 CONC_T2  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2483 CONC_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2483 CONC_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2483 CONC_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2484 CONC_T2  POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2485 CONC_T2  PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
```

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 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2486 CONC_T2  PRMX_LOG -1.4000000e+001 -1.4000000e+001 -
1.4000000e+001
-1.4000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2487 CONC_T2  PRMY_LOG -1.4000000e+001 -1.4000000e+001 -
1.4000000e+001
-1.4000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2488 CONC_T2  PRMZ_LOG -1.4000000e+001 -1.4000000e+001 -
1.4000000e+001
-1.4000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         3045 CONC_T2  RADN_DRZ  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2492 CONC_T2  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3041 CONC_T2  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3044 CONC_T2  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3042 CONC_T2  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3043 CONC_T2  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2493 CONC_T2  SAT_IBRN  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2494 CONC_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2494 CONC_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2494 CONC_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2495 CONC_T2  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
          841 CS       LOGSOLM   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(moles/lit
          116 CS137    ATWEIGHT  1.3690700e-001  1.3690700e-001  1.3690700e-
001
 1.3690700e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3369 CS137    EPAREL    1.0000000e+003  1.0000000e+003
1.0000000e+003
 1.0000000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          117 CS137    HALFLIFE  9.4670000e+008  9.4670000e+008
9.4670000e+008
 9.4670000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     s
         2037 CS137    INVCHD    6.9300000e+003  6.9300000e+003
6.9300000e+003
```

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 6.9300000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          118 CS137    INVRHD    1.7700000e+005  1.7700000e+005
1.7700000e+005
 1.7700000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3487 CULEBRA  APOROS    2.1000000e-003  1.0000000e-003  1.0000000e-
004
 1.0000000e-002  0.00000000e+000 0.0000000e+000 LOGUNIFORM   NONE
          119 CULEBRA  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          120 CULEBRA  COMP_RCK  1.0000000e-010  1.0000000e-010  1.0000000e-
010
 1.0000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3483 CULEBRA  DISP_L    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3484 CULEBRA  DISPT_L   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
          843 CULEBRA  DNSGRAIN  2.8200000e+003  2.8200000e+003
2.8200000e+003
 2.8200000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         3486 CULEBRA  DPOROS    1.6000000e-001  1.6000000e-001  1.0000000e-
001
 2.5000000e-001  0.0000000e+000  1.0000000e-001 CUMULATIVE   NONE
         3486 CULEBRA  DPOROS    1.6000000e-001  1.6000000e-001  1.0000000e-
001
 2.5000000e-001  1.0000000e-001  1.1000000e-001 CUMULATIVE   NONE
         3486 CULEBRA  DPOROS    1.6000000e-001  1.6000000e-001  1.0000000e-
001
 2.5000000e-001  2.5000000e-001  1.2000000e-001 CUMULATIVE   NONE
         3486 CULEBRA  DPOROS    1.6000000e-001  1.6000000e-001  1.0000000e-
001
 2.5000000e-001  5.0000000e-001  1.6000000e-001 CUMULATIVE   NONE
         3486 CULEBRA  DPOROS    1.6000000e-001  1.6000000e-001  1.0000000e-
001
 2.5000000e-001  7.5000000e-001  1.8000000e-001 CUMULATIVE   NONE
         3486 CULEBRA  DPOROS    1.6000000e-001  1.6000000e-001  1.0000000e-
001
 2.5000000e-001  9.0000000e-001  1.9000000e-001 CUMULATIVE   NONE
         3486 CULEBRA  DPOROS    1.6000000e-001  1.6000000e-001  1.0000000e-
001
 2.5000000e-001  1.0000000e+000  2.5000000e-001 CUMULATIVE   NONE
         3474 CULEBRA  DTORT     1.1000000e-001  1.1000000e-001  1.1000000e-
001
 1.1000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3462 CULEBRA  ETHICK    4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
          861 CULEBRA  FTORT     1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3485 CULEBRA  HMBLKLT   2.7500000e-001  2.7500000e-001  5.0000000e-
002
 5.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      m
         2691 CULEBRA  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
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 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3418 CULEBRA  MEA_STOR  1.0000000e-005  1.0000000e-005  1.0000000e-
005
 1.0000000e-005  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3419 CULEBRA  MINP_FAC  5.0050000e+002  5.0050000e+002
1.0000000e+000
 1.0000000e+003  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         137 CULEBRA  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        2692 CULEBRA  PCT_A     2.6000000e-001  2.6000000e-001  2.6000000e-
001
 2.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        2693 CULEBRA  PCT_EXP  -3.4800000e-001 -3.4800000e-001 -3.4800000e-
001
-3.4800000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         141 CULEBRA  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         139 CULEBRA  PORE_DIS  6.4360000e-001  6.4360000e-001  6.4360000e-
001
 6.4360000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         140 CULEBRA  POROSITY  1.5100000e-001  1.5100000e-001  1.5100000e-
001
 1.5100000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         142 CULEBRA  PRESSURE  9.1410000e+005  9.1410000e+005
9.1410000e+005
 9.1410000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         143 CULEBRA  PRMX_LOG -1.3112000e+001 -1.3112000e+001 -
1.3112000e+001
-1.3112000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         144 CULEBRA  PRMY_LOG -1.3112000e+001 -1.3112000e+001 -
1.3112000e+001
-1.3112000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         145 CULEBRA  PRMZ_LOG -1.3112000e+001 -1.3112000e+001 -
1.3112000e+001
-1.3112000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         148 CULEBRA  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         149 CULEBRA  SAT_IBRN  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         150 CULEBRA  SAT_RBRN  8.3630000e-002  8.3630000e-002  8.3630000e-
002
 8.3630000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         151 CULEBRA  SAT_RGAS  7.7110000e-002  7.7110000e-002  7.7110000e-
002
 7.7110000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3469 CULEBRA  SKIN_RES  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        2071 CULEBRA  THICK     7.7500000e+000  7.7500000e+000
7.7500000e+000
 7.7500000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         153 DEWYLAKE CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
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 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          154 DEWYLAKE COMP_RCK  1.0000000e-008  1.0000000e-008  1.0000000e-
008
 1.0000000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2696 DEWYLAKE KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          156 DEWYLAKE PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2697 DEWYLAKE PCT_A     2.6000000e-001  2.6000000e-001  2.6000000e-
001
 2.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2698 DEWYLAKE PCT_EXP  -3.4800000e-001 -3.4800000e-001 -3.4800000e-
001
-3.4800000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          159 DEWYLAKE PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          157 DEWYLAKE PORE_DIS  6.4360000e-001  6.4360000e-001  6.4360000e-
001
 6.4360000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          158 DEWYLAKE POROSITY  1.4300000e-001  1.4300000e-001  3.5000000e-
002
 2.4800000e-001  0.00000000e+000 3.5000000e-002 STUDENT      NONE
          158 DEWYLAKE POROSITY  1.4300000e-001  1.4300000e-001  3.5000000e-
002
 2.4800000e-001  0.00000000e+000 5.4000000e-002 STUDENT      NONE
          158 DEWYLAKE POROSITY  1.4300000e-001  1.4300000e-001  3.5000000e-
002
 2.4800000e-001  0.00000000e+000 9.4000000e-002 STUDENT      NONE
          158 DEWYLAKE POROSITY  1.4300000e-001  1.4300000e-001  3.5000000e-
002
 2.4800000e-001  0.00000000e+000 1.1600000e-001 STUDENT      NONE
          158 DEWYLAKE POROSITY  1.4300000e-001  1.4300000e-001  3.5000000e-
002
 2.4800000e-001  0.00000000e+000 1.4900000e-001 STUDENT      NONE
          158 DEWYLAKE POROSITY  1.4300000e-001  1.4300000e-001  3.5000000e-
002
 2.4800000e-001  0.00000000e+000 2.1500000e-001 STUDENT      NONE
          158 DEWYLAKE POROSITY  1.4300000e-001  1.4300000e-001  3.5000000e-
002
 2.4800000e-001  0.00000000e+000 2.3200000e-001 STUDENT      NONE
          158 DEWYLAKE POROSITY  1.4300000e-001  1.4300000e-001  3.5000000e-
002
 2.4800000e-001  0.00000000e+000 2.4800000e-001 STUDENT      NONE
          160 DEWYLAKE PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          161 DEWYLAKE PRMX_LOG -1.6300000e+001 -1.6300000e+001 -
1.6300000e+001
-1.6300000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          162 DEWYLAKE PRMY_LOG -1.6300000e+001 -1.6300000e+001 -
1.6300000e+001
-1.6300000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          163 DEWYLAKE PRMZ_LOG -1.6300000e+001 -1.6300000e+001 -
1.6300000e+001
```

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-1.6300000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          166 DEWYLAKE RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          167 DEWYLAKE SAL_USAT  8.3600000e-002  8.3600000e-002  8.3600000e-
002
 8.3600000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          168 DEWYLAKE SAT_IBRN  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          169 DEWYLAKE SAT_RBRN  8.3630000e-002  8.3630000e-002  8.3630000e-
002
 8.3630000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          170 DEWYLAKE SAT_RGAS  7.7110000e-002  7.7110000e-002  7.7110000e-
002
 7.7110000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          171 DRILLMUD DNSFLUID  1.2100000e+003  1.2100000e+003
1.1400000e+003
 1.3800000e+003  0.0000000e+000  1.1400000e+003 CUMULATIVE   kg/m^3
          171 DRILLMUD DNSFLUID  1.2100000e+003  1.2100000e+003
1.1400000e+003
 1.3800000e+003  9.0000000e-001  1.2600000e+003 CUMULATIVE   kg/m^3
          171 DRILLMUD DNSFLUID  1.2100000e+003  1.2100000e+003
1.1400000e+003
 1.3800000e+003  1.0000000e+000  1.3800000e+003 CUMULATIVE   kg/m^3
          172 DRILLMUD VISCO     1.1000000e-002  9.1700000e-003  5.0000000e-
003
 3.0000000e-002  0.0000000e+000  5.0000000e-003 CUMULATIVE   Pa*s
          172 DRILLMUD VISCO     1.1000000e-002  9.1700000e-003  5.0000000e-
003
 3.0000000e-002  6.0000000e-001  1.0000000e-002 CUMULATIVE   Pa*s
          172 DRILLMUD VISCO     1.1000000e-002  9.1700000e-003  5.0000000e-
003
 3.0000000e-002  8.0000000e-001  1.5000000e-002 CUMULATIVE   Pa*s
          172 DRILLMUD VISCO     1.1000000e-002  9.1700000e-003  5.0000000e-
003
 3.0000000e-002  9.2000000e-001  2.0000000e-002 CUMULATIVE   Pa*s
          172 DRILLMUD VISCO     1.1000000e-002  9.1700000e-003  5.0000000e-
003
 3.0000000e-002  9.8000000e-001  2.5000000e-002 CUMULATIVE   Pa*s
          172 DRILLMUD VISCO     1.1000000e-002  9.1700000e-003  5.0000000e-
003
 3.0000000e-002  1.0000000e+000  3.0000000e-002 CUMULATIVE   Pa*s
          173 DRILLMUD YLDSTRSS  5.9800000e+000  4.4000000e+000
2.4000000e+000
 1.9200000e+001  0.0000000e+000  2.4000000e+000 CUMULATIVE   Pa
          173 DRILLMUD YLDSTRSS  5.9800000e+000  4.4000000e+000
2.4000000e+000
 1.9200000e+001  6.0000000e-001  4.8000000e+000 CUMULATIVE   Pa
          173 DRILLMUD YLDSTRSS  5.9800000e+000  4.4000000e+000
2.4000000e+000
 1.9200000e+001  8.0000000e-001  8.6000000e+000 CUMULATIVE   Pa
          173 DRILLMUD YLDSTRSS  5.9800000e+000  4.4000000e+000
2.4000000e+000
 1.9200000e+001  9.2000000e-001  1.2400000e+001 CUMULATIVE   Pa
          173 DRILLMUD YLDSTRSS  5.9800000e+000  4.4000000e+000
2.4000000e+000
```

1.9200000e+001 9.8000000e-001 1.6300000e+001 CUMULATIVE   Pa
173 DRILLMUD YLDSTRSS 5.9800000e+000 4.4000000e+000
2.4000000e+000
1.9200000e+001 1.0000000e+000 1.9200000e+001 CUMULATIVE   Pa
174 DRZ_0   CAP_MOD   1.0000000e+000 1.0000000e+000
1.0000000e+000
1.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   NONE
175 DRZ_0   COMP_RCK 7.4100000e-010 7.4100000e-010 7.4100000e-
010
7.4100000e-010 0.00000000e+000 0.0000000e+000 CONSTANT   Pa^-1
2701 DRZ_0   KPT   0.0000000e+000 0.0000000e+000
0.0000000e+000
0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   NONE
176 DRZ_0   PC_MAX   1.0000000e+008 1.0000000e+008
1.0000000e+008
1.0000000e+008 0.00000000e+000 0.0000000e+000 CONSTANT   Pa
2702 DRZ_0   PCT_A   0.0000000e+000 0.0000000e+000
0.0000000e+000
0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   Pa
2703 DRZ_0   PCT_EXP   0.0000000e+000 0.0000000e+000
0.0000000e+000
0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   NONE
179 DRZ_0   PO_MIN   1.0132500e+005 1.0132500e+005
1.0132500e+005
1.0132500e+005 0.00000000e+000 0.0000000e+000 CONSTANT   Pa
177 DRZ_0   PORE_DIS 7.0000000e-001 7.0000000e-001 7.0000000e-
001
7.0000000e-001 0.00000000e+000 0.0000000e+000 CONSTANT   NONE
178 DRZ_0   POROSITY 1.5650000e-002 1.2900000e-002 3.9000000e-
003
3.2900000e-002 0.0000000e+000 3.9000000e-003 CUMULATIVE   NONE
178 DRZ_0   POROSITY 1.5650000e-002 1.2900000e-002 3.9000000e-
003
3.2900000e-002 5.0000000e-001 1.2900000e-002 CUMULATIVE   NONE
178 DRZ_0   POROSITY 1.5650000e-002 1.2900000e-002 3.9000000e-
003
3.2900000e-002 1.0000000e+000 3.2900000e-002 CUMULATIVE   NONE
181 DRZ_0   PRMX_LOG -1.7000000e+001 -1.7000000e+001 -
1.7000000e+001
-1.7000000e+001 0.00000000e+000 0.0000000e+000 CONSTANT   log(m^2)
182 DRZ_0   PRMY_LOG -1.7000000e+001 -1.7000000e+001 -
1.7000000e+001
-1.7000000e+001 0.00000000e+000 0.0000000e+000 CONSTANT   log(m^2)
183 DRZ_0   PRMZ_LOG -1.7000000e+001 -1.7000000e+001 -
1.7000000e+001
-1.7000000e+001 0.00000000e+000 0.0000000e+000 CONSTANT   log(m^2)
186 DRZ_0   RELP_MOD 4.0000000e+000 4.0000000e+000
1.0000000e+000
4.0000000e+000 3.3000000e-001 1.0000000e+000 DELTA   NONE
186 DRZ_0   RELP_MOD 4.0000000e+000 4.0000000e+000
1.0000000e+000
4.0000000e+000 0.0000000e+000 2.0000000e+000 DELTA   NONE
186 DRZ_0   RELP_MOD 4.0000000e+000 4.0000000e+000
1.0000000e+000
4.0000000e+000 0.0000000e+000 3.0000000e+000 DELTA   NONE
186 DRZ_0   RELP_MOD 4.0000000e+000 4.0000000e+000
1.0000000e+000

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 4.0000000e+000  6.7000000e-001  4.0000000e+000 DELTA        NONE
          187 DRZ_0    SAT_IBRN  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          188 DRZ_0    SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          189 DRZ_0    SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          190 DRZ_1    CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          191 DRZ_1    COMP_RCK  7.4100000e-010  7.4100000e-010  7.4100000e-
010
 7.4100000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3116 DRZ_1    KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          193 DRZ_1    PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3128 DRZ_1    PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3129 DRZ_1    PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          196 DRZ_1    PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          194 DRZ_1    PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          195 DRZ_1    POROSITY  1.5650000e-002  1.2900000e-002  3.9000000e-
003
 3.2900000e-002  0.0000000e+000  3.9000000e-003 CUMULATIVE   NONE
          195 DRZ_1    POROSITY  1.5650000e-002  1.2900000e-002  3.9000000e-
003
 3.2900000e-002  5.0000000e-001  1.2900000e-002 CUMULATIVE   NONE
          195 DRZ_1    POROSITY  1.5650000e-002  1.2900000e-002  3.9000000e-
003
 3.2900000e-002  1.0000000e+000  3.2900000e-002 CUMULATIVE   NONE
          198 DRZ_1    PRMX_LOG -1.6000000e+001 -1.6000000e+001 -
1.9400000e+001
-1.2500000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
          199 DRZ_1    PRMY_LOG -1.6000000e+001 -1.6000000e+001 -
1.9400000e+001
-1.2500000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
          200 DRZ_1    PRMZ_LOG -1.6000000e+001 -1.6000000e+001 -
1.9400000e+001
-1.2500000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
          203 DRZ_1    RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  3.3000000e-001  1.0000000e+000 DELTA        NONE
          203 DRZ_1    RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
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 4.0000000e+000  0.0000000e+000  2.0000000e+000 DELTA        NONE
          203 DRZ_1    RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  3.0000000e+000 DELTA        NONE
          203 DRZ_1    RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  6.7000000e-001  4.0000000e+000 DELTA        NONE
          205 DRZ_1    SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          206 DRZ_1    SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3533 DRZ_PCS  CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3534 DRZ_PCS  COMP_RCK  7.4100000e-010  7.4100000e-010  7.4100000e-
010
 7.4100000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3535 DRZ_PCS  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3536 DRZ_PCS  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3537 DRZ_PCS  PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3538 DRZ_PCS  PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3539 DRZ_PCS  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3540 DRZ_PCS  PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3541 DRZ_PCS  POROSITY  1.5650000e-002  1.2900000e-002  3.9000000e-
003
 3.2900000e-002  0.0000000e+000  3.9000000e-003 CUMULATIVE   NONE
         3541 DRZ_PCS  POROSITY  1.5650000e-002  1.2900000e-002  3.9000000e-
003
 3.2900000e-002  5.0000000e-001  1.2900000e-002 CUMULATIVE   NONE
         3541 DRZ_PCS  POROSITY  1.5650000e-002  1.2900000e-002  3.9000000e-
003
 3.2900000e-002  1.0000000e+000  3.2900000e-002 CUMULATIVE   NONE
         3542 DRZ_PCS  PRMX_LOG -1.8816000e+001 -1.8749600e+001 -
2.0699000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3543 DRZ_PCS  PRMY_LOG -1.8816000e+001 -1.8749600e+001 -
2.0699000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3544 DRZ_PCS  PRMZ_LOG -1.8816000e+001 -1.8749600e+001 -
2.0699000e+001
-1.7000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         3545 DRZ_PCS  RELP_MOD  0.0000000e+000  0.0000000e+000
1.0000000e+000
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 4.0000000e+000  3.3000000e-001  1.0000000e+000 DELTA        NONE
         3545 DRZ_PCS  RELP_MOD  0.0000000e+000  0.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  2.0000000e+000 DELTA        NONE
         3545 DRZ_PCS  RELP_MOD  0.0000000e+000  0.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  3.0000000e+000 DELTA        NONE
         3545 DRZ_PCS  RELP_MOD  0.0000000e+000  0.0000000e+000
1.0000000e+000
 4.0000000e+000  6.7000000e-001  4.0000000e+000 DELTA        NONE
         3546 DRZ_PCS  SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3547 DRZ_PCS  SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2496 EARTH    CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2497 EARTH    COMP_RCK  9.9000000e-009  9.9000000e-009  9.9000000e-
009
 9.9000000e-009  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2706 EARTH    KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2498 EARTH    PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2707 EARTH    PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2708 EARTH    PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2501 EARTH    PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2499 EARTH    PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2499 EARTH    PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2499 EARTH    PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2500 EARTH    POROSITY  3.2000000e-001  3.2000000e-001  3.2000000e-
001
 3.2000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2502 EARTH    PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2503 EARTH    PRMX_LOG -1.4333000e+001 -1.4000000e+001 -
1.7000000e+001
-1.2000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2504 EARTH    PRMY_LOG -1.4333000e+001 -1.4000000e+001 -
1.7000000e+001
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-1.2000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2505 EARTH    PRMZ_LOG -1.4333000e+001 -1.4000000e+001 -
1.7000000e+001
-1.2000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
         2509 EARTH    RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3032 EARTH    RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3035 EARTH    RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3033 EARTH    RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         3034 EARTH    RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2510 EARTH    SAT_IBRN  8.0000000e-001  8.0000000e-001  8.0000000e-
001
 8.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2511 EARTH    SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2511 EARTH    SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2511 EARTH    SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2512 EARTH    SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
          207 EXP_AREA CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          208 EXP_AREA COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2711 EXP_AREA KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          209 EXP_AREA PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2712 EXP_AREA PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2713 EXP_AREA PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          212 EXP_AREA PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          210 EXP_AREA PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
```

```
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         211 EXP_AREA POROSITY  1.8000000e-001  1.8000000e-001  1.8000000e-
001
 1.8000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         213 EXP_AREA PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         214 EXP_AREA PRMX_LOG -1.1000000e+001 -1.1000000e+001 -
1.1000000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         215 EXP_AREA PRMY_LOG -1.1000000e+001 -1.1000000e+001 -
1.1000000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         216 EXP_AREA PRMZ_LOG -1.1000000e+001 -1.1000000e+001 -
1.1000000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         219 EXP_AREA RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         220 EXP_AREA SAT_IBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         221 EXP_AREA SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         222 EXP_AREA SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        2085 FORTYNIN CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        2238 FORTYNIN COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
        2715 FORTYNIN KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        2239 FORTYNIN PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        2716 FORTYNIN PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        2717 FORTYNIN PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        2718 FORTYNIN PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        2087 FORTYNIN PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        2088 FORTYNIN POROSITY  8.2000000e-002  8.2000000e-002
0.0000000e+000
 2.4000000e-001  0.00000000e+000 0.0000000e+000 STUDENT      NONE
        2088 FORTYNIN POROSITY  8.2000000e-002  8.2000000e-002
0.0000000e+000
```

```
 2.4000000e-001  0.00000000e+000 2.0000000e-003 STUDENT      NONE
         2088 FORTYNIN POROSITY  8.2000000e-002  8.2000000e-002
0.0000000e+000
 2.4000000e-001  0.00000000e+000 2.0000000e-003 STUDENT      NONE
         2088 FORTYNIN POROSITY  8.2000000e-002  8.2000000e-002
0.0000000e+000
 2.4000000e-001  0.00000000e+000 4.0000000e-003 STUDENT      NONE
         2088 FORTYNIN POROSITY  8.2000000e-002  8.2000000e-002
0.0000000e+000
 2.4000000e-001  0.00000000e+000 9.1000000e-002 STUDENT      NONE
         2088 FORTYNIN POROSITY  8.2000000e-002  8.2000000e-002
0.0000000e+000
 2.4000000e-001  0.00000000e+000 2.3500000e-001 STUDENT      NONE
         2088 FORTYNIN POROSITY  8.2000000e-002  8.2000000e-002
0.0000000e+000
 2.4000000e-001  0.00000000e+000 2.4000000e-001 STUDENT      NONE
         2899 FORTYNIN PRMX_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2900 FORTYNIN PRMY_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2901 FORTYNIN PRMZ_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2093 FORTYNIN RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2240 FORTYNIN SAT_RBRN  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2094 FORTYNIN SAT_RGAS  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3234 FR221    ATWEIGHT  2.2101400e-001  2.2101400e-001  2.2101400e-
001
 2.2101400e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3332 FR221    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3279 FR221    HALFLIFE  2.8800000e+002  2.8800000e+002
2.8800000e+002
 2.8800000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     s
          223 GLOBAL   CLIMTIDX  1.3100000e+000  1.1700000e+000
1.0000000e+000
 2.2500000e+000  0.0000000e+000  1.0000000e+000 CUMULATIVE   NONE
          223 GLOBAL   CLIMTIDX  1.3100000e+000  1.1700000e+000
1.0000000e+000
 2.2500000e+000  7.5000000e-001  1.2500000e+000 CUMULATIVE   NONE
          223 GLOBAL   CLIMTIDX  1.3100000e+000  1.1700000e+000
1.0000000e+000
 2.2500000e+000  7.5000000e-001  1.5000000e+000 CUMULATIVE   NONE
          223 GLOBAL   CLIMTIDX  1.3100000e+000  1.1700000e+000
1.0000000e+000
 2.2500000e+000  1.0000000e+000  2.2500000e+000 CUMULATIVE   NONE
         3501 GLOBAL   FPICD     1.0000000e+000  1.0000000e+000
1.0000000e+000
```

```
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3500 GLOBAL   FPICM     1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3494 GLOBAL   LAMBDAD   4.6800000e-003  4.6800000e-003  4.6800000e-
003
 4.6800000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     (km^-2)(yr^-1
         3497 GLOBAL   MINERT    1.0000000e-004  1.0000000e-004  1.0000000e-
004
 1.0000000e-004  0.00000000e+000 0.0000000e+000 CONSTANT     yr^-1
         3644 GLOBAL   ONEPLG    2.0000000e-002  2.0000000e-002  2.0000000e-
002
 2.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3417 GLOBAL   OXSTAT    5.0000000e-001  5.0000000e-001
0.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         3493 GLOBAL   PBRINE    3.0500000e-001  3.0500000e-001  1.0000000e-
002
 6.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         3495 GLOBAL   PLGPAT    0.0000000e+000  0.0000000e+000
1.0000000e+000
 3.0000000e+000  2.0000000e-002  1.0000000e+000 DELTA        NONE
         3495 GLOBAL   PLGPAT    0.0000000e+000  0.0000000e+000
1.0000000e+000
 3.0000000e+000  6.8000000e-001  2.0000000e+000 DELTA        NONE
         3495 GLOBAL   PLGPAT    0.0000000e+000  0.0000000e+000
1.0000000e+000
 3.0000000e+000  3.0000000e-001  3.0000000e+000 DELTA        NONE
         3491 GLOBAL   TA        1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     yr
         3646 GLOBAL   THREEPLG  3.0000000e-001  3.0000000e-001  3.0000000e-
001
 3.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3499 GLOBAL   TPICD     6.0000000e+002  6.0000000e+002
6.0000000e+002
 6.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     yr
         3498 GLOBAL   TPICM     6.0000000e+002  6.0000000e+002
6.0000000e+002
 6.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     yr
          225 GLOBAL   TRANSIDX  5.0000000e-001  5.0000000e-001
0.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         3645 GLOBAL   TWOPLG    6.8000000e-001  6.8000000e-001  6.8000000e-
001
 6.8000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          228 H2       VISCO     8.9338900e-006  8.9338900e-006  8.9338900e-
006
 8.9338900e-006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa*s
          229 IMPERM_Z CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          230 IMPERM_Z COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2720 IMPERM_Z KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
```

```
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          231 IMPERM_Z PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2721 IMPERM_Z PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2722 IMPERM_Z PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          234 IMPERM_Z PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          232 IMPERM_Z PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          233 IMPERM_Z POROSITY  5.0000000e-003  5.0000000e-003  5.0000000e-
003
 5.0000000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          236 IMPERM_Z PRMX_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          237 IMPERM_Z PRMY_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          238 IMPERM_Z PRMZ_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
          241 IMPERM_Z RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          243 IMPERM_Z SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          244 IMPERM_Z SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2097 MAGENTA  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3016 MAGENTA  COMP_RCK  2.6440000e-010  2.6440000e-010  1.1620000e-
010
 4.5530000e-010  0.00000000e+000 1.1620000e-010 STUDENT      Pa^-1
         3016 MAGENTA  COMP_RCK  2.6440000e-010  2.6440000e-010  1.1620000e-
010
 4.5530000e-010  0.00000000e+000 2.2170000e-010 STUDENT      Pa^-1
         3016 MAGENTA  COMP_RCK  2.6440000e-010  2.6440000e-010  1.1620000e-
010
 4.5530000e-010  0.00000000e+000 4.5530000e-010 STUDENT      Pa^-1
         2725 MAGENTA  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2098 MAGENTA  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2726 MAGENTA  PCT_A     2.6000000e-001  2.6000000e-001  2.6000000e-
001
```

2.6000000e-001 0.00000000e+000 0.0000000e+000 CONSTANT   Pa
        2727 MAGENTA PCT_EXP -3.4800000e-001 -3.4800000e-001 -3.4800000e-001
-3.4800000e-001 0.00000000e+000 0.0000000e+000 CONSTANT   NONE
        2728 MAGENTA PO_MIN   1.0132500e+005 1.0132500e+005 1.0132500e+005
 1.0132500e+005 0.00000000e+000 0.0000000e+000 CONSTANT   Pa
        2099 MAGENTA PORE_DIS 6.4360000e-001 6.4360000e-001 6.4360000e-001
 6.4360000e-001 0.00000000e+000 0.0000000e+000 CONSTANT   NONE
        2100 MAGENTA POROSITY 1.3800000e-001 1.3800000e-001 2.7000000e-002
 2.5200000e-001 0.00000000e+000 2.7000000e-002 STUDENT   NONE
        2100 MAGENTA POROSITY 1.3800000e-001 1.3800000e-001 2.7000000e-002
 2.5200000e-001 0.00000000e+000 1.0600000e-001 STUDENT   NONE
        2100 MAGENTA POROSITY 1.3800000e-001 1.3800000e-001 2.7000000e-002
 2.5200000e-001 0.00000000e+000 1.6600000e-001 STUDENT   NONE
        2100 MAGENTA POROSITY 1.3800000e-001 1.3800000e-001 2.7000000e-002
 2.5200000e-001 0.00000000e+000 2.5200000e-001 STUDENT   NONE
        2101 MAGENTA PRESSURE 9.4650000e+005 9.4650000e+005 9.4650000e+005
 9.4650000e+005 0.00000000e+000 0.0000000e+000 CONSTANT   Pa
        2102 MAGENTA PRMX_LOG -1.5200000e+001 -1.5200000e+001 -1.5200000e+001
-1.5200000e+001 0.00000000e+000 0.0000000e+000 CONSTANT   log(m^2)
        2103 MAGENTA PRMY_LOG -1.5200000e+001 -1.5200000e+001 -1.5200000e+001
-1.5200000e+001 0.00000000e+000 0.0000000e+000 CONSTANT   log(m^2)
        2104 MAGENTA PRMZ_LOG -1.5200000e+001 -1.5200000e+001 -1.5200000e+001
-1.5200000e+001 0.00000000e+000 0.0000000e+000 CONSTANT   log(m^2)
        2106 MAGENTA RELP_MOD 4.0000000e+000 4.0000000e+000 4.0000000e+000
 4.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   NONE
        2241 MAGENTA SAT_RBRN 8.3630000e-002 8.3630000e-002 8.3630000e-002
 8.3630000e-002 0.00000000e+000 0.0000000e+000 CONSTANT   NONE
        2107 MAGENTA SAT_RGAS 7.7110000e-002 7.7110000e-002 7.7110000e-002
 7.7110000e-002 0.00000000e+000 0.0000000e+000 CONSTANT   NONE
        3235 ND143   ATWEIGHT 1.4291000e-001 1.4291000e-001 1.4291000e-001
 1.4291000e-001 0.00000000e+000 0.0000000e+000 CONSTANT   kg/mole
        3333 ND143   EPAREL   0.0000000e+000 0.0000000e+000 0.0000000e+000
 0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   Curies/wuf
        3280 ND143   HALFLIFE 1.0000000e+038 1.0000000e+038 1.0000000e+038
 1.0000000e+038 0.00000000e+000 0.0000000e+000 CONSTANT   s
        2906 NITRATE QINIT   2.6100000e+007 2.6100000e+007 2.6100000e+007
 2.6100000e+007 0.00000000e+000 0.0000000e+000 CONSTANT   moles
        3458 NP   CAPHUM   1.1000000e-005 1.1000000e-005 1.1000000e-005

```
 1.1000000e-005  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
        3313 NP       CAPMIC    2.7000000e-003  2.7000000e-003  2.7000000e-
003
 2.7000000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
        3312 NP       CONCINT   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
        3439 NP       CONCMIN   2.6000000e-008  2.6000000e-008  2.6000000e-
008
 2.6000000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
        3314 NP       PROPMIC   1.2000000e+001  1.2000000e+001
1.2000000e+001
 1.2000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3477 NP+4     MKD_NP    3.5000000e+000  2.6000000e+000  7.0000000e-
001
 1.0000000e+001  0.00000000e+000 0.0000000e+000 LOGUNIFORM   m^3/kg
        3476 NP+5     MKD_NP    3.8000000e-002  1.4000000e-002  1.0000000e-
003
 2.0000000e-001  0.00000000e+000 0.0000000e+000 LOGUNIFORM   m^3/kg
         246 NP237    ATWEIGHT  2.3704800e-001  2.3704800e-001  2.3704800e-
001
 2.3704800e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3370 NP237    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         247 NP237    HALFLIFE  6.7530000e+013  6.7530000e+013
6.7530000e+013
 6.7530000e+013  0.00000000e+000 0.0000000e+000 CONSTANT     s
         248 NP237    INVCHD    1.1300000e+001  1.1300000e+001
1.1300000e+001
 1.1300000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         249 NP237    INVRHD    1.0100000e+000  1.0100000e+000
1.0100000e+000
 1.0100000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
        3236 NP239    ATWEIGHT  2.3905300e-001  2.3905300e-001  2.3905300e-
001
 2.3905300e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3334 NP239    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
        3281 NP239    HALFLIFE  2.0350000e+005  2.0350000e+005
2.0350000e+005
 2.0350000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     s
           7 OPS_AREA CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           8 OPS_AREA COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
        2604 OPS_AREA KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           9 OPS_AREA PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        2605 OPS_AREA PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
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```
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2606 OPS_AREA PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           12 OPS_AREA PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
           10 OPS_AREA PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           11 OPS_AREA POROSITY  1.8000000e-001  1.8000000e-001  1.8000000e-
001
 1.8000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           13 OPS_AREA PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
           14 OPS_AREA PRMX_LOG -1.1000000e+001 -1.1000000e+001 -
1.1000000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
           15 OPS_AREA PRMY_LOG -1.1000000e+001 -1.1000000e+001 -
1.1000000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
           16 OPS_AREA PRMZ_LOG -1.1000000e+001 -1.1000000e+001 -
1.1000000e+001
-1.1000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
           19 OPS_AREA RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           20 OPS_AREA SAT_IBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           21 OPS_AREA SAT_RBRN  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
           22 OPS_AREA SAT_RGAS  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          250 PA231    ATWEIGHT  2.3103600e-001  2.3103600e-001  2.3103600e-
001
 2.3103600e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3371 PA231    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          251 PA231    HALFLIFE  1.0340000e+012  1.0340000e+012
1.0340000e+012
 1.0340000e+012  0.00000000e+000 0.0000000e+000 CONSTANT     s
         2267 PA231    INVCHD    1.9700000e+000  1.9700000e+000
1.9700000e+000
 1.9700000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         2268 PA231    INVRHD    6.8600000e-004  6.8600000e-004  6.8600000e-
004
 6.8600000e-004  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3237 PA233    ATWEIGHT  2.3304000e-001  2.3304000e-001  2.3304000e-
001
 2.3304000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3335 PA233    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
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 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
        3282 PA233    HALFLIFE  2.3330000e+006  2.3330000e+006
2.3330000e+006
 2.3330000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     s
        3197 PA234M   ATWEIGHT  2.3404300e-001  2.3404300e-001  2.3404300e-
001
 2.3404300e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3336 PA234M   EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
        3283 PA234M   HALFLIFE  7.0200000e+001  7.0200000e+001
7.0200000e+001
 7.0200000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     s
         252 PAN_SEAL CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         253 PAN_SEAL COMP_RCK  2.0000000e-010  2.0000000e-010  2.0000000e-
010
 2.0000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
        2731 PAN_SEAL KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         254 PAN_SEAL PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        2732 PAN_SEAL PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        2733 PAN_SEAL PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         257 PAN_SEAL PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         255 PAN_SEAL PORE_DIS  9.4000000e-001  9.4000000e-001  9.4000000e-
001
 9.4000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         256 PAN_SEAL POROSITY  1.5000000e-001  1.5000000e-001  1.5000000e-
001
 1.5000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         258 PAN_SEAL PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         259 PAN_SEAL PRMX_LOG -1.8045300e+001 -1.8045300e+001 -
1.8045300e+001
-1.8045300e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         260 PAN_SEAL PRMY_LOG -1.2714000e+001 -1.2714000e+001 -
1.2714000e+001
-1.2714000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         261 PAN_SEAL PRMZ_LOG -1.2714000e+001 -1.2714000e+001 -
1.2714000e+001
-1.2714000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         264 PAN_SEAL RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        2734 PAN_SEAL SAT_IBRN  2.1000000e-001  2.1000000e-001  2.1000000e-
001
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 2.1000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          265 PAN_SEAL SAT_RBRN  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          266 PAN_SEAL SAT_RGAS  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          282 PB       LOGSOLM   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(moles/lit
         3421 PB209    ATWEIGHT  2.0898100e-001  2.0898100e-001  2.0898100e-
001
 2.0898100e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3337 PB209    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3284 PB209    HALFLIFE  1.1880000e+004  1.1880000e+004
1.1880000e+004
 1.1880000e+004  0.00000000e+000 0.0000000e+000 CONSTANT     s
          283 PB210    ATWEIGHT  2.0998400e-001  2.0998400e-001  2.0998400e-
001
 2.0998400e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3372 PB210    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          284 PB210    HALFLIFE  7.0370000e+008  7.0370000e+008
7.0370000e+008
 7.0370000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     s
          285 PB210    INVCHD    7.9000000e+000  7.9000000e+000
7.9000000e+000
 7.9000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          286 PB210    INVRHD    1.6200000e-005  1.6200000e-005  1.6200000e-
005
 1.6200000e-005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         3200 PB211    ATWEIGHT  2.1098900e-001  2.1098900e-001  2.1098900e-
001
 2.1098900e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3338 PB211    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3285 PB211    HALFLIFE  2.1660000e+003  2.1660000e+003
2.1660000e+003
 2.1660000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3201 PB212    ATWEIGHT  2.1199200e-001  2.1199200e-001  2.1199200e-
001
 2.1199200e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3339 PB212    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3286 PB212    HALFLIFE  3.8300000e+004  3.8300000e+004
3.8300000e+004
 3.8300000e+004  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3202 PB214    ATWEIGHT  2.1400000e-001  2.1400000e-001  2.1400000e-
001
 2.1400000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3340 PB214    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
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 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
        3287 PB214    HALFLIFE  1.6080000e+003  1.6080000e+003
1.6080000e+003
 1.6080000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     s
        3429 PHUMOX3  PHUMCIM   1.1000000e+000  1.3700000e+000  6.5000000e-
002
 1.6000000e+000  0.0000000e+000  6.5000000e-002 CUMULATIVE   NONE
        3429 PHUMOX3  PHUMCIM   1.1000000e+000  1.3700000e+000  6.5000000e-
002
 1.6000000e+000  5.0000000e-001  1.3700000e+000 CUMULATIVE   NONE
        3429 PHUMOX3  PHUMCIM   1.1000000e+000  1.3700000e+000  6.5000000e-
002
 1.6000000e+000  1.0000000e+000  1.6000000e+000 CUMULATIVE   NONE
        3433 PHUMOX3  PHUMSIM   1.9000000e-001  1.9000000e-001  1.9000000e-
001
 1.9000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3430 PHUMOX4  PHUMCIM   6.3000000e+000  6.3000000e+000
6.3000000e+000
 6.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3434 PHUMOX4  PHUMSIM   6.3000000e+000  6.3000000e+000
6.3000000e+000
 6.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3431 PHUMOX5  PHUMCIM   7.4000000e-003  7.4000000e-003  7.4000000e-
003
 7.4000000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3435 PHUMOX5  PHUMSIM   9.1000000e-004  9.1000000e-004  9.1000000e-
004
 9.1000000e-004  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3432 PHUMOX6  PHUMCIM   5.1000000e-001  5.1000000e-001  5.1000000e-
001
 5.1000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3436 PHUMOX6  PHUMSIM   1.2000000e-001  1.2000000e-001  1.2000000e-
001
 1.2000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         287 PM147    ATWEIGHT  1.4691500e-001  1.4691500e-001  1.4691500e-
001
 1.4691500e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3341 PM147    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         288 PM147    HALFLIFE  8.2790000e+007  8.2790000e+007
8.2790000e+007
 8.2790000e+007  0.00000000e+000 0.0000000e+000 CONSTANT     s
        2038 PM147    INVCHD    4.1300000e-004  4.1300000e-004  4.1300000e-
004
 4.1300000e-004  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         289 PM147    INVRHD    8.0500000e-002  8.0500000e-002  8.0500000e-
002
 8.0500000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
        3203 PO212    ATWEIGHT  2.1198900e-001  2.1198900e-001  2.1198900e-
001
 2.1198900e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3342 PO212    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
        3288 PO212    HALFLIFE  3.0000000e-007  3.0000000e-007  3.0000000e-
007
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3.0000000e-007 0.00000000e+000 0.0000000e+000 CONSTANT s
3204 PO213 ATWEIGHT 2.1299300e-001 2.1299300e-001 2.1299300e-
001
2.1299300e-001 0.00000000e+000 0.0000000e+000 CONSTANT kg/mole
3343 PO213 EPAREL 0.0000000e+000 0.0000000e+000
0.0000000e+000
0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT Curies/wuf
3289 PO213 HALFLIFE 4.2000000e-006 4.2000000e-006 4.2000000e-
006
4.2000000e-006 0.00000000e+000 0.0000000e+000 CONSTANT s
3205 PO214 ATWEIGHT 2.1399500e-001 2.1399500e-001 2.1399500e-
001
2.1399500e-001 0.00000000e+000 0.0000000e+000 CONSTANT kg/mole
3344 PO214 EPAREL 0.0000000e+000 0.0000000e+000
0.0000000e+000
0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT Curies/wuf
3290 PO214 HALFLIFE 1.6430000e-004 1.6430000e-004 1.6430000e-
004
1.6430000e-004 0.00000000e+000 0.0000000e+000 CONSTANT s
3206 PO215 ATWEIGHT 2.1499900e-001 2.1499900e-001 2.1499900e-
001
2.1499900e-001 0.00000000e+000 0.0000000e+000 CONSTANT kg/mole
3345 PO215 EPAREL 0.0000000e+000 0.0000000e+000
0.0000000e+000
0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT Curies/wuf
3291 PO215 HALFLIFE 1.7800000e-003 1.7800000e-003 1.7800000e-
003
1.7800000e-003 0.00000000e+000 0.0000000e+000 CONSTANT s
3207 PO216 ATWEIGHT 2.1600200e-001 2.1600200e-001 2.1600200e-
001
2.1600200e-001 0.00000000e+000 0.0000000e+000 CONSTANT kg/mole
3346 PO216 EPAREL 0.0000000e+000 0.0000000e+000
0.0000000e+000
0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT Curies/wuf
3292 PO216 HALFLIFE 1.5000000e-001 1.5000000e-001 1.5000000e-
001
1.5000000e-001 0.00000000e+000 0.0000000e+000 CONSTANT s
3208 PO218 ATWEIGHT 2.1800900e-001 2.1800900e-001 2.1800900e-
001
2.1800900e-001 0.00000000e+000 0.0000000e+000 CONSTANT kg/mole
3347 PO218 EPAREL 0.0000000e+000 0.0000000e+000
0.0000000e+000
0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT Curies/wuf
3293 PO218 HALFLIFE 1.8300000e+002 1.8300000e+002
1.8300000e+002
1.8300000e+002 0.00000000e+000 0.0000000e+000 CONSTANT s
3459 PU CAPHUM 1.1000000e-005 1.1000000e-005 1.1000000e-
005
1.1000000e-005 0.00000000e+000 0.0000000e+000 CONSTANT moles/liter
3315 PU CAPMIC 6.8000000e-005 6.8000000e-005 6.8000000e-
005
6.8000000e-005 0.00000000e+000 0.0000000e+000 CONSTANT moles/liter
3316 PU CONCINT 1.0000000e-009 1.0000000e-009 1.0000000e-
009
1.0000000e-009 0.00000000e+000 0.0000000e+000 CONSTANT moles/liter
3440 PU CONCMIN 2.6000000e-008 2.6000000e-008 2.6000000e-
008

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 2.6000000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
        3317 PU       PROPMIC   3.0000000e-001  3.0000000e-001  3.0000000e-
001
 3.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3442 PU+3     MD0       3.0000000e-010  3.0000000e-010  3.0000000e-
010
 3.0000000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     m^2/s
        3480 PU+3     MKD_PU    1.3000000e-001  9.0000000e-002  2.0000000e-
002
 4.0000000e-001  0.00000000e+000 0.0000000e+000 LOGUNIFORM   m^3/kg
        3443 PU+4     MD0       1.5300000e-010  1.5300000e-010  1.5300000e-
010
 1.5300000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     m^2/s
        3481 PU+4     MKD_PU    3.5000000e+000  2.6000000e+000  7.0000000e-
001
 1.0000000e+001  0.00000000e+000 0.0000000e+000 LOGUNIFORM   m^3/kg
         291 PU238    ATWEIGHT  2.3805000e-001  2.3805000e-001  2.3805000e-
001
 2.3805000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3373 PU238    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         292 PU238    HALFLIFE  2.7690000e+009  2.7690000e+009
2.7690000e+009
 2.7690000e+009  0.00000000e+000 0.0000000e+000 CONSTANT     s
         293 PU238    INVCHD    1.5300000e+006  1.5300000e+006
1.5300000e+006
 1.5300000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         294 PU238    INVRHD    3.4800000e+003  3.4800000e+003
3.4800000e+003
 3.4800000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
        3506 PU238L   INVCHD    1.5300000e+006  1.5300000e+006
1.5300000e+006
 1.5300000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
        3511 PU238L   INVRHD    3.4800000e+003  3.4800000e+003
3.4800000e+003
 3.4800000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         295 PU239    ATWEIGHT  2.3905200e-001  2.3905200e-001  2.3905200e-
001
 2.3905200e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3374 PU239    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         296 PU239    HALFLIFE  7.5940000e+011  7.5940000e+011
7.5940000e+011
 7.5940000e+011  0.00000000e+000 0.0000000e+000 CONSTANT     s
         297 PU239    INVCHD    7.7700000e+005  7.7700000e+005
7.7700000e+005
 7.7700000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         298 PU239    INVRHD    5.6400000e+003  5.6400000e+003
5.6400000e+003
 5.6400000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
        3505 PU239L   INVCHD    9.1000000e+005  9.1000000e+005
9.1000000e+005
 9.1000000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
        3510 PU239L   INVRHD    7.4700000e+003  7.4700000e+003
7.4700000e+003
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 7.4700000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          299 PU240    ATWEIGHT  2.4005400e-001  2.4005400e-001  2.4005400e-
001
 2.4005400e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3375 PU240    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          300 PU240    HALFLIFE  2.0630000e+011  2.0630000e+011
2.0630000e+011
 2.0630000e+011  0.00000000e+000 0.0000000e+000 CONSTANT     s
          301 PU240    INVCHD    1.3200000e+005  1.3200000e+005
1.3200000e+005
 1.3200000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          302 PU240    INVRHD    1.8200000e+003  1.8200000e+003
1.8200000e+003
 1.8200000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          303 PU241    ATWEIGHT  2.4105700e-001  2.4105700e-001  2.4105700e-
001
 2.4105700e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3348 PU241    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          304 PU241    HALFLIFE  4.5440000e+008  4.5440000e+008
4.5440000e+008
 4.5440000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     s
          305 PU241    INVCHD    5.1700000e+005  5.1700000e+005
5.1700000e+005
 5.1700000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          306 PU241    INVRHD    1.4900000e+005  1.4900000e+005
1.4900000e+005
 1.4900000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          307 PU242    ATWEIGHT  2.4205900e-001  2.4205900e-001  2.4205900e-
001
 2.4205900e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3376 PU242    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          308 PU242    HALFLIFE  1.2210000e+013  1.2210000e+013
1.2210000e+013
 1.2210000e+013  0.00000000e+000 0.0000000e+000 CONSTANT     s
          309 PU242    INVCHD    3.2700000e+001  3.2700000e+001
3.2700000e+001
 3.2700000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          310 PU242    INVRHD    5.0200000e-001  5.0200000e-001  5.0200000e-
001
 5.0200000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          311 PU244    ATWEIGHT  2.4406400e-001  2.4406400e-001  2.4406400e-
001
 2.4406400e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3377 PU244    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          312 PU244    HALFLIFE  2.6070000e+015  2.6070000e+015
2.6070000e+015
 2.6070000e+015  0.00000000e+000 0.0000000e+000 CONSTANT     s
         2269 PU244    INVCHD    1.4500000e-006  1.4500000e-006  1.4500000e-
006
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 1.4500000e-006  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
        2270 PU244    INVRHD    1.5600000e-003  1.5600000e-003  1.5600000e-
003
 1.5600000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         313 RA       LOGSOLM   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(moles/lit
        3209 RA223    ATWEIGHT  2.2301900e-001  2.2301900e-001  2.2301900e-
001
 2.2301900e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3349 RA223    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
        3294 RA223    HALFLIFE  9.8790000e+005  9.8790000e+005
9.8790000e+005
 9.8790000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     s
        3210 RA224    ATWEIGHT  2.2402000e-001  2.2402000e-001  2.2402000e-
001
 2.2402000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3350 RA224    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
        3295 RA224    HALFLIFE  3.1620000e+005  3.1620000e+005
3.1620000e+005
 3.1620000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     s
        3211 RA225    ATWEIGHT  2.2502400e-001  2.2502400e-001  2.2502400e-
001
 2.2502400e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3351 RA225    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
        3296 RA225    HALFLIFE  1.2790000e+006  1.2790000e+006
1.2790000e+006
 1.2790000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     s
         314 RA226    ATWEIGHT  2.2602500e-001  2.2602500e-001  2.2602500e-
001
 2.2602500e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3378 RA226    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         315 RA226    HALFLIFE  5.0490000e+010  5.0490000e+010
5.0490000e+010
 5.0490000e+010  0.00000000e+000 0.0000000e+000 CONSTANT     s
         316 RA226    INVCHD    1.0000000e+001  1.0000000e+001
1.0000000e+001
 1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         317 RA226    INVRHD    5.5500000e-005  5.5500000e-005  5.5500000e-
005
 5.5500000e-005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         318 RA228    ATWEIGHT  2.2803100e-001  2.2803100e-001  2.2803100e-
001
 2.2803100e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3352 RA228    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         319 RA228    HALFLIFE  2.1143000e+008  2.1143000e+008
2.1143000e+008
```

2.1143000e+008 0.00000000e+000 0.0000000e+000 CONSTANT s
2271 RA228 INVCHD 7.6500000e+000 7.6500000e+000
7.6500000e+000
7.6500000e+000 0.00000000e+000 0.0000000e+000 CONSTANT Curies
2272 RA228 INVRHD 3.3600000e-001 3.3600000e-001 3.3600000e-
001
3.3600000e-001 0.00000000e+000 0.0000000e+000 CONSTANT Curies
3503 REFCON ABERM 6.2850000e+005 6.2850000e+005
6.2850000e+005
6.2850000e+005 0.00000000e+000 0.0000000e+000 CONSTANT m^2
2833 REFCON ACF_CH4 1.0000000e-002 1.0000000e-002 1.0000000e-
002
1.0000000e-002 0.00000000e+000 0.0000000e+000 CONSTANT NONE
2832 REFCON ACF_CO2 2.3100000e-001 2.3100000e-001 2.3100000e-
001
2.3100000e-001 0.00000000e+000 0.0000000e+000 CONSTANT NONE
2831 REFCON ACF_H2 0.0000000e+000 0.0000000e+000
0.0000000e+000
0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT NONE
2835 REFCON ACF_H2S 1.0000000e-001 1.0000000e-001 1.0000000e-
001
1.0000000e-001 0.00000000e+000 0.0000000e+000 CONSTANT NONE
2834 REFCON ACF_N2 4.5000000e-002 4.5000000e-002 4.5000000e-
002
4.5000000e-002 0.00000000e+000 0.0000000e+000 CONSTANT NONE
2836 REFCON ACF_O2 1.9000000e-002 1.9000000e-002 1.9000000e-
002
1.9000000e-002 0.00000000e+000 0.0000000e+000 CONSTANT NONE
2897 REFCON AL2 6.9314720e-001 6.9314720e-001 6.9314720e-
001
6.9314720e-001 0.00000000e+000 0.0000000e+000 CONSTANT NONE
3489 REFCON AREA_CH 1.1150000e+005 1.1150000e+005
1.1150000e+005
1.1150000e+005 0.00000000e+000 0.0000000e+000 CONSTANT m^2
3496 REFCON AREA_RH 1.5760000e+004 1.5760000e+004
1.5760000e+004
1.5760000e+004 0.00000000e+000 0.0000000e+000 CONSTANT m^2
3488 REFCON AREA_ZRO 4.1330000e+003 4.1330000e+003
4.1330000e+003
4.1330000e+003 0.00000000e+000 0.0000000e+000 CONSTANT m^2
3106 REFCON ASDRUM 6.0000000e+000 6.0000000e+000
6.0000000e+000
6.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT m^2
2890 REFCON ATMPA 1.0132500e+005 1.0132500e+005
1.0132500e+005
1.0132500e+005 0.00000000e+000 0.0000000e+000 CONSTANT Pa/atm
3109 REFCON AVOGADRO 6.0221370e+023 6.0221370e+023
6.0221370e+023
6.0221370e+023 0.00000000e+000 0.0000000e+000 CONSTANT mole^-1
2879 REFCON BBLG 4.2000000e+001 4.2000000e+001
4.2000000e+001
4.2000000e+001 0.00000000e+000 0.0000000e+000 CONSTANT gal/bbl
3590 REFCON BIP_11 0.0000000e+000 0.0000000e+000
0.0000000e+000
0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT NONE
3591 REFCON BIP_12 -3.4260000e-001 -3.4260000e-001 -3.4260000e-
001

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-3.4260000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3592 REFCON   BIP_13   -2.2200000e-002 -2.2200000e-002 -2.2200000e-
002
-2.2200000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3593 REFCON   BIP_14    9.7800000e-002  9.7800000e-002  9.7800000e-
002
 9.7800000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3594 REFCON   BIP_15    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3595 REFCON   BIP_16    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3596 REFCON   BIP_21   -3.4260000e-001 -3.4260000e-001 -3.4260000e-
001
-3.4260000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3597 REFCON   BIP_22    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3598 REFCON   BIP_23    9.3300000e-002  9.3300000e-002  9.3300000e-
002
 9.3300000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3599 REFCON   BIP_24   -3.1500000e-002 -3.1500000e-002 -3.1500000e-
002
-3.1500000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3600 REFCON   BIP_25    9.8900000e-002  9.8900000e-002  9.8900000e-
002
 9.8900000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3601 REFCON   BIP_26    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3602 REFCON   BIP_31   -2.2200000e-002 -2.2200000e-002 -2.2200000e-
002
-2.2200000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3603 REFCON   BIP_32    9.3300000e-002  9.3300000e-002  9.3300000e-
002
 9.3300000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3604 REFCON   BIP_33    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3605 REFCON   BIP_34    2.7800000e-002  2.7800000e-002  2.7800000e-
002
 2.7800000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3606 REFCON   BIP_35    8.5000000e-002  8.5000000e-002  8.5000000e-
002
 8.5000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3607 REFCON   BIP_36    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3608 REFCON   BIP_41    9.7800000e-002  9.7800000e-002  9.7800000e-
002
 9.7800000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3609 REFCON   BIP_42   -3.1500000e-002 -3.1500000e-002 -3.1500000e-
002
-3.1500000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3610 REFCON   BIP_43    2.7800000e-002  2.7800000e-002  2.7800000e-
002
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 2.7800000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3611 REFCON   BIP_44    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3612 REFCON   BIP_45    1.6960000e-001  1.6960000e-001  1.6960000e-
001
 1.6960000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3613 REFCON   BIP_46   -7.8000000e-003 -7.8000000e-003 -7.8000000e-
003
-7.8000000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3614 REFCON   BIP_51    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3615 REFCON   BIP_52    9.8900000e-002  9.8900000e-002  9.8900000e-
002
 9.8900000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3616 REFCON   BIP_53    8.5000000e-002  8.5000000e-002  8.5000000e-
002
 8.5000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3617 REFCON   BIP_54    1.6960000e-001  1.6960000e-001  1.6960000e-
001
 1.6960000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3618 REFCON   BIP_55    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3619 REFCON   BIP_56    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3620 REFCON   BIP_61    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3621 REFCON   BIP_62    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3622 REFCON   BIP_63    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3623 REFCON   BIP_64   -7.8000000e-003 -7.8000000e-003 -7.8000000e-
003
-7.8000000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3624 REFCON   BIP_65    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3625 REFCON   BIP_66    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3111 REFCON   CITOBQ    3.7000000e+010  3.7000000e+010
3.7000000e+010
 3.7000000e+010  0.00000000e+000 0.0000000e+000 CONSTANT     Bq/Curies
         2882 REFCON   DARM2     9.8692330e-013  9.8692330e-013  9.8692330e-
013
 9.8692330e-013  0.00000000e+000 0.0000000e+000 CONSTANT     m^2/darcy
         2887 REFCON   DAYSEC    8.6400000e+004  8.6400000e+004
8.6400000e+004
 8.6400000e+004  0.00000000e+000 0.0000000e+000 CONSTANT     s/day
         3132 REFCON   DRROOM    6.8040000e+003  6.8040000e+003
6.8040000e+003
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 6.8040000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2883 REFCON   F3M3      2.8316850e-002  2.8316850e-002  2.8316850e-
002
 2.8316850e-002  0.00000000e+000 0.0000000e+000 CONSTANT     m^3/ft^3
         2881 REFCON   FTM       3.0480000e-001  3.0480000e-001  3.0480000e-
001
 3.0480000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     m/ft
         3647 REFCON   FVRW      1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3492 REFCON   FVW       3.8600000e-001  3.8600000e-001  3.8600000e-
001
 3.8600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2889 REFCON   GRAVACC   9.8066500e+000  9.8066500e+000
9.8066500e+000
 9.8066500e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m/s^2
         2884 REFCON   GTI3      2.3100010e+002  2.3100010e+002
2.3100010e+002
 2.3100010e+002  0.00000000e+000 0.0000000e+000 CONSTANT     in^3/gal
         3502 REFCON   HRH       5.0900000e-001  5.0900000e-001  5.0900000e-
001
 5.0900000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2886 REFCON   KGLB      2.2046230e+000  2.2046230e+000
2.2046230e+000
 2.2046230e+000  0.00000000e+000 0.0000000e+000 CONSTANT     lb/kg
         2885 REFCON   LBKG      4.5359240e-001  4.5359240e-001  4.5359240e-
001
 4.5359240e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/lb
         3582 REFCON   LHSBLANK  5.0000000e-001  5.0000000e-001
0.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         3589 REFCON   MW_CELL   2.7023000e-002  2.7023000e-002  2.7023000e-
002
 2.7023000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         2866 REFCON   MW_CH2O   3.0026280e-002  3.0026280e-002  3.0026280e-
002
 3.0026280e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3585 REFCON   MW_CH4    1.6042760e-002  1.6042760e-002  1.6042760e-
002
 1.6042760e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3584 REFCON   MW_CO2    4.4009800e-002  4.4009800e-002  4.4009800e-
002
 4.4009800e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         2865 REFCON   MW_FE     5.5847000e-002  5.5847000e-002  5.5847000e-
002
 5.5847000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         2858 REFCON   MW_H2     2.0158800e-003  2.0158800e-003  2.0158800e-
003
 2.0158800e-003  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         2864 REFCON   MW_H2O    1.8015280e-002  1.8015280e-002  1.8015280e-
002
 1.8015280e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3587 REFCON   MW_H2S    3.4081880e-002  3.4081880e-002  3.4081880e-
002
 3.4081880e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3586 REFCON   MW_N2     2.8013480e-002  2.8013480e-002  2.8013480e-
002
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 2.8013480e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3583 REFCON   MW_NACL   5.8442468e-002  5.8442468e-002  5.8442468e-
002
 5.8442468e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3588 REFCON   MW_O2     3.1998800e-002  3.1998800e-002  3.1998800e-
002
 3.1998800e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        2894 REFCON   OMEGAA    4.2747000e-001  4.2747000e-001  4.2747000e-
001
 4.2747000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        2895 REFCON   OMEGAB    8.6640000e-002  8.6640000e-002  8.6640000e-
002
 8.6640000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        2880 REFCON   PASCP     1.0000000e+003  1.0000000e+003
1.0000000e+003
 1.0000000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     cP/Pa*s
        2839 REFCON   PC_CH4    4.6170000e+006  4.6170000e+006
4.6170000e+006
 4.6170000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        2838 REFCON   PC_CO2    7.3760000e+006  7.3760000e+006
7.3760000e+006
 7.3760000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        2837 REFCON   PC_H2     2.0470000e+006  2.0470000e+006
2.0470000e+006
 2.0470000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        2841 REFCON   PC_H2S    9.0070000e+006  9.0070000e+006
9.0070000e+006
 9.0070000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        2840 REFCON   PC_N2     3.3940000e+006  3.3940000e+006
3.3940000e+006
 3.3940000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        2842 REFCON   PC_O2     5.0800000e+006  5.0800000e+006
5.0800000e+006
 5.0800000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        2896 REFCON   PI        3.1415930e+000  3.1415930e+000
3.1415930e+000
 3.1415930e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        2892 REFCON   PSIPA     6.8947570e+003  6.8947570e+003
6.8947570e+003
 6.8947570e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Pa*in^2/lb
        2893 REFCON   R         8.3145100e+000  8.3145100e+000
8.3145100e+000
 8.3145100e+000  0.00000000e+000 0.0000000e+000 CONSTANT     J/mole*K
        2891 REFCON   RTK       5.5555560e-001  5.5555560e-001  5.5555560e-
001
 5.5555560e-001  0.00000000e+000 0.0000000e+000 CONSTANT     K/rankine
        3112 REFCON   SECYR     3.1688770e-008  3.1688770e-008  3.1688770e-
008
 3.1688770e-008  0.00000000e+000 0.0000000e+000 CONSTANT     yr/s
        2827 REFCON   TC_CH4    1.9063000e+002  1.9063000e+002
1.9063000e+002
 1.9063000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     K
        2826 REFCON   TC_CO2    3.0415000e+002  3.0415000e+002
3.0415000e+002
 3.0415000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     K
        2825 REFCON   TC_H2     4.3600000e+001  4.3600000e+001
4.3600000e+001
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 4.3600000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     K
         2829 REFCON   TC_H2S    3.7355000e+002  3.7355000e+002
3.7355000e+002
 3.7355000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     K
         2828 REFCON   TC_N2     1.2615000e+002  1.2615000e+002
1.2615000e+002
 1.2615000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     K
         2830 REFCON   TC_O2     1.5477000e+002  1.5477000e+002
1.5477000e+002
 1.5477000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     K
         3490 REFCON   VOLWP     4.3600000e+005  4.3600000e+005
4.3600000e+005
 4.3600000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     m^3
         3107 REFCON   VPANLEX   4.6097650e+004  4.6097650e+004
4.6097650e+004
 4.6097650e+004  0.00000000e+000 0.0000000e+000 CONSTANT     m^3
         3108 REFCON   VREPOS    4.3840608e+005  4.3840608e+005
4.3840608e+005
 4.3840608e+005  0.00000000e+000 0.0000000e+000 CONSTANT     m^3
         3105 REFCON   VROOM     3.6443780e+003  3.6443780e+003
3.6443780e+003
 3.6443780e+003  0.00000000e+000 0.0000000e+000 CONSTANT     m^3
         2888 REFCON   YRSEC     3.1556930e+007  3.1556930e+007
3.1556930e+007
 3.1556930e+007  0.00000000e+000 0.0000000e+000 CONSTANT     s/yr
         3110 REFCON   ZCINK     2.7315000e+002  2.7315000e+002
2.7315000e+002
 2.7315000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     K
         2110 REPOSIT  CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3455 REPOSIT  CLOSMOD   4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2112 REPOSIT  COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2113 REPOSIT  DCELLCHW  5.4000000e+001  5.4000000e+001
5.4000000e+001
 5.4000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2114 REPOSIT  DCELLRHW  1.7000000e+001  1.7000000e+001
1.7000000e+001
 1.7000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2115 REPOSIT  DIRNCCHW  1.3900000e+002  1.3900000e+002
1.3900000e+002
 1.3900000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2116 REPOSIT  DIRNCRHW  2.5910000e+003  2.5910000e+003
2.5910000e+003
 2.5910000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2117 REPOSIT  DIRONCHW  1.7000000e+002  1.7000000e+002
1.7000000e+002
 1.7000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2118 REPOSIT  DIRONRHW  1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2119 REPOSIT  DPLASCHW  3.4000000e+001  3.4000000e+001
3.4000000e+001
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 3.4000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2120 REPOSIT  DPLASRHW  1.5000000e+001  1.5000000e+001
1.5000000e+001
 1.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2121 REPOSIT  DPLSCCHW  2.6000000e+001  2.6000000e+001
2.6000000e+001
 2.6000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2995 REPOSIT  DPLSCRHW  3.1000000e+000  3.1000000e+000
3.1000000e+000
 3.1000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2122 REPOSIT  DRUBBCHW  1.0000000e+001  1.0000000e+001
1.0000000e+001
 1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2123 REPOSIT  DRUBBRHW  3.3000000e+000  3.3000000e+000
3.3000000e+000
 3.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2127 REPOSIT  GRATMICH  6.3420000e-010  6.3420000e-010
0.0000000e+000
 1.2684000e-009  0.00000000e+000 0.0000000e+000 UNIFORM      moles/(kg*s)
         2128 REPOSIT  GRATMICI  4.9150000e-009  4.9150000e-009  3.1710000e-
010
 9.5129000e-009  0.00000000e+000 0.0000000e+000 UNIFORM      moles/(kg*s)
         2736 REPOSIT  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2242 REPOSIT  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2737 REPOSIT  PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2738 REPOSIT  PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2739 REPOSIT  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2129 REPOSIT  PORE_DIS  3.2500000e+000  2.8900000e+000
1.4400000e+000
 5.7800000e+000  0.0000000e+000  1.4400000e+000 CUMULATIVE   NONE
         2129 REPOSIT  PORE_DIS  3.2500000e+000  2.8900000e+000
1.4400000e+000
 5.7800000e+000  5.0000000e-001  2.8900000e+000 CUMULATIVE   NONE
         2129 REPOSIT  PORE_DIS  3.2500000e+000  2.8900000e+000
1.4400000e+000
 5.7800000e+000  1.0000000e+000  5.7800000e+000 CUMULATIVE   NONE
         2130 REPOSIT  POROSITY  8.4800000e-001  8.4800000e-001  8.4800000e-
001
 8.4800000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2131 REPOSIT  PRMX_LOG -1.26198000e+001-1.26198000e+001-
1.26198000e+00
1-1.26198000e+001 0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2132 REPOSIT  PRMY_LOG -1.26198000e+001-1.26198000e+001-
1.26198000e+00
1-1.26198000e+001 0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2133 REPOSIT  PRMZ_LOG -1.26198000e+001-1.26198000e+001-
1.26198000e+00
```

```
1-1.26198000e+001 0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2824 REPOSIT  PROBDEG   2.0000000e+000  2.0000000e+000
0.0000000e+000
 2.0000000e+000  5.0000000e-001  0.0000000e+000 DELTA        NONE
         2824 REPOSIT  PROBDEG   2.0000000e+000  2.0000000e+000
0.0000000e+000
 2.0000000e+000  2.5000000e-001  1.0000000e+000 DELTA        NONE
         2824 REPOSIT  PROBDEG   2.0000000e+000  2.0000000e+000
0.0000000e+000
 2.0000000e+000  2.5000000e-001  2.0000000e+000 DELTA        NONE
         2135 REPOSIT  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2740 REPOSIT  SAT_IBRN  1.5000000e-002  1.5000000e-002  1.5000000e-
002
 1.5000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2741 REPOSIT  SAT_RBRN  2.7600000e-001  2.7600000e-001
0.0000000e+000
 5.5200000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2137 REPOSIT  SAT_RGAS  7.5000000e-002  7.5000000e-002
0.0000000e+000
 1.5000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2141 REPOSIT  VOLCHW    1.6900000e+005  1.6900000e+005
1.6900000e+005
 1.6900000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     m^3
         2142 REPOSIT  VOLRHW    7.0800000e+003  7.0800000e+003
7.0800000e+003
 7.0800000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     m^3
         3212 RN219    ATWEIGHT  2.1900900e-001  2.1900900e-001  2.1900900e-
001
 2.1900900e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3353 RN219    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3297 RN219    HALFLIFE  3.9600000e+000  3.9600000e+000
3.9600000e+000
 3.9600000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3213 RN220    ATWEIGHT  2.2001100e-001  2.2001100e-001  2.2001100e-
001
 2.2001100e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3354 RN220    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3298 RN220    HALFLIFE  5.5600000e+001  5.5600000e+001
5.5600000e+001
 5.5600000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3214 RN222    ATWEIGHT  2.2201800e-001  2.2201800e-001  2.2201800e-
001
 2.2201800e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3355 RN222    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         3299 RN222    HALFLIFE  3.3040000e+005  3.3040000e+005
3.3040000e+005
 3.3040000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     s
         2819 S_ANH_AB BKLINK    2.7100000e-001  2.7100000e-001  2.7100000e-
001
```

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 2.7100000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          520 S_ANH_AB CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          521 S_ANH_AB COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 1.0900000e-011 STUDENT      Pa^-1
          521 S_ANH_AB COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 1.0900000e-011 STUDENT      Pa^-1
          521 S_ANH_AB COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 3.3700000e-011 STUDENT      Pa^-1
          521 S_ANH_AB COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 2.7500000e-010 STUDENT      Pa^-1
         1661 S_ANH_AB DNSGRAIN  2.7500000e+003  2.7500000e+003
2.7500000e+003
 2.7500000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2158 S_ANH_AB DPHIMAX   2.3900000e-001  2.3900000e-001  2.3900000e-
001
 2.3900000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2820 S_ANH_AB EXPKLINK -3.4100000e-001 -3.4100000e-001 -3.4100000e-
001
-3.4100000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2812 S_ANH_AB IFRX      1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2815 S_ANH_AB IFRY      1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2818 S_ANH_AB IFRZ      0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2159 S_ANH_AB KMAXLOG  -9.0000000e+000 -9.0000000e+000 -
9.0000000e+000
-9.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2773 S_ANH_AB KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          522 S_ANH_AB PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2774 S_ANH_AB PCT_A     2.6000000e-001  2.6000000e-001  2.6000000e-
001
 2.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2775 S_ANH_AB PCT_EXP  -3.4800000e-001 -3.4800000e-001 -3.4800000e-
001
-3.4800000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          524 S_ANH_AB PF_DELTA  3.8000000e+006  3.8000000e+006
3.8000000e+006
 3.8000000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          526 S_ANH_AB PI_DELTA  2.0000000e+005  2.0000000e+005
2.0000000e+005
 2.0000000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          529 S_ANH_AB PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
```

```
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          527 S_ANH_AB PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 4.9053000e-001 STUDENT      NONE
          527 S_ANH_AB PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 5.5775000e-001 STUDENT      NONE
          527 S_ANH_AB PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 6.5200000e-001 STUDENT      NONE
          527 S_ANH_AB PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 6.5500000e-001 STUDENT      NONE
          527 S_ANH_AB PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 6.6452000e-001 STUDENT      NONE
          527 S_ANH_AB PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 8.4178000e-001 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 6.0000000e-003 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 7.0000000e-003 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 8.0000000e-003 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 8.0000000e-003 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 9.0000000e-003 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 9.0000000e-003 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.0000000e-002 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.0000000e-002 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.0000000e-002 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.1000000e-002 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.3000000e-002 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.3000000e-002 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
```

```
 1.7000000e-002  0.00000000e+000 1.4000000e-002 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.4000000e-002 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.5000000e-002 STUDENT      NONE
          528 S_ANH_AB POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.7000000e-002 STUDENT      NONE
          531 S_ANH_AB PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-2.1000000e+001 STUDENT      log(m^2)
          531 S_ANH_AB PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9200000e+001 STUDENT      log(m^2)
          531 S_ANH_AB PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9100000e+001 STUDENT      log(m^2)
          531 S_ANH_AB PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8800000e+001 STUDENT      log(m^2)
          531 S_ANH_AB PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8100000e+001 STUDENT      log(m^2)
          531 S_ANH_AB PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.7100000e+001 STUDENT      log(m^2)
          532 S_ANH_AB PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-2.1000000e+001 STUDENT      log(m^2)
          532 S_ANH_AB PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9200000e+001 STUDENT      log(m^2)
          532 S_ANH_AB PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9100000e+001 STUDENT      log(m^2)
          532 S_ANH_AB PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8800000e+001 STUDENT      log(m^2)
          532 S_ANH_AB PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8100000e+001 STUDENT      log(m^2)
          532 S_ANH_AB PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.7100000e+001 STUDENT      log(m^2)
          533 S_ANH_AB PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-2.1000000e+001 STUDENT      log(m^2)
          533 S_ANH_AB PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9200000e+001 STUDENT      log(m^2)
          533 S_ANH_AB PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9100000e+001 STUDENT      log(m^2)
          533 S_ANH_AB PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
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-1.7100000e+001  0.00000000e+000-1.8800000e+001 STUDENT      log(m^2)
          533 S_ANH_AB PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8100000e+001 STUDENT      log(m^2)
          533 S_ANH_AB PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.7100000e+001 STUDENT      log(m^2)
          536 S_ANH_AB RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  5.0000000e-001  1.0000000e+000 DELTA        NONE
          536 S_ANH_AB RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  2.0000000e+000 DELTA        NONE
          536 S_ANH_AB RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  3.0000000e+000 DELTA        NONE
          536 S_ANH_AB RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  5.0000000e-001  4.0000000e+000 DELTA        NONE
          537 S_ANH_AB SAT_IBRN  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          538 S_ANH_AB SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 7.7846000e-003 STUDENT      NONE
          538 S_ANH_AB SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 6.8842000e-002 STUDENT      NONE
          538 S_ANH_AB SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 6.9860000e-002 STUDENT      NONE
          538 S_ANH_AB SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 7.2620000e-002 STUDENT      NONE
          538 S_ANH_AB SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 1.0861000e-001 STUDENT      NONE
          538 S_ANH_AB SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 1.7401000e-001 STUDENT      NONE
          539 S_ANH_AB SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3980000e-
002
 1.9719000e-001  0.00000000e+000 1.3980000e-002 STUDENT      NONE
          539 S_ANH_AB SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3980000e-
002
 1.9719000e-001  0.00000000e+000 2.5200000e-002 STUDENT      NONE
          539 S_ANH_AB SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3980000e-
002
 1.9719000e-001  0.00000000e+000 3.2180000e-002 STUDENT      NONE
          539 S_ANH_AB SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3980000e-
002
 1.9719000e-001  0.00000000e+000 7.7730000e-002 STUDENT      NONE
          539 S_ANH_AB SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3980000e-
002
 1.9719000e-001  0.00000000e+000 1.1637000e-001 STUDENT      NONE
          539 S_ANH_AB SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3980000e-
002
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```
 1.9719000e-001  0.00000000e+000 1.9719000e-001 STUDENT      NONE
          540 S_HALITE CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          541 S_HALITE COMP_RCK  9.7500000e-011  9.7500000e-011  2.9400000e-
012
 1.9200000e-010  0.00000000e+000 0.0000000e+000 UNIFORM      Pa^-1
         2778 S_HALITE KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          542 S_HALITE PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2779 S_HALITE PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2780 S_HALITE PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          545 S_HALITE PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          543 S_HALITE PORE_DIS  2.9000000e+000  7.0000000e-001  2.0000000e-
001
 1.0000000e+001  0.0000000e+000  2.0000000e-001 CUMULATIVE   NONE
          543 S_HALITE PORE_DIS  2.9000000e+000  7.0000000e-001  2.0000000e-
001
 1.0000000e+001  5.0000000e-001  7.0000000e-001 CUMULATIVE   NONE
          543 S_HALITE PORE_DIS  2.9000000e+000  7.0000000e-001  2.0000000e-
001
 1.0000000e+001  1.0000000e+000  1.0000000e+001 CUMULATIVE   NONE
          544 S_HALITE POROSITY  1.2800000e-002  1.0000000e-002  1.0000000e-
003
 3.0000000e-002  0.0000000e+000  1.0000000e-003 CUMULATIVE   NONE
          544 S_HALITE POROSITY  1.2800000e-002  1.0000000e-002  1.0000000e-
003
 3.0000000e-002  5.0000000e-001  1.0000000e-002 CUMULATIVE   NONE
          544 S_HALITE POROSITY  1.2800000e-002  1.0000000e-002  1.0000000e-
003
 3.0000000e-002  1.0000000e+000  3.0000000e-002 CUMULATIVE   NONE
          546 S_HALITE PRESSURE  1.2470000e+007  1.2470000e+007
1.1040000e+007
 1.3890000e+007  0.00000000e+000 0.0000000e+000 UNIFORM      Pa
          547 S_HALITE PRMX_LOG -2.2500000e+001 -2.2500000e+001 -
2.4000000e+001
-2.1000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
          548 S_HALITE PRMY_LOG -2.2500000e+001 -2.2500000e+001 -
2.4000000e+001
-2.1000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
          549 S_HALITE PRMZ_LOG -2.2500000e+001 -2.2500000e+001 -
2.4000000e+001
-2.1000000e+001  0.00000000e+000 0.0000000e+000 UNIFORM      log(m^2)
          553 S_HALITE RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  3.3000000e-001  1.0000000e+000 DELTA        NONE
          553 S_HALITE RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
```

```
 4.0000000e+000  0.0000000e+000  2.0000000e+000 DELTA        NONE
          553 S_HALITE RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  3.0000000e+000 DELTA        NONE
          553 S_HALITE RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  6.7000000e-001  4.0000000e+000 DELTA        NONE
          554 S_HALITE SAT_IBRN  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          555 S_HALITE SAT_RBRN  3.0000000e-001  3.0000000e-001
0.0000000e+000
 6.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
          556 S_HALITE SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2904 S_MB138  BKLINK    2.7100000e-001  2.7100000e-001  2.7100000e-
001
 2.7100000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          559 S_MB138  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          560 S_MB138  COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 1.0900000e-011 STUDENT      Pa^-1
          560 S_MB138  COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 1.0900000e-011 STUDENT      Pa^-1
          560 S_MB138  COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 3.3700000e-011 STUDENT      Pa^-1
          560 S_MB138  COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 2.7500000e-010 STUDENT      Pa^-1
         1743 S_MB138  DNSGRAIN  2.7500000e+003  2.7500000e+003
2.7500000e+003
 2.7500000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2169 S_MB138  DPHIMAX   3.9000000e-002  3.9000000e-002  3.9000000e-
002
 3.9000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2902 S_MB138  EXPKLINK -3.4100000e-001 -3.4100000e-001 -3.4100000e-
001
-3.4100000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2810 S_MB138  IFRX      1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2813 S_MB138  IFRY      1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2816 S_MB138  IFRZ      0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2170 S_MB138  KMAXLOG  -9.0000000e+000 -9.0000000e+000 -
9.0000000e+000
-9.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2783 S_MB138  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
```

```
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          561 S_MB138  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2784 S_MB138  PCT_A     2.6000000e-001  2.6000000e-001  2.6000000e-
001
 2.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2785 S_MB138  PCT_EXP  -3.4800000e-001 -3.4800000e-001 -3.4800000e-
001
-3.4800000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          563 S_MB138  PF_DELTA  3.8000000e+006  3.8000000e+006
3.8000000e+006
 3.8000000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          565 S_MB138  PI_DELTA  2.0000000e+005  2.0000000e+005
2.0000000e+005
 2.0000000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          568 S_MB138  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          566 S_MB138  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 4.9053000e-001 STUDENT      NONE
          566 S_MB138  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 5.5775000e-001 STUDENT      NONE
          566 S_MB138  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 6.5200000e-001 STUDENT      NONE
          566 S_MB138  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 6.5500000e-001 STUDENT      NONE
          566 S_MB138  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 6.6452000e-001 STUDENT      NONE
          566 S_MB138  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 8.4178000e-001 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 6.0000000e-003 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 7.0000000e-003 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 8.0000000e-003 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 8.0000000e-003 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 9.0000000e-003 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 9.0000000e-003 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
```

```
 1.7000000e-002  0.00000000e+000 1.0000000e-002 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.0000000e-002 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.0000000e-002 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.1000000e-002 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.3000000e-002 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.3000000e-002 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.4000000e-002 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.4000000e-002 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.5000000e-002 STUDENT      NONE
          567 S_MB138  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.7000000e-002 STUDENT      NONE
          569 S_MB138  PRESSURE  1.1630000e+007  1.1630000e+007
9.3800000e+006
 1.2940000e+007  0.00000000e+000 9.3800000e+006 STUDENT      Pa
          569 S_MB138  PRESSURE  1.1630000e+007  1.1630000e+007
9.3800000e+006
 1.2940000e+007  0.00000000e+000 1.1110000e+007 STUDENT      Pa
          569 S_MB138  PRESSURE  1.1630000e+007  1.1630000e+007
9.3800000e+006
 1.2940000e+007  0.00000000e+000 1.2270000e+007 STUDENT      Pa
          569 S_MB138  PRESSURE  1.1630000e+007  1.1630000e+007
9.3800000e+006
 1.2940000e+007  0.00000000e+000 1.2430000e+007 STUDENT      Pa
          569 S_MB138  PRESSURE  1.1630000e+007  1.1630000e+007
9.3800000e+006
 1.2940000e+007  0.00000000e+000 1.2940000e+007 STUDENT      Pa
          570 S_MB138  PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-2.1000000e+001 STUDENT      log(m^2)
          570 S_MB138  PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9200000e+001 STUDENT      log(m^2)
          570 S_MB138  PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9100000e+001 STUDENT      log(m^2)
          570 S_MB138  PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8800000e+001 STUDENT      log(m^2)
          570 S_MB138  PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
```

```
-1.7100000e+001  0.00000000e+000-1.8100000e+001 STUDENT      log(m^2)
          570 S_MB138  PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.7100000e+001 STUDENT      log(m^2)
          571 S_MB138  PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-2.1000000e+001 STUDENT      log(m^2)
          571 S_MB138  PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9200000e+001 STUDENT      log(m^2)
          571 S_MB138  PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9100000e+001 STUDENT      log(m^2)
          571 S_MB138  PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8800000e+001 STUDENT      log(m^2)
          571 S_MB138  PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8100000e+001 STUDENT      log(m^2)
          571 S_MB138  PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.7100000e+001 STUDENT      log(m^2)
          572 S_MB138  PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-2.1000000e+001 STUDENT      log(m^2)
          572 S_MB138  PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9200000e+001 STUDENT      log(m^2)
          572 S_MB138  PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.9100000e+001 STUDENT      log(m^2)
          572 S_MB138  PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8800000e+001 STUDENT      log(m^2)
          572 S_MB138  PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.8100000e+001 STUDENT      log(m^2)
          572 S_MB138  PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001  0.00000000e+000-1.7100000e+001 STUDENT      log(m^2)
          575 S_MB138  RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  5.0000000e-001  1.0000000e+000 DELTA        NONE
          575 S_MB138  RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  2.0000000e+000 DELTA        NONE
          575 S_MB138  RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  3.0000000e+000 DELTA        NONE
          575 S_MB138  RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  5.0000000e-001  4.0000000e+000 DELTA        NONE
          576 S_MB138  SAT_IBRN  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          577 S_MB138  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
```

```
 1.7401000e-001  0.00000000e+000 7.7846000e-003 STUDENT      NONE
         577 S_MB138  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 6.8842000e-002 STUDENT      NONE
         577 S_MB138  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 6.9860000e-002 STUDENT      NONE
         577 S_MB138  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 7.2620000e-002 STUDENT      NONE
         577 S_MB138  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 1.0861000e-001 STUDENT      NONE
         577 S_MB138  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 1.7401000e-001 STUDENT      NONE
         578 S_MB138  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 1.3981000e-002 STUDENT      NONE
         578 S_MB138  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 2.5201000e-002 STUDENT      NONE
         578 S_MB138  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 3.2177000e-002 STUDENT      NONE
         578 S_MB138  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 7.7729000e-002 STUDENT      NONE
         578 S_MB138  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 1.1637000e-001 STUDENT      NONE
         578 S_MB138  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 1.9719000e-001 STUDENT      NONE
        2905 S_MB139  BKLINK    2.7100000e-001  2.7100000e-001  2.7100000e-
001
 2.7100000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         579 S_MB139  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         580 S_MB139  COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 1.0900000e-011 STUDENT      Pa^-1
         580 S_MB139  COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 1.0900000e-011 STUDENT      Pa^-1
         580 S_MB139  COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 3.3700000e-011 STUDENT      Pa^-1
         580 S_MB139  COMP_RCK  8.2630000e-011  8.2630000e-011  1.0900000e-
011
 2.7500000e-010  0.00000000e+000 2.7500000e-010 STUDENT      Pa^-1
        1784 S_MB139  DNSGRAIN  2.7500000e+003  2.7500000e+003
2.7500000e+003
 2.7500000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
        2177 S_MB139  DPHIMAX   3.9000000e-002  3.9000000e-002  3.9000000e-
002
```

```
 3.9000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2903 S_MB139  EXPKLINK -3.4100000e-001 -3.4100000e-001 -3.4100000e-
001
-3.4100000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2811 S_MB139  IFRX      1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2814 S_MB139  IFRY      1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2817 S_MB139  IFRZ      0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2178 S_MB139  KMAXLOG  -9.0000000e+000 -9.0000000e+000 -
9.0000000e+000
-9.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2788 S_MB139  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          582 S_MB139  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2789 S_MB139  PCT_A     2.6000000e-001  2.6000000e-001  2.6000000e-
001
 2.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2790 S_MB139  PCT_EXP  -3.4800000e-001 -3.4800000e-001 -3.4800000e-
001
-3.4800000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2180 S_MB139  PF_DELTA  3.8000000e+006  3.8000000e+006
3.8000000e+006
 3.8000000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          586 S_MB139  PI_DELTA  2.0000000e+005  2.0000000e+005
2.0000000e+005
 2.0000000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          589 S_MB139  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
          587 S_MB139  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 4.9053000e-001 STUDENT      NONE
          587 S_MB139  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 5.5775000e-001 STUDENT      NONE
          587 S_MB139  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 6.5200000e-001 STUDENT      NONE
          587 S_MB139  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 6.5500000e-001 STUDENT      NONE
          587 S_MB139  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 6.6452000e-001 STUDENT      NONE
          587 S_MB139  PORE_DIS  6.4360000e-001  6.4360000e-001  4.9053000e-
001
 8.4178000e-001  0.00000000e+000 8.4178000e-001 STUDENT      NONE
          588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
```

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 1.7000000e-002  0.00000000e+000 6.0000000e-003 STUDENT      NONE
         588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 7.0000000e-003 STUDENT      NONE
         588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 8.0000000e-003 STUDENT      NONE
         588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 8.0000000e-003 STUDENT      NONE
         588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 9.0000000e-003 STUDENT      NONE
         588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 9.0000000e-003 STUDENT      NONE
         588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.0000000e-002 STUDENT      NONE
         588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.0000000e-002 STUDENT      NONE
         588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.0000000e-002 STUDENT      NONE
         588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.1000000e-002 STUDENT      NONE
         588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.3000000e-002 STUDENT      NONE
         588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.3000000e-002 STUDENT      NONE
         588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.4000000e-002 STUDENT      NONE
         588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.4000000e-002 STUDENT      NONE
         588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.5000000e-002 STUDENT      NONE
         588 S_MB139  POROSITY  1.1000000e-002  1.1000000e-002  6.0000000e-
003
 1.7000000e-002  0.00000000e+000 1.7000000e-002 STUDENT      NONE
         590 S_MB139  PRESSURE  1.1630000e+007  1.1630000e+007
9.3800000e+006
 1.2940000e+007  0.00000000e+000 9.3800000e+006 STUDENT      Pa
         590 S_MB139  PRESSURE  1.1630000e+007  1.1630000e+007
9.3800000e+006
 1.2940000e+007  0.00000000e+000 1.1110000e+007 STUDENT      Pa
         590 S_MB139  PRESSURE  1.1630000e+007  1.1630000e+007
9.3800000e+006
 1.2940000e+007  0.00000000e+000 1.2270000e+007 STUDENT      Pa
         590 S_MB139  PRESSURE  1.1630000e+007  1.1630000e+007
9.3800000e+006
```

 1.2940000e+007 0.00000000e+000 1.2430000e+007 STUDENT   Pa
          590 S_MB139 PRESSURE 1.1630000e+007 1.1630000e+007
9.3800000e+006
 1.2940000e+007 0.00000000e+000 1.2940000e+007 STUDENT   Pa
          591 S_MB139 PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001 0.00000000e+000-2.1000000e+001 STUDENT   log(m^2)
          591 S_MB139 PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001 0.00000000e+000-1.9200000e+001 STUDENT   log(m^2)
          591 S_MB139 PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001 0.00000000e+000-1.9100000e+001 STUDENT   log(m^2)
          591 S_MB139 PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001 0.00000000e+000-1.8800000e+001 STUDENT   log(m^2)
          591 S_MB139 PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001 0.00000000e+000-1.8100000e+001 STUDENT   log(m^2)
          591 S_MB139 PRMX_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001 0.00000000e+000-1.7100000e+001 STUDENT   log(m^2)
          592 S_MB139 PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001 0.00000000e+000-2.1000000e+001 STUDENT   log(m^2)
          592 S_MB139 PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001 0.00000000e+000-1.9200000e+001 STUDENT   log(m^2)
          592 S_MB139 PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001 0.00000000e+000-1.9100000e+001 STUDENT   log(m^2)
          592 S_MB139 PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001 0.00000000e+000-1.8800000e+001 STUDENT   log(m^2)
          592 S_MB139 PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001 0.00000000e+000-1.8100000e+001 STUDENT   log(m^2)
          592 S_MB139 PRMY_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001 0.00000000e+000-1.7100000e+001 STUDENT   log(m^2)
          593 S_MB139 PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001 0.00000000e+000-2.1000000e+001 STUDENT   log(m^2)
          593 S_MB139 PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001 0.00000000e+000-1.9200000e+001 STUDENT   log(m^2)
          593 S_MB139 PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001 0.00000000e+000-1.9100000e+001 STUDENT   log(m^2)
          593 S_MB139 PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001 0.00000000e+000-1.8800000e+001 STUDENT   log(m^2)
          593 S_MB139 PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001
-1.7100000e+001 0.00000000e+000-1.8100000e+001 STUDENT   log(m^2)
          593 S_MB139 PRMZ_LOG -1.8890000e+001 -1.8890000e+001 -
2.1000000e+001

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-1.7100000e+001  0.00000000e+000-1.7100000e+001 STUDENT      log(m^2)
          596 S_MB139  RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  5.0000000e-001  1.0000000e+000 DELTA        NONE
          596 S_MB139  RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  2.0000000e+000 DELTA        NONE
          596 S_MB139  RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  0.0000000e+000  3.0000000e+000 DELTA        NONE
          596 S_MB139  RELP_MOD  4.0000000e+000  4.0000000e+000
1.0000000e+000
 4.0000000e+000  5.0000000e-001  4.0000000e+000 DELTA        NONE
          597 S_MB139  SAT_IBRN  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          598 S_MB139  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 7.7846000e-003 STUDENT      NONE
          598 S_MB139  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 6.8842000e-002 STUDENT      NONE
          598 S_MB139  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 6.9860000e-002 STUDENT      NONE
          598 S_MB139  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 7.2620000e-002 STUDENT      NONE
          598 S_MB139  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 1.0861000e-001 STUDENT      NONE
          598 S_MB139  SAT_RBRN  8.3620000e-002  8.3620000e-002  7.7846000e-
003
 1.7401000e-001  0.00000000e+000 1.7401000e-001 STUDENT      NONE
          599 S_MB139  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 1.3981000e-002 STUDENT      NONE
          599 S_MB139  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 2.5201000e-002 STUDENT      NONE
          599 S_MB139  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 3.2177000e-002 STUDENT      NONE
          599 S_MB139  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 7.7729000e-002 STUDENT      NONE
          599 S_MB139  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 1.1637000e-001 STUDENT      NONE
          599 S_MB139  SAT_RGAS  7.7110000e-002  7.7110000e-002  1.3981000e-
002
 1.9719000e-001  0.00000000e+000 1.9719000e-001 STUDENT      NONE
         2513 SALT_T1  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2514 SALT_T1  COMP_RCK  8.0000000e-011  8.0000000e-011  8.0000000e-
011
```

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 8.0000000e-011  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2939 SALT_T1  CUMPROB   5.0000000e-001  5.0000000e-001
0.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2744 SALT_T1  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2515 SALT_T1  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2745 SALT_T1  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2746 SALT_T1  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2942 SALT_T1  PMLT_HI  -1.2265200e+001 -1.2265200e+001 -
1.2265200e+001
-1.2265200e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2941 SALT_T1  PMLT_LO  -1.7301000e+001 -1.7301000e+001 -
1.7301000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2940 SALT_T1  PMLT_MD  -1.4782500e+001 -1.4782500e+001 -
1.4782500e+001
-1.4782500e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2518 SALT_T1  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2516 SALT_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2516 SALT_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2516 SALT_T1  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2517 SALT_T1  POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2519 SALT_T1  PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2938 SALT_T1  RADN_DRZ  1.8140000e+000  1.8140000e+000
1.8140000e+000
 1.8140000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2526 SALT_T1  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2934 SALT_T1  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2937 SALT_T1  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2935 SALT_T1  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
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 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2936 SALT_T1  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2527 SALT_T1  SAT_IBRN  3.2000000e-001  3.2000000e-001  3.2000000e-
001
 3.2000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2528 SALT_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2528 SALT_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2528 SALT_T1  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2529 SALT_T1  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2530 SALT_T2  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2531 SALT_T2  COMP_RCK  8.0000000e-011  8.0000000e-011  8.0000000e-
011
 8.0000000e-011  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2749 SALT_T2  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2532 SALT_T2  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2750 SALT_T2  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2751 SALT_T2  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2950 SALT_T2  PMLT_HI  -1.2265200e+001 -1.2265200e+001 -
1.2265200e+001
-1.2265200e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2949 SALT_T2  PMLT_LO  -1.7301000e+001 -1.7301000e+001 -
1.7301000e+001
-1.7301000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2948 SALT_T2  PMLT_MD  -1.4782500e+001 -1.4782500e+001 -
1.4782500e+001
-1.4782500e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2535 SALT_T2  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2533 SALT_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2533 SALT_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2533 SALT_T2  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
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```
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2534 SALT_T2  POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2947 SALT_T2  RADN_DRZ  1.1100000e+000  1.1100000e+000
1.1100000e+000
 1.1100000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2543 SALT_T2  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2943 SALT_T2  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2946 SALT_T2  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2944 SALT_T2  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2945 SALT_T2  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2545 SALT_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2545 SALT_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2545 SALT_T2  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2546 SALT_T2  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2547 SALT_T3  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2548 SALT_T3  COMP_RCK  8.0000000e-011  8.0000000e-011  8.0000000e-
011
 8.0000000e-011  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2754 SALT_T3  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2549 SALT_T3  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2755 SALT_T3  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2756 SALT_T3  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2958 SALT_T3  PMLT_HI  -1.2265200e+001 -1.2265200e+001 -
1.2265200e+001
-1.2265200e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2957 SALT_T3  PMLT_LO  -1.7301000e+001 -1.7301000e+001 -
1.7301000e+001
```

```
-1.7301000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2956 SALT_T3  PMLT_MD  -1.4782500e+001 -1.4782500e+001 -
1.4782500e+001
-1.4782500e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2552 SALT_T3  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2550 SALT_T3  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2550 SALT_T3  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2550 SALT_T3  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2551 SALT_T3  POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2955 SALT_T3  RADN_DRZ  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2560 SALT_T3  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2951 SALT_T3  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2954 SALT_T3  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2952 SALT_T3  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2953 SALT_T3  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2562 SALT_T3  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2562 SALT_T3  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2562 SALT_T3  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2563 SALT_T3  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2564 SALT_T4  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2565 SALT_T4  COMP_RCK  8.0000000e-011  8.0000000e-011  8.0000000e-
011
 8.0000000e-011  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2759 SALT_T4  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
```

```
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2566 SALT_T4  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2760 SALT_T4  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2761 SALT_T4  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2966 SALT_T4  PMLT_HI  -1.3950800e+001 -1.3950800e+001 -
1.3950800e+001
-1.3950800e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2965 SALT_T4  PMLT_LO  -2.2876100e+001 -2.2876100e+001 -
2.2876100e+001
-2.2876100e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2964 SALT_T4  PMLT_MD  -1.7165600e+001 -1.7165600e+001 -
1.7165600e+001
-1.7165600e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2569 SALT_T4  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2567 SALT_T4  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2567 SALT_T4  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2567 SALT_T4  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2568 SALT_T4  POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2963 SALT_T4  RADN_DRZ  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2577 SALT_T4  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2959 SALT_T4  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2962 SALT_T4  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2960 SALT_T4  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2961 SALT_T4  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2579 SALT_T4  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2579 SALT_T4  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
```

```
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
        2579 SALT_T4  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
        2580 SALT_T4  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
        2581 SALT_T5  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        2582 SALT_T5  COMP_RCK  8.0000000e-011  8.0000000e-011  8.0000000e-
011
 8.0000000e-011  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
        2764 SALT_T5  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        2583 SALT_T5  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        2765 SALT_T5  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        2766 SALT_T5  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        2974 SALT_T5  PMLT_HI  -1.5426000e+001 -1.5426000e+001 -
1.5426000e+001
-1.5426000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
        2973 SALT_T5  PMLT_LO  -2.2876100e+001 -2.2876100e+001 -
2.2876100e+001
-2.2876100e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
        2972 SALT_T5  PMLT_MD  -1.9278200e+001 -1.9278200e+001 -
1.9278200e+001
-1.9278200e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
        3125 SALT_T5  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        2809 SALT_T5  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
        2809 SALT_T5  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
        2809 SALT_T5  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
        2585 SALT_T5  POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        2971 SALT_T5  RADN_DRZ  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        2594 SALT_T5  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        2967 SALT_T5  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
```

```
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2970 SALT_T5  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2968 SALT_T5  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2969 SALT_T5  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2596 SALT_T5  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2596 SALT_T5  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2596 SALT_T5  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2597 SALT_T5  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
         2983 SALT_T6  CAP_MOD   2.0000000e+000  2.0000000e+000
2.0000000e+000
 2.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2984 SALT_T6  COMP_RCK  8.0000000e-011  8.0000000e-011  8.0000000e-
011
 8.0000000e-011  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2985 SALT_T6  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2986 SALT_T6  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2987 SALT_T6  PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2988 SALT_T6  PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2982 SALT_T6  PMLT_HI  -1.7667600e+001 -1.7667600e+001 -
1.7667600e+001
-1.7667600e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2981 SALT_T6  PMLT_LO  -2.2876100e+001 -2.2876100e+001 -
2.2876100e+001
-2.2876100e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2980 SALT_T6  PMLT_MD  -2.0271600e+001 -2.0271600e+001 -
2.0271600e+001
-2.0271600e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         3126 SALT_T6  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2989 SALT_T6  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  0.0000000e+000  1.1000000e-001 CUMULATIVE   NONE
         2989 SALT_T6  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
```

```
 8.1000000e+000  5.0000000e-001  9.4000000e-001 CUMULATIVE   NONE
         2989 SALT_T6  PORE_DIS  2.5200000e+000  9.4000000e-001  1.1000000e-
001
 8.1000000e+000  1.0000000e+000  8.1000000e+000 CUMULATIVE   NONE
         2990 SALT_T6  POROSITY  5.0000000e-002  5.0000000e-002  5.0000000e-
002
 5.0000000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2979 SALT_T6  RADN_DRZ  1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2991 SALT_T6  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2975 SALT_T6  RSH_AIR   3.0900000e+000  3.0900000e+000
3.0900000e+000
 3.0900000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2978 SALT_T6  RSH_EXH   2.3000000e+000  2.3000000e+000
2.3000000e+000
 2.3000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2976 SALT_T6  RSH_SAL   1.8000000e+000  1.8000000e+000
1.8000000e+000
 1.8000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2977 SALT_T6  RSH_WAS   3.5000000e+000  3.5000000e+000
3.5000000e+000
 3.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m
         2992 SALT_T6  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         2992 SALT_T6  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         2992 SALT_T6  SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         2993 SALT_T6  SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
          336 SANTAROS CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          337 SANTAROS COMP_RCK  1.0000000e-008  1.0000000e-008  1.0000000e-
008
 1.0000000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2768 SANTAROS KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          339 SANTAROS PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2769 SANTAROS PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2770 SANTAROS PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          342 SANTAROS PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
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 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         340 SANTAROS PORE_DIS  6.4360000e-001  6.4360000e-001  6.4360000e-
001
 6.4360000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         341 SANTAROS POROSITY  1.7500000e-001  1.7500000e-001  1.7500000e-
001
 1.7500000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         343 SANTAROS PRESSURE  1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         344 SANTAROS PRMX_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         345 SANTAROS PRMY_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         346 SANTAROS PRMZ_LOG -1.0000000e+001 -1.0000000e+001 -
1.0000000e+001
-1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         349 SANTAROS RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         350 SANTAROS SAT_IBRN  8.3630000e-002  8.3630000e-002  8.3630000e-
002
 8.3630000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         351 SANTAROS SAT_RBRN  8.3630000e-002  8.3630000e-002  8.3630000e-
002
 8.3630000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         352 SANTAROS SAT_RGAS  7.7110000e-002  7.7110000e-002  7.7110000e-
002
 7.7110000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3133 SHFT_DRZ PRMX_LOG -1.5333330e+001 -1.5000000e+001 -
1.7000000e+001
-1.4000000e+001  0.00000000e+000 0.0000000e+000 TRIANGULAR   log(m^2)
        3562 SHFTL_T1 COMP_POR  4.2800000e-009  4.2800000e-009  4.2800000e-
009
 4.2800000e-009  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
        3563 SHFTL_T1 KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3564 SHFTL_T1 PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        3565 SHFTL_T1 PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        3566 SHFTL_T1 PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3567 SHFTL_T1 PO_MIN    1.0100000e+005  1.0100000e+005
1.0100000e+005
 1.0100000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
        3568 SHFTL_T1 POROSITY  1.1300000e-001  1.1300000e-001  1.1300000e-
001
 1.1300000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
        3569 SHFTL_T1 PRMX_LOG -1.8000000e+001 -1.8200000e+001 -
2.0000000e+001
```

```
-1.6500000e+001  0.0000000e+000 -2.0000000e+001 CUMULATIVE   log(m^2)
         3569 SHFTL_T1 PRMX_LOG -1.8000000e+001 -1.8200000e+001 -
2.0000000e+001
-1.6500000e+001  1.0000000e-002 -1.9500000e+001 CUMULATIVE   log(m^2)
         3569 SHFTL_T1 PRMX_LOG -1.8000000e+001 -1.8200000e+001 -
2.0000000e+001
-1.6500000e+001  1.0000000e-001 -1.9000000e+001 CUMULATIVE   log(m^2)
         3569 SHFTL_T1 PRMX_LOG -1.8000000e+001 -1.8200000e+001 -
2.0000000e+001
-1.6500000e+001  3.0700000e-001 -1.8500000e+001 CUMULATIVE   log(m^2)
         3569 SHFTL_T1 PRMX_LOG -1.8000000e+001 -1.8200000e+001 -
2.0000000e+001
-1.6500000e+001  6.3700000e-001 -1.8000000e+001 CUMULATIVE   log(m^2)
         3569 SHFTL_T1 PRMX_LOG -1.8000000e+001 -1.8200000e+001 -
2.0000000e+001
-1.6500000e+001  8.7300000e-001 -1.7500000e+001 CUMULATIVE   log(m^2)
         3569 SHFTL_T1 PRMX_LOG -1.8000000e+001 -1.8200000e+001 -
2.0000000e+001
-1.6500000e+001  9.9300000e-001 -1.7000000e+001 CUMULATIVE   log(m^2)
         3569 SHFTL_T1 PRMX_LOG -1.8000000e+001 -1.8200000e+001 -
2.0000000e+001
-1.6500000e+001  1.0000000e+000 -1.6500000e+001 CUMULATIVE   log(m^2)
         3570 SHFTL_T1 RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3571 SHFTL_T1 SAT_IBRN  5.3400000e-001  5.3400000e-001  5.3400000e-
001
 5.3400000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3572 SHFTL_T2 COMP_POR  4.2800000e-009  4.2800000e-009  4.2800000e-
009
 4.2800000e-009  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3573 SHFTL_T2 KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3574 SHFTL_T2 PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3575 SHFTL_T2 PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3576 SHFTL_T2 PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3577 SHFTL_T2 PO_MIN    1.0100000e+005  1.0100000e+005
1.0100000e+005
 1.0100000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3578 SHFTL_T2 POROSITY  1.1300000e-001  1.1300000e-001  1.1300000e-
001
 1.1300000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3579 SHFTL_T2 PRMX_LOG -1.9800000e+001 -2.0100000e+001 -
2.2500000e+001
-1.8000000e+001  0.0000000e+000 -2.2500000e+001 CUMULATIVE   log(m^2)
         3579 SHFTL_T2 PRMX_LOG -1.9800000e+001 -2.0100000e+001 -
2.2500000e+001
-1.8000000e+001  2.0000000e-002 -2.2000000e+001 CUMULATIVE   log(m^2)
         3579 SHFTL_T2 PRMX_LOG -1.9800000e+001 -2.0100000e+001 -
2.2500000e+001
```

```
-1.8000000e+001  8.0000000e-002 -2.1500000e+001 CUMULATIVE   log(m^2)
         3579 SHFTL_T2 PRMX_LOG -1.9800000e+001 -2.0100000e+001 -
2.2500000e+001
-1.8000000e+001  1.7000000e-001 -2.1000000e+001 CUMULATIVE   log(m^2)
         3579 SHFTL_T2 PRMX_LOG -1.9800000e+001 -2.0100000e+001 -
2.2500000e+001
-1.8000000e+001  3.0500000e-001 -2.0500000e+001 CUMULATIVE   log(m^2)
         3579 SHFTL_T2 PRMX_LOG -1.9800000e+001 -2.0100000e+001 -
2.2500000e+001
-1.8000000e+001  5.2500000e-001 -2.0000000e+001 CUMULATIVE   log(m^2)
         3579 SHFTL_T2 PRMX_LOG -1.9800000e+001 -2.0100000e+001 -
2.2500000e+001
-1.8000000e+001  7.0000000e-001 -1.9500000e+001 CUMULATIVE   log(m^2)
         3579 SHFTL_T2 PRMX_LOG -1.9800000e+001 -2.0100000e+001 -
2.2500000e+001
-1.8000000e+001  8.6500000e-001 -1.9000000e+001 CUMULATIVE   log(m^2)
         3579 SHFTL_T2 PRMX_LOG -1.9800000e+001 -2.0100000e+001 -
2.2500000e+001
-1.8000000e+001  9.6500000e-001 -1.8500000e+001 CUMULATIVE   log(m^2)
         3579 SHFTL_T2 PRMX_LOG -1.9800000e+001 -2.0100000e+001 -
2.2500000e+001
-1.8000000e+001  1.0000000e+000 -1.8000000e+001 CUMULATIVE   log(m^2)
         3580 SHFTL_T2 RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3581 SHFTL_T2 SAT_IBRN  5.3400000e-001  5.3400000e-001  5.3400000e-
001
 5.3400000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3550 SHFTU    COMP_POR  2.0500000e-008  2.0500000e-008  2.0500000e-
008
 2.0500000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         3551 SHFTU    KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3552 SHFTU    PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3553 SHFTU    PCT_A     5.6000000e-001  5.6000000e-001  5.6000000e-
001
 5.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3554 SHFTU    PCT_EXP  -3.4600000e-001 -3.4600000e-001 -3.4600000e-
001
-3.4600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3555 SHFTU    PO_MIN    1.0100000e+005  1.0100000e+005
1.0100000e+005
 1.0100000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         3556 SHFTU    POROSITY  2.9100000e-001  2.9100000e-001  2.9100000e-
001
 2.9100000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3557 SHFTU    PRMX_LOG -1.8200000e+001 -1.8300000e+001 -
2.0500000e+001
-1.6500000e+001  0.0000000e+000 -2.0500000e+001 CUMULATIVE   log(m^2)
         3557 SHFTU    PRMX_LOG -1.8200000e+001 -1.8300000e+001 -
2.0500000e+001
-1.6500000e+001  3.0000000e-002 -2.0000000e+001 CUMULATIVE   log(m^2)
         3557 SHFTU    PRMX_LOG -1.8200000e+001 -1.8300000e+001 -
2.0500000e+001
```

```
-1.6500000e+001  1.1000000e-001 -1.9500000e+001 CUMULATIVE   log(m^2)
         3557 SHFTU    PRMX_LOG -1.8200000e+001 -1.8300000e+001 -
2.0500000e+001
-1.6500000e+001  2.4000000e-001 -1.9000000e+001 CUMULATIVE   log(m^2)
         3557 SHFTU    PRMX_LOG -1.8200000e+001 -1.8300000e+001 -
2.0500000e+001
-1.6500000e+001  4.3000000e-001 -1.8500000e+001 CUMULATIVE   log(m^2)
         3557 SHFTU    PRMX_LOG -1.8200000e+001 -1.8300000e+001 -
2.0500000e+001
-1.6500000e+001  6.5000000e-001 -1.8000000e+001 CUMULATIVE   log(m^2)
         3557 SHFTU    PRMX_LOG -1.8200000e+001 -1.8300000e+001 -
2.0500000e+001
-1.6500000e+001  8.9000000e-001 -1.7500000e+001 CUMULATIVE   log(m^2)
         3557 SHFTU    PRMX_LOG -1.8200000e+001 -1.8300000e+001 -
2.0500000e+001
-1.6500000e+001  9.9000000e-001 -1.7000000e+001 CUMULATIVE   log(m^2)
         3557 SHFTU    PRMX_LOG -1.8200000e+001 -1.8300000e+001 -
2.0500000e+001
-1.6500000e+001  1.0000000e+000 -1.6500000e+001 CUMULATIVE   log(m^2)
         3558 SHFTU    RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3559 SHFTU    SAT_IBRN  7.9600000e-001  7.9600000e-001  7.9600000e-
001
 7.9600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3560 SHFTU    SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  0.0000000e+000  0.0000000e+000 CUMULATIVE   NONE
         3560 SHFTU    SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  5.0000000e-001  2.0000000e-001 CUMULATIVE   NONE
         3560 SHFTU    SAT_RBRN  2.5000000e-001  2.0000000e-001
0.0000000e+000
 6.0000000e-001  1.0000000e+000  6.0000000e-001 CUMULATIVE   NONE
         3561 SHFTU    SAT_RGAS  2.0000000e-001  2.0000000e-001
0.0000000e+000
 4.0000000e-001  0.00000000e+000 0.0000000e+000 UNIFORM      NONE
          514 SM147    ATWEIGHT  1.4691500e-001  1.4691500e-001  1.4691500e-
001
 1.4691500e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3379 SM147    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          515 SM147    HALFLIFE  3.3770000e+018  3.3770000e+018
3.3770000e+018
 3.3770000e+018  0.00000000e+000 0.0000000e+000 CONSTANT     s
         3263 SOLAM3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
         3263 SOLAM3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
         3263 SOLAM3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
         3263 SOLAM3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
```

```
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
         3263 SOLAM3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
         3263 SOLAM3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
         3263 SOLAM3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
         3263 SOLAM3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
         3263 SOLAM3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.0000000e+000  1.4000000e+000 CUMULATIVE   moles/liter
         3262 SOLAM3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
         3262 SOLAM3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
         3262 SOLAM3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
         3262 SOLAM3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
         3262 SOLAM3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
         3262 SOLAM3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
         3262 SOLAM3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
         3262 SOLAM3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
         3262 SOLAM3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.0000000e+000  1.4000000e+000 CUMULATIVE   moles/liter
         3402 SOLMOD3  SOLCIM    1.3000000e-008  1.3000000e-008  1.3000000e-
008
 1.3000000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3628 SOLMOD3  SOLCOC    1.7700000e-007  1.7700000e-007  1.7700000e-
007
 1.7700000e-007  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3629 SOLMOD3  SOLCOH    1.6900000e-007  1.6900000e-007  1.6900000e-
007
 1.6900000e-007  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3406 SOLMOD3  SOLSIM    1.2000000e-007  1.2000000e-007  1.2000000e-
007
 1.2000000e-007  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3630 SOLMOD3  SOLSOC    3.0700000e-007  3.0700000e-007  3.0700000e-
007
```

3.0700000e-007 0.00000000e+000 0.0000000e+000 CONSTANT   moles/liter
3631 SOLMOD3 SOLSOH   3.0700000e-007 3.0700000e-007 3.0700000e-
007
3.0700000e-007 0.00000000e+000 0.0000000e+000 CONSTANT   moles/liter
3403 SOLMOD4 SOLCIM   4.1000000e-008 4.1000000e-008 4.1000000e-
008
4.1000000e-008 0.00000000e+000 0.0000000e+000 CONSTANT   moles/liter
3632 SOLMOD4 SOLCOC   5.8400000e-009 5.8400000e-009 5.8400000e-
009
5.8400000e-009 0.00000000e+000 0.0000000e+000 CONSTANT   moles/liter
3633 SOLMOD4 SOLCOH   2.4700000e-008 2.4700000e-008 2.4700000e-
008
2.4700000e-008 0.00000000e+000 0.0000000e+000 CONSTANT   moles/liter
3407 SOLMOD4 SOLSIM   1.3000000e-008 1.3000000e-008 1.3000000e-
008
1.3000000e-008 0.00000000e+000 0.0000000e+000 CONSTANT   moles/liter
3634 SOLMOD4 SOLSOC   1.2400000e-008 1.2400000e-008 1.2400000e-
008
1.2400000e-008 0.00000000e+000 0.0000000e+000 CONSTANT   moles/liter
3635 SOLMOD4 SOLSOH   1.1900000e-008 1.1900000e-008 1.1900000e-
008
1.1900000e-008 0.00000000e+000 0.0000000e+000 CONSTANT   moles/liter
3404 SOLMOD5 SOLCIM   4.8000000e-007 4.8000000e-007 4.8000000e-
007
4.8000000e-007 0.00000000e+000 0.0000000e+000 CONSTANT   moles/liter
3636 SOLMOD5 SOLCOC   2.1300000e-005 2.1300000e-005 2.1300000e-
005
2.1300000e-005 0.00000000e+000 0.0000000e+000 CONSTANT   moles/liter
3637 SOLMOD5 SOLCOH   5.0800000e-006 5.0800000e-006 5.0800000e-
006
5.0800000e-006 0.00000000e+000 0.0000000e+000 CONSTANT   moles/liter
3408 SOLMOD5 SOLSIM   2.4000000e-007 2.4000000e-007 2.4000000e-
007
2.4000000e-007 0.00000000e+000 0.0000000e+000 CONSTANT   moles/liter
3638 SOLMOD5 SOLSOC   9.7200000e-007 9.7200000e-007 9.7200000e-
007
9.7200000e-007 0.00000000e+000 0.0000000e+000 CONSTANT   moles/liter
3639 SOLMOD5 SOLSOH   1.0200000e-006 1.0200000e-006 1.0200000e-
006
1.0200000e-006 0.00000000e+000 0.0000000e+000 CONSTANT   moles/liter
3405 SOLMOD6 SOLCIM   2.7000000e-005 8.8000000e-006 8.8000000e-
007
8.8000000e-005 0.0000000e+000 8.8000000e-007 CUMULATIVE   moles/liter
3405 SOLMOD6 SOLCIM   2.7000000e-005 8.8000000e-006 8.8000000e-
007
8.8000000e-005 5.0000000e-001 8.8000000e-006 CUMULATIVE   moles/liter
3405 SOLMOD6 SOLCIM   2.7000000e-005 8.8000000e-006 8.8000000e-
007
8.8000000e-005 1.0000000e+000 8.8000000e-005 CUMULATIVE   moles/liter
3640 SOLMOD6 SOLCOC   8.8000000e-006 8.8000000e-006 8.8000000e-
006
8.8000000e-006 0.00000000e+000 0.0000000e+000 CONSTANT   moles/liter
3641 SOLMOD6 SOLCOH   8.8000000e-006 8.8000000e-006 8.8000000e-
006
8.8000000e-006 0.00000000e+000 0.0000000e+000 CONSTANT   moles/liter
3409 SOLMOD6 SOLSIM   2.6000000e-005 8.7000000e-006 8.7000000e-
007

```
 8.7000000e-005  0.0000000e+000  8.7000000e-007 CUMULATIVE   moles/liter
        3409 SOLMOD6  SOLSIM    2.6000000e-005  8.7000000e-006  8.7000000e-
007
 8.7000000e-005  5.0000000e-001  8.7000000e-006 CUMULATIVE   moles/liter
        3409 SOLMOD6  SOLSIM    2.6000000e-005  8.7000000e-006  8.7000000e-
007
 8.7000000e-005  1.0000000e+000  8.7000000e-005 CUMULATIVE   moles/liter
        3642 SOLMOD6  SOLSOC    8.7000000e-006  8.7000000e-006  8.7000000e-
006
 8.7000000e-006  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
        3643 SOLMOD6  SOLSOH    8.7000000e-006  8.7000000e-006  8.7000000e-
006
 8.7000000e-006  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
        3264 SOLPU3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
        3264 SOLPU3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
        3264 SOLPU3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
        3264 SOLPU3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
        3264 SOLPU3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
        3264 SOLPU3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
        3264 SOLPU3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
        3264 SOLPU3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
        3264 SOLPU3   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.0000000e+000  1.4000000e+000 CUMULATIVE   moles/liter
        3265 SOLPU3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
        3265 SOLPU3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
        3265 SOLPU3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
        3265 SOLPU3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
        3265 SOLPU3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
        3265 SOLPU3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
```

```
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
         3265 SOLPU3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
         3265 SOLPU3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
         3265 SOLPU3   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.0000000e+000  1.4000000e+000 CUMULATIVE   moles/liter
         3389 SOLPU4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
         3389 SOLPU4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
         3389 SOLPU4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
         3389 SOLPU4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
         3389 SOLPU4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
         3389 SOLPU4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
         3389 SOLPU4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
         3389 SOLPU4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
         3389 SOLPU4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.0000000e+000  1.4000000e+000 CUMULATIVE   moles/liter
         3266 SOLPU4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
         3266 SOLPU4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
         3266 SOLPU4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
         3266 SOLPU4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
         3266 SOLPU4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
         3266 SOLPU4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
         3266 SOLPU4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
```

```
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
         3266 SOLPU4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
         3266 SOLPU4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.0000000e+000  1.4000000e+000 CUMULATIVE   moles/liter
         3627 SOLTH4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
         3627 SOLTH4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
         3627 SOLTH4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
         3627 SOLTH4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
         3627 SOLTH4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
         3627 SOLTH4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
         3627 SOLTH4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
         3627 SOLTH4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
         3627 SOLTH4   SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.0000000e+000  1.4000000e+000 CUMULATIVE   moles/liter
         3393 SOLTH4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
         3393 SOLTH4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
         3393 SOLTH4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
         3393 SOLTH4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
         3393 SOLTH4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
         3393 SOLTH4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
         3393 SOLTH4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
         3393 SOLTH4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
```

```
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
         3393 SOLTH4   SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.0000000e+000  1.4000000e+000 CUMULATIVE   moles/liter
         3626 SOLU4    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
         3626 SOLU4    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
         3626 SOLU4    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
         3626 SOLU4    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
         3626 SOLU4    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
         3626 SOLU4    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
         3626 SOLU4    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
         3626 SOLU4    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
         3626 SOLU4    SOLCIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.0000000e+000  1.4000000e+000 CUMULATIVE   moles/liter
         3390 SOLU4    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
         3390 SOLU4    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
         3390 SOLU4    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
         3390 SOLU4    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
         3390 SOLU4    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  6.3000000e-001  0.0000000e+000 CUMULATIVE   moles/liter
         3390 SOLU4    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.4000000e-001  2.5000000e-001 CUMULATIVE   moles/liter
         3390 SOLU4    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  8.9000000e-001  5.0000000e-001 CUMULATIVE   moles/liter
         3390 SOLU4    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000  9.9000000e-001  1.0000000e+000 CUMULATIVE   moles/liter
         3390 SOLU4    SOLSIM    1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
```

1.4000000e+000 1.0000000e+000 1.4000000e+000 CUMULATIVE   moles/liter
        3392 SOLU6   SOLCIM   1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000 0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
        3392 SOLU6   SOLCIM   1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000 4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
        3392 SOLU6   SOLCIM   1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000 1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
        3392 SOLU6   SOLCIM   1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000 2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
        3392 SOLU6   SOLCIM   1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000 6.3000000e-001 0.0000000e+000 CUMULATIVE   moles/liter
        3392 SOLU6   SOLCIM   1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000 8.4000000e-001 2.5000000e-001 CUMULATIVE   moles/liter
        3392 SOLU6   SOLCIM   1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000 8.9000000e-001 5.0000000e-001 CUMULATIVE   moles/liter
        3392 SOLU6   SOLCIM   1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000 9.9000000e-001 1.0000000e+000 CUMULATIVE   moles/liter
        3392 SOLU6   SOLCIM   1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000 1.0000000e+000 1.4000000e+000 CUMULATIVE   moles/liter
        3391 SOLU6   SOLSIM   1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000 0.0000000e+000 -2.0000000e+000 CUMULATIVE   moles/liter
        3391 SOLU6   SOLSIM   1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000 4.0000000e-002 -1.0000000e+000 CUMULATIVE   moles/liter
        3391 SOLU6   SOLSIM   1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000 1.3000000e-001 -5.0000000e-001 CUMULATIVE   moles/liter
        3391 SOLU6   SOLSIM   1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000 2.7000000e-001 -2.5000000e-001 CUMULATIVE   moles/liter
        3391 SOLU6   SOLSIM   1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000 6.3000000e-001 0.0000000e+000 CUMULATIVE   moles/liter
        3391 SOLU6   SOLSIM   1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000 8.4000000e-001 2.5000000e-001 CUMULATIVE   moles/liter
        3391 SOLU6   SOLSIM   1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000 8.9000000e-001 5.0000000e-001 CUMULATIVE   moles/liter
        3391 SOLU6   SOLSIM   1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000 9.9000000e-001 1.0000000e+000 CUMULATIVE   moles/liter
        3391 SOLU6   SOLSIM   1.8000000e-001 -9.0000000e-002 -
2.0000000e+000
 1.4000000e+000 1.0000000e+000 1.4000000e+000 CUMULATIVE   moles/liter
        1659 SR   LOGSOLM   0.0000000e+000 0.0000000e+000
0.0000000e+000

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 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     log(moles/lit
          516 SR90     ATWEIGHT  8.9908000e-002  8.9908000e-002  8.9908000e-
002
 8.9908000e-002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3380 SR90     EPAREL    1.0000000e+003  1.0000000e+003
1.0000000e+003
 1.0000000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          517 SR90     HALFLIFE  9.1900000e+008  9.1900000e+008
9.1900000e+008
 9.1900000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     s
         2039 SR90     INVCHD    2.8200000e+004  2.8200000e+004
2.8200000e+004
 2.8200000e+004  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          518 SR90     INVRHD    1.1800000e+005  1.1800000e+005
1.1800000e+005
 1.1800000e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         2907 STEEL    CORRMCO2  1.5850000e-014  1.5850000e-014
0.0000000e+000
 3.1700000e-014  0.00000000e+000 0.0000000e+000 UNIFORM      m/s
         2908 STEEL    CORRWCO2  1.0318000e-013  1.0318000e-013
0.0000000e+000
 2.0635000e-013  0.00000000e+000 0.0000000e+000 UNIFORM      m/s
         2910 STEEL    HUMCORR   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     m/s
         2898 STEEL    STOIFX    1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2909 SULFATE  QINIT     6.5900000e+006  6.5900000e+006
6.5900000e+006
 6.5900000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     moles
         2183 TAMARISK CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2243 TAMARISK COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2793 TAMARISK KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2244 TAMARISK PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2794 TAMARISK PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2795 TAMARISK PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2796 TAMARISK PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2185 TAMARISK PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2186 TAMARISK POROSITY  6.4000000e-002  6.4000000e-002
0.0000000e+000
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 2.1700000e-001  0.00000000e+000 0.0000000e+000 STUDENT      NONE
         2186 TAMARISK POROSITY  6.4000000e-002  6.4000000e-002
0.0000000e+000
 2.1700000e-001  0.00000000e+000 2.0000000e-003 STUDENT      NONE
         2186 TAMARISK POROSITY  6.4000000e-002  6.4000000e-002
0.0000000e+000
 2.1700000e-001  0.00000000e+000 2.0000000e-003 STUDENT      NONE
         2186 TAMARISK POROSITY  6.4000000e-002  6.4000000e-002
0.0000000e+000
 2.1700000e-001  0.00000000e+000 3.0000000e-003 STUDENT      NONE
         2186 TAMARISK POROSITY  6.4000000e-002  6.4000000e-002
0.0000000e+000
 2.1700000e-001  0.00000000e+000 1.0000000e-002 STUDENT      NONE
         2186 TAMARISK POROSITY  6.4000000e-002  6.4000000e-002
0.0000000e+000
 2.1700000e-001  0.00000000e+000 2.1300000e-001 STUDENT      NONE
         2186 TAMARISK POROSITY  6.4000000e-002  6.4000000e-002
0.0000000e+000
 2.1700000e-001  0.00000000e+000 2.1700000e-001 STUDENT      NONE
         2914 TAMARISK PRMX_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2915 TAMARISK PRMY_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2916 TAMARISK PRMZ_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2191 TAMARISK RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2245 TAMARISK SAT_RBRN  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2192 TAMARISK SAT_RGAS  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3461 TH       CAPHUM    1.1000000e-005  1.1000000e-005  1.1000000e-
005
 1.1000000e-005  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3318 TH       CAPMIC    1.9000000e-003  1.9000000e-003  1.9000000e-
003
 1.9000000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3319 TH       CONCINT   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3437 TH       CONCMIN   2.6000000e-008  2.6000000e-008  2.6000000e-
008
 2.6000000e-008  0.00000000e+000 0.0000000e+000 CONSTANT     moles/liter
         3320 TH       PROPMIC   3.1000000e+000  3.1000000e+000
3.1000000e+000
 3.1000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3449 TH+4     MD0       1.5300000e-010  1.5300000e-010  1.5300000e-
010
 1.5300000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     m^2/s
         3478 TH+4     MKD_TH    3.5000000e+000  2.6000000e+000  7.0000000e-
001
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 1.0000000e+001  0.00000000e+000 0.0000000e+000 LOGUNIFORM   m^3/kg
        3216 TH227    ATWEIGHT  2.2702800e-001  2.2702800e-001  2.2702800e-
001
 2.2702800e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3356 TH227    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
        3300 TH227    HALFLIFE  1.6170000e+006  1.6170000e+006
1.6170000e+006
 1.6170000e+006  0.00000000e+000 0.0000000e+000 CONSTANT     s
        3217 TH228    ATWEIGHT  2.2802900e-001  2.2802900e-001  2.2802900e-
001
 2.2802900e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3357 TH228    EPAREL    0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
        3301 TH228    HALFLIFE  6.0370000e+007  6.0370000e+007
6.0370000e+007
 6.0370000e+007  0.00000000e+000 0.0000000e+000 CONSTANT     s
         603 TH229    ATWEIGHT  2.2903200e-001  2.2903200e-001  2.2903200e-
001
 2.2903200e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3381 TH229    EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         604 TH229    HALFLIFE  2.3160000e+011  2.3160000e+011
2.3160000e+011
 2.3160000e+011  0.00000000e+000 0.0000000e+000 CONSTANT     s
         605 TH229    INVCHD    6.1200000e+000  6.1200000e+000
6.1200000e+000
 6.1200000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         606 TH229    INVRHD    1.8300000e-001  1.8300000e-001  1.8300000e-
001
 1.8300000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         607 TH230    ATWEIGHT  2.3003300e-001  2.3003300e-001  2.3003300e-
001
 2.3003300e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3382 TH230    EPAREL    1.0000000e+001  1.0000000e+001
1.0000000e+001
 1.0000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         608 TH230    HALFLIFE  2.4300000e+012  2.4300000e+012
2.4300000e+012
 2.4300000e+012  0.00000000e+000 0.0000000e+000 CONSTANT     s
         609 TH230    INVCHD    2.2600000e-001  2.2600000e-001  2.2600000e-
001
 2.2600000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         610 TH230    INVRHD    7.2400000e-003  7.2400000e-003  7.2400000e-
003
 7.2400000e-003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
        3508 TH230L   INVCHD    6.3500000e+000  6.3500000e+000
6.3500000e+000
 6.3500000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
        3513 TH230L   INVRHD    1.9000000e-001  1.9000000e-001  1.9000000e-
001
 1.9000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
        3218 TH231    ATWEIGHT  2.3103600e-001  2.3103600e-001  2.3103600e-
001
```

2.3103600e-001 0.00000000e+000 0.0000000e+000 CONSTANT kg/mole
3358 TH231 EPAREL 0.0000000e+000 0.0000000e+000
0.0000000e+000
0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT Curies/wuf
3302 TH231 HALFLIFE 9.1870000e+004 9.1870000e+004
9.1870000e+004
9.1870000e+004 0.00000000e+000 0.0000000e+000 CONSTANT s
611 TH232 ATWEIGHT 2.3203800e-001 2.3203800e-001 2.3203800e-
001
2.3203800e-001 0.00000000e+000 0.0000000e+000 CONSTANT kg/mole
3383 TH232 EPAREL 1.0000000e+001 1.0000000e+001
1.0000000e+001
1.0000000e+001 0.00000000e+000 0.0000000e+000 CONSTANT Curies/wuf
612 TH232 HALFLIFE 4.4340000e+017 4.4340000e+017
4.4340000e+017
4.4340000e+017 0.00000000e+000 0.0000000e+000 CONSTANT s
613 TH232 INVCHD 6.6300000e+000 6.6300000e+000
6.6300000e+000
6.6300000e+000 0.00000000e+000 0.0000000e+000 CONSTANT Curies
614 TH232 INVRHD 2.9100000e-001 2.9100000e-001 2.9100000e-
001
2.9100000e-001 0.00000000e+000 0.0000000e+000 CONSTANT Curies
3219 TH234 ATWEIGHT 2.3404400e-001 2.3404400e-001 2.3404400e-
001
2.3404400e-001 0.00000000e+000 0.0000000e+000 CONSTANT kg/mole
3359 TH234 EPAREL 0.0000000e+000 0.0000000e+000
0.0000000e+000
0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT Curies/wuf
3303 TH234 HALFLIFE 2.0820000e+006 2.0820000e+006
2.0820000e+006
2.0820000e+006 0.00000000e+000 0.0000000e+000 CONSTANT s
3196 TL207 ATWEIGHT 2.0697700e-001 2.0697700e-001 2.0697700e-
001
2.0697700e-001 0.00000000e+000 0.0000000e+000 CONSTANT kg/mole
3360 TL207 EPAREL 0.0000000e+000 0.0000000e+000
0.0000000e+000
0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT Curies/wuf
3304 TL207 HALFLIFE 2.8620000e+002 2.8620000e+002
2.8620000e+002
2.8620000e+002 0.00000000e+000 0.0000000e+000 CONSTANT s
3460 U CAPHUM 1.1000000e-005 1.1000000e-005 1.1000000e-
005
1.1000000e-005 0.00000000e+000 0.0000000e+000 CONSTANT moles/liter
3308 U CAPMIC 2.1000000e-003 2.1000000e-003 2.1000000e-
003
2.1000000e-003 0.00000000e+000 0.0000000e+000 CONSTANT moles/liter
3307 U CONCINT 0.0000000e+000 0.0000000e+000
0.0000000e+000
0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT moles/liter
3438 U CONCMIN 2.6000000e-008 2.6000000e-008 2.6000000e-
008
2.6000000e-008 0.00000000e+000 0.0000000e+000 CONSTANT moles/liter
3309 U PROPMIC 2.1000000e-003 2.1000000e-003 2.1000000e-
003
2.1000000e-003 0.00000000e+000 0.0000000e+000 CONSTANT NONE
3446 U+4 MD0 1.5300000e-010 1.5300000e-010 1.5300000e-
010

```
 1.5300000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     m^2/s
        3479 U+4      MKD_U     3.5000000e+000  2.6000000e+000  7.0000000e-
001
 1.0000000e+001  0.00000000e+000 0.0000000e+000 LOGUNIFORM   m^3/kg
        3448 U+6      MD0       4.2600000e-010  4.2600000e-010  4.2600000e-
010
 4.2600000e-010  0.00000000e+000 0.0000000e+000 CONSTANT     m^2/s
        3475 U+6      MKD_U     3.1000000e-003  7.7000000e-004  3.0000000e-
005
 2.0000000e-002  0.00000000e+000 0.0000000e+000 LOGUNIFORM   m^3/kg
         632 U233     ATWEIGHT  2.3304000e-001  2.3304000e-001  2.3304000e-
001
 2.3304000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3384 U233     EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         633 U233     HALFLIFE  5.0020000e+012  5.0020000e+012
5.0020000e+012
 5.0020000e+012  0.00000000e+000 0.0000000e+000 CONSTANT     s
         634 U233     INVCHD    1.4300000e+003  1.4300000e+003
1.4300000e+003
 1.4300000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         635 U233     INVRHD    4.3800000e+001  4.3800000e+001
4.3800000e+001
 4.3800000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         636 U234     ATWEIGHT  2.3404100e-001  2.3404100e-001  2.3404100e-
001
 2.3404100e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3385 U234     EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         637 U234     HALFLIFE  7.7160000e+012  7.7160000e+012
7.7160000e+012
 7.7160000e+012  0.00000000e+000 0.0000000e+000 CONSTANT     s
         638 U234     INVCHD    3.6400000e+002  3.6400000e+002
3.6400000e+002
 3.6400000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         639 U234     INVRHD    2.3500000e+001  2.3500000e+001
2.3500000e+001
 2.3500000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
        3507 U234L    INVCHD    1.7900000e+003  1.7900000e+003
1.7900000e+003
 1.7900000e+003  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
        3512 U234L    INVRHD    6.7300000e+001  6.7300000e+001
6.7300000e+001
 6.7300000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         640 U235     ATWEIGHT  2.3504400e-001  2.3504400e-001  2.3504400e-
001
 2.3504400e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
        3386 U235     EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
         641 U235     HALFLIFE  2.2210000e+016  2.2210000e+016
2.2210000e+016
 2.2210000e+016  0.00000000e+000 0.0000000e+000 CONSTANT     s
         642 U235     INVCHD    1.3800000e+000  1.3800000e+000
1.3800000e+000
```

```
 1.3800000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          643 U235     INVRHD    9.7900000e-001  9.7900000e-001  9.7900000e-
001
 9.7900000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          644 U236     ATWEIGHT  2.3604600e-001  2.3604600e-001  2.3604600e-
001
 2.3604600e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3387 U236     EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          645 U236     HALFLIFE  7.3890000e+014  7.3890000e+014
7.3890000e+014
 7.3890000e+014  0.00000000e+000 0.0000000e+000 CONSTANT     s
         2216 U236     INVCHD    2.6000000e-001  2.6000000e-001  2.6000000e-
001
 2.6000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          646 U236     INVRHD    1.4800000e+000  1.4800000e+000
1.4800000e+000
 1.4800000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          647 U238     ATWEIGHT  2.3805100e-001  2.3805100e-001  2.3805100e-
001
 2.3805100e-001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/mole
         3388 U238     EPAREL    1.0000000e+002  1.0000000e+002
1.0000000e+002
 1.0000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies/wuf
          648 U238     HALFLIFE  1.4100000e+017  1.4100000e+017
1.4100000e+017
 1.4100000e+017  0.00000000e+000 0.0000000e+000 CONSTANT     s
          649 U238     INVCHD    2.4600000e+001  2.4600000e+001
2.4600000e+001
 2.4600000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
          650 U238     INVRHD    1.3100000e+002  1.3100000e+002
1.3100000e+002
 1.3100000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     Curies
         2217 UNNAMED  CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2218 UNNAMED  COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2799 UNNAMED  KPT       0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2247 UNNAMED  PC_MAX    1.0000000e+008  1.0000000e+008
1.0000000e+008
 1.0000000e+008  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2800 UNNAMED  PCT_A     0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2801 UNNAMED  PCT_EXP   0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2802 UNNAMED  PO_MIN    1.0132500e+005  1.0132500e+005
1.0132500e+005
 1.0132500e+005  0.00000000e+000 0.0000000e+000 CONSTANT     Pa
         2219 UNNAMED  PORE_DIS  7.0000000e-001  7.0000000e-001  7.0000000e-
001
```

```
 7.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2220 UNNAMED  POROSITY  1.8100000e-001  1.8100000e-001  2.0000000e-
003
 2.7300000e-001  0.00000000e+000 2.0000000e-003 STUDENT      NONE
         2220 UNNAMED  POROSITY  1.8100000e-001  1.8100000e-001  2.0000000e-
003
 2.7300000e-001  0.00000000e+000 2.6800000e-001 STUDENT      NONE
         2220 UNNAMED  POROSITY  1.8100000e-001  1.8100000e-001  2.0000000e-
003
 2.7300000e-001  0.00000000e+000 2.7300000e-001 STUDENT      NONE
         2911 UNNAMED  PRMX_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2912 UNNAMED  PRMY_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2913 UNNAMED  PRMZ_LOG -3.5000000e+001 -3.5000000e+001 -
3.5000000e+001
-3.5000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     log(m^2)
         2225 UNNAMED  RELP_MOD  4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2248 UNNAMED  SAT_RBRN  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         2226 UNNAMED  SAT_RGAS  2.0000000e-001  2.0000000e-001  2.0000000e-
001
 2.0000000e-001  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          651 WAS_AREA ABSROUGH  2.5000000e-002  2.5000000e-002  1.0000000e-
002
 4.0000000e-002  0.00000000e+000 0.0000000e+000 UNIFORM      m
          652 WAS_AREA CAP_MOD   1.0000000e+000  1.0000000e+000
1.0000000e+000
 1.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
         3454 WAS_AREA CLOSMOD   4.0000000e+000  4.0000000e+000
4.0000000e+000
 4.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     NONE
          653 WAS_AREA COMP_RCK  0.0000000e+000  0.0000000e+000
0.0000000e+000
 0.0000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     Pa^-1
         2041 WAS_AREA DCELLCHW  5.8000000e+001  5.8000000e+001
5.8000000e+001
 5.8000000e+001  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2274 WAS_AREA DCELLRHW  4.5000000e+000  4.5000000e+000
4.5000000e+000
 4.5000000e+000  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         1992 WAS_AREA DIRNCCHW  1.7000000e+002  1.7000000e+002
1.7000000e+002
 1.7000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         1993 WAS_AREA DIRNCRHW  4.8000000e+002  4.8000000e+002
4.8000000e+002
 4.8000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2040 WAS_AREA DIRONCHW  1.1000000e+002  1.1000000e+002
1.1000000e+002
 1.1000000e+002  0.00000000e+000 0.0000000e+000 CONSTANT     kg/m^3
         2044 WAS_AREA DIRONRHW  1.1000000e+002  1.1000000e+002
1.1000000e+002
```

1.1000000e+002 0.00000000e+000 0.0000000e+000 CONSTANT   kg/m^3
2043 WAS_AREA DPLASCHW 4.2000000e+001 4.2000000e+001
4.2000000e+001
4.2000000e+001 0.00000000e+000 0.0000000e+000 CONSTANT   kg/m^3
2275 WAS_AREA DPLASRHW 4.9000000e+000 4.9000000e+000
4.9000000e+000
4.9000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   kg/m^3
1995 WAS_AREA DPLSCCHW 1.6000000e+001 1.6000000e+001
1.6000000e+001
1.6000000e+001 0.00000000e+000 0.0000000e+000 CONSTANT   kg/m^3
2228 WAS_AREA DPLSCRHW 1.4000000e+000 1.4000000e+000
1.4000000e+000
1.4000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   kg/m^3
2042 WAS_AREA DRUBBCHW 1.4000000e+001 1.4000000e+001
1.4000000e+001
1.4000000e+001 0.00000000e+000 0.0000000e+000 CONSTANT   kg/m^3
2046 WAS_AREA DRUBBRHW 3.1000000e+000 3.1000000e+000
3.1000000e+000
3.1000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   kg/m^3
656 WAS_AREA GRATMICH 6.3420000e-010 6.3420000e-010
0.0000000e+000
1.2684000e-009 0.00000000e+000 0.0000000e+000 UNIFORM   moles/(kg*s)
657 WAS_AREA GRATMICI 4.9150000e-009 4.9150000e-009 3.1710000e-
010
9.5129000e-009 0.00000000e+000 0.0000000e+000 UNIFORM   moles/(kg*s)
2804 WAS_AREA KPT   0.0000000e+000 0.0000000e+000
0.0000000e+000
0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   NONE
658 WAS_AREA PC_MAX   1.0000000e+008 1.0000000e+008
1.0000000e+008
1.0000000e+008 0.00000000e+000 0.0000000e+000 CONSTANT   Pa
2805 WAS_AREA PCT_A   0.0000000e+000 0.0000000e+000
0.0000000e+000
0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   Pa
2806 WAS_AREA PCT_EXP   0.0000000e+000 0.0000000e+000
0.0000000e+000
0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   NONE
661 WAS_AREA PO_MIN   1.0132500e+005 1.0132500e+005
1.0132500e+005
1.0132500e+005 0.00000000e+000 0.0000000e+000 CONSTANT   Pa
659 WAS_AREA PORE_DIS 3.2500000e+000 2.8900000e+000
1.4400000e+000
5.7800000e+000 0.0000000e+000 1.4400000e+000 CUMULATIVE   NONE
659 WAS_AREA PORE_DIS 3.2500000e+000 2.8900000e+000
1.4400000e+000
5.7800000e+000 5.0000000e-001 2.8900000e+000 CUMULATIVE   NONE
659 WAS_AREA PORE_DIS 3.2500000e+000 2.8900000e+000
1.4400000e+000
5.7800000e+000 1.0000000e+000 5.7800000e+000 CUMULATIVE   NONE
660 WAS_AREA POROSITY 8.4800000e-001 8.4800000e-001 8.4800000e-
001
8.4800000e-001 0.00000000e+000 0.0000000e+000 CONSTANT   NONE
662 WAS_AREA PRESSURE 1.0132500e+005 1.0132500e+005
1.0132500e+005
1.0132500e+005 0.00000000e+000 0.0000000e+000 CONSTANT   Pa
663 WAS_AREA PRMX_LOG -1.2619800e+001 -1.2619800e+001 -
1.2619800e+001

-1.2619800e+001 0.00000000e+000 0.0000000e+000 CONSTANT   log(m^2)
          664 WAS_AREA PRMY_LOG -1.2619800e+001 -1.2619800e+001 -
1.2619800e+001
-1.2619800e+001 0.00000000e+000 0.0000000e+000 CONSTANT   log(m^2)
          665 WAS_AREA PRMZ_LOG -1.2619800e+001 -1.2619800e+001 -
1.2619800e+001
-1.2619800e+001 0.00000000e+000 0.0000000e+000 CONSTANT   log(m^2)
         2823 WAS_AREA PROBDEG   2.0000000e+000 2.0000000e+000
0.0000000e+000
 2.0000000e+000 5.0000000e-001 0.0000000e+000 DELTA   NONE
         2823 WAS_AREA PROBDEG   2.0000000e+000 2.0000000e+000
0.0000000e+000
 2.0000000e+000 2.5000000e-001 1.0000000e+000 DELTA   NONE
         2823 WAS_AREA PROBDEG   2.0000000e+000 2.0000000e+000
0.0000000e+000
 2.0000000e+000 2.5000000e-001 2.0000000e+000 DELTA   NONE
         3549 WAS_AREA PTHRESH   8.0000000e+006 8.0000000e+006
8.0000000e+006
 8.0000000e+006 0.00000000e+000 0.0000000e+000 CONSTANT   Pa
          668 WAS_AREA RELP_MOD 4.0000000e+000 4.0000000e+000
4.0000000e+000
 4.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   NONE
          669 WAS_AREA SAT_IBRN 1.5000000e-002 1.5000000e-002 1.5000000e-
002
 1.5000000e-002 0.00000000e+000 0.0000000e+000 CONSTANT   NONE
          670 WAS_AREA SAT_RBRN 2.7600000e-001 2.7600000e-001
0.0000000e+000
 5.5200000e-001 0.00000000e+000 0.0000000e+000 UNIFORM   NONE
          671 WAS_AREA SAT_RGAS 7.5000000e-002 7.5000000e-002
0.0000000e+000
 1.5000000e-001 0.00000000e+000 0.0000000e+000 UNIFORM   NONE
         2231 WAS_AREA SAT_WICK 5.0000000e-001 5.0000000e-001
0.0000000e+000
 1.0000000e+000 0.00000000e+000 0.0000000e+000 UNIFORM   NONE
         2232 WAS_AREA VOLCHW   1.6900000e+005 1.6900000e+005
1.6900000e+005
 1.6900000e+005 0.00000000e+000 0.0000000e+000 CONSTANT   m^3
         2233 WAS_AREA VOLRHW   7.0800000e+003 7.0800000e+003
7.0800000e+003
 7.0800000e+003 0.00000000e+000 0.0000000e+000 CONSTANT   m^3
         3548 WAS_AREA VOLSPALL 2.2500000e+000 2.2500000e+000 5.0000000e-
001
 4.0000000e+000 0.00000000e+000 0.0000000e+000 UNIFORM   m^3
         3198 Y90   ATWEIGHT 8.9907000e-002 8.9907000e-002 8.9907000e-
002
 8.9907000e-002 0.00000000e+000 0.0000000e+000 CONSTANT   kg/mole
         3361 Y90   EPAREL   0.0000000e+000 0.0000000e+000
0.0000000e+000
 0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   Curies/wuf
         3305 Y90   HALFLIFE 2.3040000e+005 2.3040000e+005
2.3040000e+005
 2.3040000e+005 0.00000000e+000 0.0000000e+000 CONSTANT   s
         3199 ZR90   ATWEIGHT 8.9905000e-002 8.9905000e-002 8.9905000e-
002
 8.9905000e-002 0.00000000e+000 0.0000000e+000 CONSTANT   kg/mole
         3362 ZR90   EPAREL   0.0000000e+000 0.0000000e+000
0.0000000e+000

0.0000000e+000 0.00000000e+000 0.0000000e+000 CONSTANT   Curies/wuf
3306 ZR90   HALFLIFE 1.0000000e+038 1.0000000e+038
1.0000000e+038
1.0000000e+038 0.00000000e+000 0.0000000e+000 CONSTANT   s

APPENDIX E: REPRESENTATIVE INPUT FILES FOR PANEL

E.1 GENMESH FILE–sets up grid/source term

```
$ type GM_PANEL_CRA1.INP
!==========================================================================
!   FILETYPE: GENMESH input text file
!   TITLE: Simple GENMESH to set up Source Term CDB
!   ANALYSTS: Christine Stockman
!   DATE: May 31, 1996
!==========================================================================
!
 *SETUP
   DIM=     3
   ORIGIN= 0.0, 0.0, 0.0
   IJKMAX= 2, 2, 2
 *GRID
!   ==================== X direction ======================
   DEL, COORD=X, DEL=   1.00, INRANGE=  1,  2, FACTOR= 1.0
!   ==================== Y direction ======================
   DEL, COORD=Y, DEL=   1.00, INRANGE=  1,  2, FACTOR= 1.0
!   ==================== Z direction ======================
   DEL, COORD=Z, DEL=   1.00, INRANGE=  1,  2, FACTOR= 1.0
!
 *REGIONS
  REGION= 1, IRANGE= 1,2, JRANGE= 1,2 KRANGE= 1, 2
!=======================================================================
 *END
```

E.2 MATSET FILE–calls up parameters/defines parameters/assigns blocks

```
$ type ms_panel_cra1.inp
!============================================================================
! TITLE:    MATSET input file for PANEL (CRA for SOURCE term in PANEL runs)
! ANALYSTS: C. T. STOCKMAN, J. W. GARNER
! CREATED:  Feb 17, 2003
! A modification of the 1996 CCA Source Term MATSET input file
! PURPOSE:  PREPARE INPUT CDB FOR  PANEL
!=========================================================================
!
*HEADING
RUN=0
SCALE=SOURCE
SCENARIO=00
TITLE=SOURCE TERM
!
*PRINT_ASSIGNED_VALUES
!
*UNITS=SI
!
*CREATE_BLOCK
 BLOCKID=      2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, &
          16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, &
          31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, &
          46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, &
```

```
          61, 62, 63, 64, 65
*RETRIEVE*NAME
COORDINATE, DIM=3, NAMES=X, Y, Z
MATERIAL,    1=GLOBAL, 2=REFCON, &
   3=AM241,  4=AM243,  5=CF252,  6=CM243,  7=CM244,  8=CM245, &
   9=CM248, 10=CS137, 11=NP237, 12=PA231, 13=PB210, 14=PM147, &
  15=PU238, 16=PU239, 17=PU240, 18=PU241, 19=PU242, 20=PU244, &
  21=RA226, 22=RA228, 23=SR90,  24=TH229, 25=TH230, &
  26=TH232, 27=U233,  28=U234,  29=U235,  30=U236,  31=U238,  &
  32=AM, 33=CF, 34=CM, 35=CS, 36=NP, 37=PA, 38=PB, 39=PM, 40=PU, &
  41=RA, 42=SR, 43=TH, 44=U,  &
  45=SOLMOD3, 46=SOLMOD4, 47=SOLMOD5, 48=SOLMOD6, &
  49=PHUMOX3, 50=PHUMOX4, 51=PHUMOX5, 52=PHUMOX6, &
  53=SOLAM3,  54=SOLPU3,  55=SOLPU4,  56=SOLTH4,  57=SOLU4,  58=SOLU6, &
  59=AM241L, 60=PU238L, 61=PU239L, 62=TH230L, 63=U234L,  64=BOREHOLE, &
  65=WAS_AREA
!MATERIALS 59-63 ARE LUMPED PARAMETERS FOR NUTS
!
PROPERTY   MATERIAL=WAS_AREA,  NAMES =PROBDEG
PROPERTY   MATERIAL=Global,    NAMES =OXSTAT
PROPERTY   MATERIAL=REFCON,    NAMES =YRSEC,INVSCALE
!ISOTOPES
PROPERTY   MATERIAL=Am241,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Am243,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Cf252,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Cm243,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Cm244,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Cm245,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Cm248,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Cs137,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Np237,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Pa231,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Pb210,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Pm147,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Pu238,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Pu239,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Pu240,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Pu241,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Pu242,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Pu244,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Ra226,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Ra228,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Sr90 ,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Th229,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Th230,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=Th232,     NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=U233,      NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=U234,      NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=U235,      NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=U236,      NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
PROPERTY   MATERIAL=U238,      NAMES =InvCHD,InvRHD,ATWEIGHT,HALFLIFE,EPAREL
!LUMPED ISOTOPES
PROPERTY   MATERIAL=AM241L,    NAMES =InvCHD,InvRHD
PROPERTY   MATERIAL=PU238L,    NAMES =InvCHD,InvRHD,LSOLDIFF
PROPERTY   MATERIAL=PU239L,    NAMES =InvCHD,InvRHD
PROPERTY   MATERIAL=TH230L,    NAMES =InvCHD,InvRHD,LSOLDIFF
PROPERTY   MATERIAL=U234L,     NAMES =InvCHD,InvRHD,LSOLDIFF
```

```
!ELEMENTS
PROPERTY   MATERIAL=AM,        NAMES =CONCMIN,CONCINT,CAPHUM,CAPMIC,PROPMIC
PROPERTY   MATERIAL=NP,        NAMES =CONCMIN,CONCINT,CAPHUM,CAPMIC,PROPMIC
PROPERTY   MATERIAL=PU,        NAMES =CONCMIN,CONCINT,CAPHUM,CAPMIC,PROPMIC
PROPERTY   MATERIAL=TH,        NAMES =CONCMIN,CONCINT,CAPHUM,CAPMIC,PROPMIC
PROPERTY   MATERIAL=U,         NAMES =CONCMIN,CONCINT,CAPHUM,CAPMIC,PROPMIC
!OXIDATION STATES
PROPERTY   MATERIAL=SOLMOD3,   NAMES =SOLSOH,SOLCOH,SOLSOC,SOLCOC
PROPERTY   MATERIAL=SOLMOD4,   NAMES =SOLSOH,SOLCOH,SOLSOC,SOLCOC
PROPERTY   MATERIAL=SOLMOD5,   NAMES =SOLSOH,SOLCOH,SOLSOC,SOLCOC
PROPERTY   MATERIAL=SOLMOD6,   NAMES =SOLSOH,SOLCOH,SOLSOC,SOLCOC
PROPERTY   MATERIAL=PHUMOX3,   NAMES =PHUMSIM,PHUMCIM
PROPERTY   MATERIAL=PHUMOX4,   NAMES =PHUMSIM,PHUMCIM
PROPERTY   MATERIAL=PHUMOX5,   NAMES =PHUMSIM,PHUMCIM
PROPERTY   MATERIAL=PHUMOX6,   NAMES =PHUMSIM,PHUMCIM
!SOLUBILITIES
PROPERTY   MATERIAL=SOLAM3,    NAMES =SOLSIM,SOLCIM
PROPERTY   MATERIAL=SOLPU3,    NAMES =SOLSIM,SOLCIM
PROPERTY   MATERIAL=SOLPU4,    NAMES =SOLSIM,SOLCIM
PROPERTY   MATERIAL=SOLTH4,    NAMES =SOLSIM,SOLCIM
PROPERTY   MATERIAL=SOLU4,     NAMES =SOLSIM,SOLCIM
PROPERTY   MATERIAL=SOLU6,     NAMES =SOLSIM,SOLCIM
!WASTE UNIT FACTOR
PROPERTY   MATERIAL=BOREHOLE,  NAMES=WUF
!============================================================================
*SET*VALUES
!INVSCALE NEEDED UNTIL ADDED TO DATA BASE
PROPERTY   MATERIAL=REFCON,    NAMES*VALUE: INVSCALE=.1044
! PROPERTY   MATERIAL=REFCON,    NAMES*VALUE: INVSCALE=1.
! PROPERTY   MATERIAL=PU238L,   NAMES*VALUE: LSOLDIFF=2.17519 CCA Value
PROPERTY   MATERIAL=PU238L,   NAMES*VALUE: LSOLDIFF=2.18488
! PROPERTY   MATERIAL=TH230L,   NAMES*VALUE: LSOLDIFF=2.900 CCA Value
PROPERTY   MATERIAL=TH230L,   NAMES*VALUE: LSOLDIFF=3.95623
! PROPERTY   MATERIAL=U234L,    NAMES*VALUE: LSOLDIFF=2.550 CCA Value
PROPERTY   MATERIAL=U234L,    NAMES*VALUE: LSOLDIFF=3.25069
!
*END
!------
```

E.3 LHS FILE–calls up sampled parameters

```
$ type lhs1_panel_cra1_a1.inp
! TITLE:    BRAGFLO 2003 CRA1 (LHS1)
! SCENARIO: S1, S2, S3, S4, S5, and S6
! ANALYSTS: Joshua Stein and Bill Zelinski
! CREATED:  April  2003
! MODIFIED: April 7
!
!  LHSCALC = CRA1 REALIZATION 1
!=========================================================================
!
!  DESCRIPTION:
!
!  WIPP 2003 Compliance Recertification Analyses (CRA)
!
!  This input file to PRELHS is used to generate, as an output file, an LHS
```

```
!  input file containing all distribution information and execution options
!  required to create a sample for Replicate R1 for the WIPP 2003 CRA
!
!  Modifed for CRA analyses:  LHSBLANK dummy changed to LHSBLANK and
!           REFCON MATERIAL (LHSBLANK) changed to REFCON
!           #59 dummy replaced with VOLSPALL
!========= No Comments Allowed between *ECHO and *ENDECHO ================
!
*ECHOLHS
TITLE 2002 TBM PA Calculation, Replicate R1 Input File for the LHS Code
NOBS           100
RANDOM SEED    921196800
CORRELATION MATRIX
   3
   18  19 -0.99
   20  21 -0.99
   28  29 -0.75
OUTPUT CORR HIST DATA
*ENDECHO
!
!== PROPERTIES TO BE RETRIEVED FROM WIPP 1997 PA CALCULATION DATABASE ==
!
*RETRIEVE
!1
  MATERIALS,  STEEL
  PROPERTIES, CORRMCO2
!2
  MATERIALS,  WAS_AREA
  PROPERTIES, PROBDEG
!3
  MATERIALS,  WAS_AREA
  PROPERTIES, GRATMICI
!4
  MATERIALS,  WAS_AREA
  PROPERTIES, GRATMICH
!5
  MATERIALS,  CELLULS
  PROPERTIES, FBETA
!6
  MATERIALS,  WAS_AREA
  PROPERTIES, SAT_RGAS
!7
  MATERIALS,  WAS_AREA
  PROPERTIES, SAT_RBRN
!8
  MATERIALS,  WAS_AREA
  PROPERTIES, SAT_WICK
!9
  MATERIALS,  DRZ_PCS
  PROPERTIES, PRMX_LOG
!10
  MATERIALS,  CONC_PCS
  PROPERTIES, PRMX_LOG
!11
  MATERIALS,  SOLU4
  PROPERTIES, SOLCIM
!12
```

```
  MATERIALS,  SOLTH4
  PROPERTIES, SOLCIM
!13 dummy placeholder
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!14
  MATERIALS,  CONC_PCS
  PROPERTIES, SAT_RGAS
!15
  MATERIALS,  CONC_PCS
  PROPERTIES, SAT_RBRN
!16
  MATERIALS,  CONC_PCS
  PROPERTIES, PORE_DIS
!17
  MATERIALS,  S_HALITE
  PROPERTIES, POROSITY
!18
  MATERIALS,  S_HALITE
  PROPERTIES, PRMX_LOG
!19
  MATERIALS,  S_HALITE
  PROPERTIES, COMP_RCK
!20
  MATERIALS,  S_MB139
  PROPERTIES, PRMX_LOG
!21
  MATERIALS,  S_MB139
  PROPERTIES, COMP_RCK
!22
  MATERIALS,  S_MB139
  PROPERTIES, RELP_MOD
!23
  MATERIALS,  S_MB139
  PROPERTIES, SAT_RBRN
!24
  MATERIALS,  S_MB139
  PROPERTIES, SAT_RGAS
!25
  MATERIALS,  S_MB139
  PROPERTIES, PORE_DIS
!26
  MATERIALS,  S_HALITE
  PROPERTIES, PRESSURE
!27
  MATERIALS,  CASTILER
  PROPERTIES, PRESSURE
!28
  MATERIALS,  CASTILER
  PROPERTIES, PRMX_LOG
!29
  MATERIALS,  CASTILER
  PROPERTIES, COMP_RCK
!30
  MATERIALS,  BH_SAND
  PROPERTIES, PRMX_LOG
!31
```

```
  MATERIALS,  DRZ_1
  PROPERTIES, PRMX_LOG
!32
  MATERIALS,  CONC_PLG
  PROPERTIES, PRMX_LOG
!33 dummy placeholder
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!34
  MATERIALS,  SOLAM3
  PROPERTIES, SOLSIM
!35
  MATERIALS,  SOLAM3
  PROPERTIES, SOLCIM
!36
  MATERIALS,  SOLPU3
  PROPERTIES, SOLSIM
!37
  MATERIALS,  SOLPU3
  PROPERTIES, SOLCIM
!38
  MATERIALS,  SOLPU4
  PROPERTIES, SOLSIM
!39
  MATERIALS,  SOLPU4
  PROPERTIES, SOLCIM
!40
  MATERIALS,  SOLU4
  PROPERTIES, SOLSIM
!41
  MATERIALS,  SOLU6
  PROPERTIES, SOLSIM
!42
  MATERIALS,  SOLU6
  PROPERTIES, SOLCIM
!43
  MATERIALS,  SOLTH4
  PROPERTIES, SOLSIM
!44
  MATERIALS,  PHUMOX3
  PROPERTIES, PHUMCIM
!45
  MATERIALS,  GLOBAL
  PROPERTIES, OXSTAT
!46
  MATERIALS,  CULEBRA
  PROPERTIES, MINP_FAC
!47
  MATERIALS,  GLOBAL
  PROPERTIES, TRANSIDX
!48
  MATERIALS,  GLOBAL
  PROPERTIES, CLIMTIDX
!49
  MATERIALS,  CULEBRA
  PROPERTIES, HMBLKLT
!50
```

```
  MATERIALS,  CULEBRA
  PROPERTIES, APOROS
!51
  MATERIALS,  CULEBRA
  PROPERTIES, DPOROS
!52
  MATERIALS,  U+6
  PROPERTIES, MKD_U
!53
  MATERIALS,  U+4
  PROPERTIES, MKD_U
!54
  MATERIALS,  PU+3
  PROPERTIES, MKD_PU
!55
  MATERIALS,  PU+4
  PROPERTIES, MKD_PU
!56
  MATERIALS,  TH+4
  PROPERTIES, MKD_TH
!57
  MATERIALS,  AM+3
  PROPERTIES, MKD_AM
!58
  MATERIALS,  BOREHOLE
  PROPERTIES, TAUFAIL
!59 dummy placeholder for VOLSPALL
  MATERIALS,  WAS_AREA
  PROPERTIES, VOLSPALL
!60
  MATERIALS,  GLOBAL
  PROPERTIES, PBRINE
!61
  MATERIALS,  BOREHOLE
  PROPERTIES, DOMEGA
!62
  MATERIALS,  SHFTU
  PROPERTIES, SAT_RBRN
!63
  MATERIALS,  SHFTU
  PROPERTIES, SAT_RGAS
!64
  MATERIALS,  SHFTU
  PROPERTIES, PRMX_LOG
!65
  MATERIALS,  SHFTL_T1
  PROPERTIES, PRMX_LOG
!66
  MATERIALS,  SHFTL_T2
  PROPERTIES, PRMX_LOG
!67
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!68
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!69
```

```
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!70
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!71
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!72
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!73
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!74
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!75
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!
!=====================================================================
!
*END
```

E.4 ALGEBRA FILE–further defines parameters/manipulates parameters

```
$ type alg_panel_cra1.inp
!
! DEFINE WMICDFLG
WMICDFLG=PROBDEG[B:65]
!
! NOW, DEFINE SOLS AND SOLC
!
LIMIT BLOCKS 45
SOLS=MAKEPROP(IFGT0(WMICDFLG,SOLSOH,SOLSOC))
SOLC=MAKEPROP(IFGT0(WMICDFLG,SOLCOH,SOLCOC))
!
LIMIT BLOCKS 46
SOLS=MAKEPROP(IFGT0(WMICDFLG,SOLSOH,SOLSOC))
SOLC=MAKEPROP(IFGT0(WMICDFLG,SOLCOH,SOLCOC))
!
LIMIT BLOCKS 47
SOLS=MAKEPROP(IFGT0(WMICDFLG,SOLSOH,SOLSOC))
SOLC=MAKEPROP(IFGT0(WMICDFLG,SOLCOH,SOLCOC))
!
LIMIT BLOCKS 48
SOLS=MAKEPROP(IFGT0(WMICDFLG,SOLSOH,SOLSOC))
SOLC=MAKEPROP(IFGT0(WMICDFLG,SOLCOH,SOLCOC))
!
DELETE WMICDFLG
!
! SET HALFLIFE AND ATWEIGHT FOR AM241L SAME AS FOR AM241
!
LIMIT BLOCK 59
ATWEIGHT=MAKEPROP(ATWEIGHT[B:3])
HALFLIFE=MAKEPROP(HALFLIFE[B:3])
```

```
! SET HALFLIFE AND ATWEIGHT FOR PU238L SAME AS FOR PU238
LIMIT BLOCK 60
ATWEIGHT=MAKEPROP(ATWEIGHT[B:15])
HALFLIFE=MAKEPROP(HALFLIFE[B:15])
! SET HALFLIFE AND ATWEIGHT FOR PU239L SAME AS FOR PU239
LIMIT BLOCK 61
ATWEIGHT=MAKEPROP(ATWEIGHT[B:16])
HALFLIFE=MAKEPROP(HALFLIFE[B:16])
! SET HALFLIFE AND ATWEIGHT FOR TH230L SAME AS FOR TH230
LIMIT BLOCK 62
ATWEIGHT=MAKEPROP(ATWEIGHT[B:25])
HALFLIFE=MAKEPROP(HALFLIFE[B:25])
! SET HALFLIFE AND ATWEIGHT FOR U234L SAME AS FOR U234
LIMIT BLOCK 63
ATWEIGHT=MAKEPROP(ATWEIGHT[B:28])
HALFLIFE=MAKEPROP(HALFLIFE[B:28])
!
END
$
```

APPENDIX F: REPRESENTATIVE INPUT FILES FOR NUTS

F.1 NUTS INPUT, SCREENING

```
$ type nut_cra1_scn_r1_s1.inp
** NUTS TITLE **
'NUTS 2.05A TRACER SCREENING TEST FOR CRA1 R1S1 (UNDISTURBED SCENARIO)'
** 1.# OF SITES,# OF MATERIAL,(2.SITE NAME,# COMP. TO BE MODELED)1,..,NSITES
**
1,30
'WIPP_SITE'   1
**(1. SITE, 2.COMP., DAUGHTER, PARENT, GROUP NAMES)1,..,NSITES **
'WIPP_SITE'
'TWASTE'  'NONE'  'NONE'  'WASTE'
** 1.# OF ELEMENT,(2.ELEM. NAME, TEMP. DEPEND., TABLE LOOK-UP)1,..,NELEMENT
**
1
'WASTE'   .FALSE.  .FALSE.
** COLLOIDAL TRANSPORT FLAG (T/F) **
.FALSE.
** PH DEPENDENT SOLUBILITY(IS PH REQUIRED (Y/N)) **
'N'
** ORDER OF THE METHOD **
1
** DEGREE OF IMPLICITNESS **
1.D0
**  PRECIPITATE IMPLICITNESS; 1.T/F,IF IMPLICIT 2.# OF ITERATION,TOL. **
.FALSE.
** IS MATRIX ADSORPTION REQUIRED (Y/N) **
'N'
** DO YOU HAVE DISPERSION IN THE MATRIX (Y/N) **
'N'
** DOES MATRIX HAVE SYMMETRIC DISPERSION (T/F): ANSWER IF DISPERSION IS Y **
** DO YOU HAVE INJECTION/PRODUCTION IN THE MATRIX (Y/N) **
'N'
** DO YOU HAVE DIRICHLET B.CS. IN THE MATRIX (F/T) **
.TRUE.
** IS CONCENTRATION INITIALIZED MANUALLY IN THE MATRIX (F/T) **
.FALSE.
** OPEN NUTS UNDISTURBED CDB FOR INTRUSION TIME OTHER THAN 350,1000 YRS **
.FALSE.
** PRINT FLAGS OF MATRIX VARIABLES IN A BINARY FILE **
0,0,0,0,0,0,1,0,0,0,0,0,0,0
** TEMP. DEPEND. OF Kd (ENTER DATA IF ADSORP. IS (Y) AND TEMP. DEPEND.) **
** PRINTING FREQUENCY IN A BINARY FILE **
1,1.D14
** DO YOU HAVE EXTERNAL NUCLIDE SOURCE? (T/F) **
.FALSE.
** MINIMUM LIMITS OF TIME TO BE SET IF ZERO ENCOUNTERED **
1.D-18
** INTRUSION TIME, ITERPOLATED INTRUSION TIME, TOLERANCE **
*** END MATERIAL MAP AND START NUCLIDES PROPERTIES ***
** IF NOT TEMP. DEPEND. (ELEMENT NAME, SOLUBILITY LIMIT) 1,..,NELEMENT **
'WASTE'     -2.D0
** (COMP. NAME, MOL.(ATOMIC) WT., INITIAL INVENTS., HALF LIFE)1,..,NUCLIDE **
```

```
'TWASTE'    .1D0   0.D0   0.D0   0.D0
** GROUND WATER PH INPUT **
** STANDARD BR. DENS. IF NOT BRAGFLO RUN (READ ASCII FILE FOR FLUX FIELD) **
** MOLECULAR DIFFUSION OF EACH COMPONENT **
** ROCK GRAIN DENSITY INPUT (REQUIRED ONLY IF SORPTION OR SOIL BASE CONC.) **
** WASTE MATRIX INPUT (1.# OF ISO,2.NAME, LOC. IN THE INPUT, WASTE SITE #) **
1
'TWASTE'  1   1
*** (1.SITE NAME, NUMBER OF GRIDS IN THE SITE 2.INDECES)1...NSITES ***
'WIPP_SITE' 33
 23,10,1   24,10,1   25,10,1   26,10,1   27,10,1   28,10,1   29,10,1
32,10,1   33,10,1   35,10,1   37,10,1
 23,11,1   24,11,1   25,11,1   26,11,1   27,11,1   28,11,1   29,11,1
32,11,1   33,11,1   35,11,1   37,11,1
 23,12,1   24,12,1   25,12,1   26,12,1   27,12,1   28,12,1   29,12,1
32,12,1   33,12,1   35,12,1   37,12,1
** MATRIX ADSORPTION INPUT **
** MATRIX DISPERSION INPUT **
** MATRIX SOURCE INPUT (INJECTED NUCLIDES IF ANY) **
** MATRIX DIR. B.CS. INPUT (REP.='GENERAL',ANYWHERE= 'NOT_GENERAL') **
1  'NOT_GENERAL'
'TWASTE'    1     33
 23,10,1   24,10,1   25,10,1   26,10,1   27,10,1   28,10,1   29,10,1
32,10,1   33,10,1   35,10,1   37,10,1
 23,11,1   24,11,1   25,11,1   26,11,1   27,11,1   28,11,1   29,11,1
32,11,1   33,11,1   35,11,1   37,11,1
 23,12,1   24,12,1   25,12,1   26,12,1   27,12,1   28,12,1   29,12,1
32,12,1   33,12,1   35,12,1   37,12,1
'TWASTE'
1.D0  1.D0  1.D0  1.D0  1.D0  1.D0  1.D0  1.D0  1.D0  1.D0  1.D0
1.D0  1.D0  1.D0  1.D0  1.D0  1.D0  1.D0  1.D0  1.D0  1.D0  1.D0
1.D0  1.D0  1.D0  1.D0  1.D0  1.D0  1.D0  1.D0  1.D0  1.D0  1.D0
** TIME DEPENDENT SOURCE IN THE MATRIX **
** MATRIX CONCENTRATION INITIALIZATION **
** COLLOID TRANSPORT VELOCITY SCALING FACTORS IN THE MATRIX **

$
```

F.2 ALGEBGRA INPUT FILE, SCREENING

```
$ type alg_nut_cra1_scn_r1_s1.inp
!       ALGEBRA INPUT FILE FOR NUTS SCREENING
!       Modified for CRA grid by Thomas Lowry, 11-April-2003
!
ALLTIMES
!FIRST ISOTOP
!MASS FLUXES LEAVING THE WASTE REGION
! WASTE TOP LAYER
!
SWASTE1 =IFGT0(FLUXJM1[E:1165],FLUXJM1[E:1165],0.)
SWASTE1 = SWASTE1 + IFGT0(FLUXJM1[E:1166],FLUXJM1[E:1166],0.)
SWASTE1 = SWASTE1 + IFGT0(FLUXJM1[E:1167],FLUXJM1[E:1167],0.)
SWASTE1 = SWASTE1 + IFGT0(FLUXJM1[E:1168],FLUXJM1[E:1168],0.)
SWASTE1 = SWASTE1 + IFGT0(FLUXJM1[E:1169],FLUXJM1[E:1169],0.)
SWASTE1 = SWASTE1 + IFGT0(FLUXJM1[E:1170],FLUXJM1[E:1170],0.)
SWASTE1 = SWASTE1 + IFGT0(FLUXJM1[E:1171],FLUXJM1[E:1171],0.)
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SWASTE1 = SWASTE1 + IFGT0(FLUXJM1[E:1172],FLUXJM1[E:1172],0.)
SWASTE1 = SWASTE1 + IFGT0(FLUXJM1[E:1469],FLUXJM1[E:1469],0.)
SWASTE1 = SWASTE1 + IFGT0(FLUXJM1[E:1197],FLUXJM1[E:1297],0.)
SWASTE1 = SWASTE1 + IFGT0(FLUXJM1[E:1198],FLUXJM1[E:1298],0.)
SWASTE1 = SWASTE1 + IFGT0(FLUXJM1[E:1199],FLUXJM1[E:1299],0.)
SWASTE1 = SWASTE1 + IFGT0(FLUXJM1[E:1475],FLUXJM1[E:1475],0.)
SWASTE1 = SWASTE1 + IFGT0(FLUXJM1[E:1209],FLUXJM1[E:1209],0.)
SWASTE1 = SWASTE1 + IFGT0(FLUXJM1[E:1210],FLUXJM1[E:1210],0.)
SWASTE1 = SWASTE1 + IFGT0(FLUXJM1[E:1211],FLUXJM1[E:1211],0.)
SWASTE1 = SWASTE1 + IFGT0(FLUXJM1[E:1481],FLUXJM1[E:1481],0.)
!
!WASTE LOWER LAYER
!
SWASTE1 = SWASTE1 + IFGT0(-FLUXJM1[E:1407],-FLUXJM1[E:1407],0.)
SWASTE1 = SWASTE1 + IFGT0(-FLUXJM1[E:1408],-FLUXJM1[E:1408],0.)
SWASTE1 = SWASTE1 + IFGT0(-FLUXJM1[E:1409],-FLUXJM1[E:1409],0.)
SWASTE1 = SWASTE1 + IFGT0(-FLUXJM1[E:1410],-FLUXJM1[E:1410],0.)
SWASTE1 = SWASTE1 + IFGT0(-FLUXJM1[E:1411],-FLUXJM1[E:1411],0.)
SWASTE1 = SWASTE1 + IFGT0(-FLUXJM1[E:1412],-FLUXJM1[E:1412],0.)
SWASTE1 = SWASTE1 + IFGT0(-FLUXJM1[E:1413],-FLUXJM1[E:1413],0.)
SWASTE1 = SWASTE1 + IFGT0(-FLUXJM1[E:1455],-FLUXJM1[E:1455],0.)
SWASTE1 = SWASTE1 + IFGT0(-FLUXJM1[E:1466],-FLUXJM1[E:1466],0.)
SWASTE1 = SWASTE1 + IFGT0(-FLUXJM1[E:1428],-FLUXJM1[E:1428],0.)
SWASTE1 = SWASTE1 + IFGT0(-FLUXJM1[E:1429],-FLUXJM1[E:1429],0.)
SWASTE1 = SWASTE1 + IFGT0(-FLUXJM1[E:1458],-FLUXJM1[E:1458],0.)
SWASTE1 = SWASTE1 + IFGT0(-FLUXJM1[E:1472],-FLUXJM1[E:1472],0.)
SWASTE1 = SWASTE1 + IFGT0(-FLUXJM1[E:1434],-FLUXJM1[E:1434],0.)
SWASTE1 = SWASTE1 + IFGT0(-FLUXJM1[E:1435],-FLUXJM1[E:1435],0.)
SWASTE1 = SWASTE1 + IFGT0(-FLUXJM1[E:1461],-FLUXJM1[E:1461],0.)
SWASTE1 = SWASTE1 + IFGT0(-FLUXJM1[E:1478],-FLUXJM1[E:1478],0.)
!
! WASTE LEFT LAYER
!
SWASTE1 = SWASTE1 + IFGT0(-FLUXIM1[E:1421],-FLUXIM1[E:1421],0.)
SWASTE1 = SWASTE1 + IFGT0(-FLUXIM1[E:1414],-FLUXIM1[E:1414],0.)
SWASTE1 = SWASTE1 + IFGT0(-FLUXIM1[E:1407],-FLUXIM1[E:1407],0.)
!
! WASTE RIGHT LAYER
!
SWASTE1 = SWASTE1 + IFGT0(FLUXIM1[E:1446],FLUXIM1[E:1446],0.)
SWASTE1 = SWASTE1 + IFGT0(FLUXIM1[E:1443],FLUXIM1[E:1443],0.)
SWASTE1 = SWASTE1 + IFGT0(FLUXIM1[E:1440],FLUXIM1[E:1440],0.)
!
!MASS FLUXES REACHING CULEBRA LOWER BOUNDARY
!
SCULBR1 = IFGT0(FLUXJM1[E:1825],FLUXJM1[E:1825],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1826],FLUXJM1[E:1826],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1827],FLUXJM1[E:1827],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1828],FLUXJM1[E:1828],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1829],FLUXJM1[E:1829],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1830],FLUXJM1[E:1830],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1831],FLUXJM1[E:1831],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1832],FLUXJM1[E:1832],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1833],FLUXJM1[E:1833],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1834],FLUXJM1[E:1834],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1835],FLUXJM1[E:1835],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1836],FLUXJM1[E:1836],0.)
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SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1837],FLUXJM1[E:1837],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1838],FLUXJM1[E:1838],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1839],FLUXJM1[E:1839],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1840],FLUXJM1[E:1840],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1841],FLUXJM1[E:1841],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1842],FLUXJM1[E:1842],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1843],FLUXJM1[E:1843],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1844],FLUXJM1[E:1844],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1845],FLUXJM1[E:1845],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1846],FLUXJM1[E:1846],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1847],FLUXJM1[E:1847],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1848],FLUXJM1[E:1848],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1849],FLUXJM1[E:1849],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1850],FLUXJM1[E:1850],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1851],FLUXJM1[E:1851],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1852],FLUXJM1[E:1852],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1853],FLUXJM1[E:1853],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1854],FLUXJM1[E:1854],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1855],FLUXJM1[E:1855],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1856],FLUXJM1[E:1856],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1857],FLUXJM1[E:1857],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1858],FLUXJM1[E:1858],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1859],FLUXJM1[E:1859],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1860],FLUXJM1[E:1860],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1861],FLUXJM1[E:1861],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1489],FLUXJM1[E:1489],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1862],FLUXJM1[E:1862],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1863],FLUXJM1[E:1863],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1864],FLUXJM1[E:1864],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1865],FLUXJM1[E:1865],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1866],FLUXJM1[E:1866],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1867],FLUXJM1[E:1867],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1868],FLUXJM1[E:1868],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1869],FLUXJM1[E:1869],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1870],FLUXJM1[E:1870],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1871],FLUXJM1[E:1871],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1872],FLUXJM1[E:1872],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1873],FLUXJM1[E:1873],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1874],FLUXJM1[E:1874],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1875],FLUXJM1[E:1875],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1876],FLUXJM1[E:1876],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1877],FLUXJM1[E:1877],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1878],FLUXJM1[E:1878],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1879],FLUXJM1[E:1879],0.)
SCULBR1 = SCULBR1 + IFGT0(FLUXJM1[E:1880],FLUXJM1[E:1880],0.)
!
!MASS FLUXES INTO MB139 SOUTH MARKER BED
!
SMB139S1 = IFGT0(-FLUXJM1[E:278],-FLUXJM1[E:278],0.)
SMB139S1 = SMB139S1 + IFGT0(FLUXJM1[E:1246],FLUXJM1[E:1246],0.)
SMB139S1 = SMB139S1 + IFGT0(-FLUXIM1[E:1247],-FLUXIM1[E:1247],0.)
SMB139S1 = SMB139S1 + IFGT0(FLUXIM1[E:1246],FLUXIM1[E:1246],0.)
!
!MASS FLUXES INTO MB139 NORTH MARKER BED
!
SMB139N1 = IFGT0(-FLUXJM1[E:421],-FLUXJM1[E:421],0.)
SMB139N1 = SMB139N1 + IFGT0(FLUXJM1[E:1283],FLUXJM1[E:1283],0.)
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SMB139N1 = SMB139N1 + IFGT0(FLUXIM1[E:1283],FLUXIM1[E:1283],0.)
SMB139N1 = SMB139N1 + IFGT0(-FLUXIM1[E:1284],-FLUXIM1[E:1284],0.)
!
!
!MASS FLUXES INTO SOUTH MBAAB MARKER BED
!
SMBABS1 = IFGT0(-FLUXJM1[E:548],-FLUXJM1[E:548],0.)
SMBABS1 = SMBABS1 + IFGT0(FLUXJM1[E:1295],FLUXJM1[E:1295],0.)
SMBABS1 = SMBABS1 + IFGT0(FLUXIM1[E:1295],FLUXIM1[E:1295],0.)
SMBABS1 = SMBABS1 + IFGT0(-FLUXIM1[E:1296],-FLUXIM1[E:1296],0.)
!
!MASS FLUXES INTO NORTH MBAAB MARKER BED
!
SMBABN1 = IFGT0(-FLUXJM1[E:603],-FLUXJM1[E:603],0.)
SMBABN1 = SMBABN1 + IFGT0(FLUXJM1[E:1332],FLUXJM1[E:1332],0.)
SMBABN1 = SMBABN1 + IFGT0(FLUXIM1[E:1332],FLUXIM1[E:1332],0.)
SMBABN1 = SMBABN1 + IFGT0(-FLUXIM1[E:1333],-FLUXIM1[E:1333],0.)
!
!MASS FLUXES INTO SOUTH MB138 MARKER BED
!
SMB138S1 = IFGT0(-FLUXJM1[E:638],-FLUXJM1[E:638],0.)
SMB138S1 = SMB138S1 + IFGT0(FLUXJM1[E:1344],FLUXJM1[E:1344],0.)
SMB138S1 = SMB138S1 + IFGT0(FLUXIM1[E:1344],FLUXIM1[E:1344],0.)
SMB138S1 = SMB138S1 + IFGT0(-FLUXIM1[E:1345],-FLUXIM1[E:1345],0.)
!
!MASS FLUXES INTO NORTH MB139 MARKER BED
!
SMB138N1 = IFGT0(-FLUXJM1[E:945],-FLUXJM1[E:945],0.)
SMB138N1 = SMB138N1 + IFGT0(FLUXJM1[E:1400],FLUXJM1[E:1400],0.)
SMB138N1 = SMB138N1 + IFGT0(FLUXIM1[E:1400],FLUXIM1[E:1400],0.)
SMB138N1 = SMB138N1 + IFGT0(-FLUXIM1[E:1401],-FLUXIM1[E:1401],0.)
!
!POINTS OF INTEREST
!
SHUP1 = IFGT0(FLUXJM1[E:1489],FLUXJM1[E:1489],0.)
BHUP1 = IFGT0(FLUXJM1[E:1845],FLUXJM1[E:1845],0.)
SURFBH1 = IFGT0(FLUXJM1[E:2155],FLUXJM1[E:2155],0.)
SURFSH1 = IFGT0(FLUXJM1[E:1496],FLUXJM1[E:1496],0.)
!
!MASS FLUXES REACHING BOREHOLE IN CULEBRA
!BOREHOLE COMMENTED OUT FOR SCENARIO 1 (UNDISTURBED SCENARIO)
!T.Lowry 4-18-03
!SBHM1   = BHUP1 + IFGT0(-FLUXJM1[E:2155],-FLUXJM1[E:2155],0.)
!SBHM1   = SBHM1 + IFGT0(FLUXIM1[E:1845],FLUXIM1[E:1845],0.)
!SBHM1   = SBHM1 + IFGT0(-FLUXIM1[E:1846],-FLUXIM1[E:1846],0.)
!SBHM1   = SBHM1 + IFGT0(FLUXIM1[E:1711],FLUXIM1[E:1711],0.)
!SBHM1   = SBHM1 + IFGT0(-FLUXIM1[E:1712],-FLUXIM1[E:1712],0.)
!SBHM1   = SBHM1 + IFGT0(FLUXIM1[E:1912],FLUXIM1[E:1912],0.)
!SBHM1   = SBHM1 + IFGT0(-FLUXIM1[E:1913],-FLUXIM1[E:1913],0.)
!SBHM1   = SBHM1 + IFGT0(FLUXIM1[E:1778],FLUXIM1[E:1778],0.)
!SBHM1   = SBHM1 + IFGT0(-FLUXIM1[E:1779],-FLUXIM1[E:1779],0.)
!SBHM1   = SBHM1 + IFGT0(FLUXIM1[E:1979],FLUXIM1[E:1979],0.)
!SBHM1   = SBHM1 + IFGT0(-FLUXIM1[E:1980],-FLUXIM1[E:1980],0.)
!SBHM1   = SBHM1 + IFGT0(FLUXIM1[E:2021],FLUXIM1[E:2021],0.)
!SBHM1   = SBHM1 + IFGT0(-FLUXIM1[E:2022],-FLUXIM1[E:2022],0.)
!SBHM1   = SBHM1 + IFGT0(FLUXIM1[E:2113],FLUXIM1[E:2113],0.)
!SBHM1   = SBHM1 + IFGT0(-FLUXIM1[E:2114],-FLUXIM1[E:2114],0.)
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!
!MASS FLUXES REACHING SHAFT IN CULEBRA
!
SSHM1   = SHUP1 + IFGT0(-FLUXJM1[E:1496],-FLUXJM1[E:1496],0.)
SSHM1   = SSHM1 + IFGT0(FLUXIM1[E:1489],FLUXIM1[E:1489],0.)
SSHM1   = SSHM1 + IFGT0(-FLUXIM1[E:1862],-FLUXIM1[E:1862],0.)
SSHM1   = SSHM1 + IFGT0(FLUXIM1[E:1490],FLUXIM1[E:1490],0.)
SSHM1   = SSHM1 + IFGT0(-FLUXIM1[E:1728],-FLUXIM1[E:1728],0.)
SSHM1   = SSHM1 + IFGT0(FLUXIM1[E:1491],FLUXIM1[E:1491],0.)
SSHM1   = SSHM1 + IFGT0(-FLUXIM1[E:1929],-FLUXIM1[E:1929],0.)
SSHM1   = SSHM1 + IFGT0(FLUXIM1[E:1492],FLUXIM1[E:1492],0.)
SSHM1   = SSHM1 + IFGT0(-FLUXIM1[E:1795],-FLUXIM1[E:1795],0.)
SSHM1   = SSHM1 + IFGT0(FLUXIM1[E:1493],FLUXIM1[E:1493],0.)
SSHM1   = SSHM1 + IFGT0(-FLUXIM1[E:2038],-FLUXIM1[E:2038],0.)
SSHM1   = SSHM1 + IFGT0(FLUXIM1[E:1494],FLUXIM1[E:1494],0.)
SSHM1   = SSHM1 + IFGT0(-FLUXIM1[E:2063],-FLUXIM1[E:2063],0.)
SSHM1   = SSHM1 + IFGT0(FLUXIM1[E:1495],FLUXIM1[E:1495],0.)
SSHM1   = SSHM1 + IFGT0(-FLUXIM1[E:2172],-FLUXIM1[E:2172],0.)
!
!MASS FLUXES REACHING SALADO UPPER BOUNDARY
!
SSALAD1 = IFGT0(FLUXJM1[E:885],FLUXJM1[E:885],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:886],FLUXJM1[E:886],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:887],FLUXJM1[E:887],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:888],FLUXJM1[E:888],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:889],FLUXJM1[E:889],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:890],FLUXJM1[E:890],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:891],FLUXJM1[E:891],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:892],FLUXJM1[E:892],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:893],FLUXJM1[E:893],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:894],FLUXJM1[E:894],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:895],FLUXJM1[E:895],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:896],FLUXJM1[E:896],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:897],FLUXJM1[E:897],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:898],FLUXJM1[E:898],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:899],FLUXJM1[E:899],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:900],FLUXJM1[E:900],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:901],FLUXJM1[E:901],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:902],FLUXJM1[E:902],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:903],FLUXJM1[E:903],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:904],FLUXJM1[E:904],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:905],FLUXJM1[E:905],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:906],FLUXJM1[E:906],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:907],FLUXJM1[E:907],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:908],FLUXJM1[E:908],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:909],FLUXJM1[E:909],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:910],FLUXJM1[E:910],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:911],FLUXJM1[E:911],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:912],FLUXJM1[E:912],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:913],FLUXJM1[E:913],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:914],FLUXJM1[E:914],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:915],FLUXJM1[E:915],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:916],FLUXJM1[E:916],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:917],FLUXJM1[E:917],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:918],FLUXJM1[E:918],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:919],FLUXJM1[E:919],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:920],FLUXJM1[E:920],0.)
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SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:921],FLUXJM1[E:921],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:922],FLUXJM1[E:922],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:923],FLUXJM1[E:923],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:924],FLUXJM1[E:924],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:925],FLUXJM1[E:925],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:926],FLUXJM1[E:926],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1503],FLUXJM1[E:1503],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1077],FLUXJM1[E:1077],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1078],FLUXJM1[E:1078],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1079],FLUXJM1[E:1079],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1080],FLUXJM1[E:1080],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1081],FLUXJM1[E:1081],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1082],FLUXJM1[E:1082],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1083],FLUXJM1[E:1083],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1084],FLUXJM1[E:1084],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1085],FLUXJM1[E:1085],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1086],FLUXJM1[E:1086],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1087],FLUXJM1[E:1087],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1088],FLUXJM1[E:1088],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1089],FLUXJM1[E:1089],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1090],FLUXJM1[E:1090],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1091],FLUXJM1[E:1091],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1092],FLUXJM1[E:1092],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1093],FLUXJM1[E:1093],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1094],FLUXJM1[E:1094],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1095],FLUXJM1[E:1095],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1096],FLUXJM1[E:1096],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1097],FLUXJM1[E:1097],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1098],FLUXJM1[E:1098],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1099],FLUXJM1[E:1099],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1100],FLUXJM1[E:1100],0.)
SSALAD1 = SSALAD1 + IFGT0(FLUXJM1[E:1101],FLUXJM1[E:1101],0.)
!
! INTEGRATION OF MASSES
!
SWASTE1C  = intright(SWASTE1)
SMB39S1C  = iflt0(intright(SMB139S1)-1.e-7,0.,intright(SMB139S1))
SMBABS1C  = iflt0(intright(SMBABS1)-1.e-7,0.,intright(SMBABS1))
SMB38N1C  = iflt0(intright(SMB138N1)-1.e-7,0.,intright(SMB138N1))
SMB38S1C  = iflt0(intright(SMB138S1)-1.e-7,0.,intright(SMB138S1))
SMB39N1C  = iflt0(intright(SMB139N1)-1.e-7,0.,intright(SMB139N1))
SMBABN1C  = iflt0(intright(SMBABN1)-1.e-7,0.,intright(SMBABN1))
SCULBR1C  = iflt0(intright(SCULBR1)-1.e-7,0.,intright(SCULBR1))
SHUP1C    = iflt0(intright(SHUP1)-1.e-7,0.,intright(SHUP1))
SURFSH1C  = iflt0(intright(SURFSH1)-1.e-7,0.,intright(SURFSH1))
SSHM1C    = iflt0(intright(SSHM1)-1.e-7,0.,intright(SSHM1))
BHUP1C    = iflt0(intright(BHUP1)-1.e-7,0.,intright(BHUP1))
SURFBH1C  = iflt0(intright(SURFBH1)-1.e-7,0.,intright(SURFBH1))
!SBHM1C    = iflt0(intright(SBHM1)-1.e-7,0.,intright(SBHM1))
SSALAD1C  = intright(SSALAD1)
!
DELETE ATTRIBUTE, PROPERTY, HISTORY, ELEMENT, NODAL
!
END
$
```

F.3 SUMMATION FILE FOR NUTS

```
$ type sum_nut_cra1_scn_r1_s1.inp
*INPUT FILES
     DIR = PAWORK:[ANALYSIS.CRA1.NUT.SCN.DATA.R1S1]
     TEMPLATE  = ALG_NUT_CRA1_SCN_R1_S1_V%%%
     TYPE      = CDB
*VECTORS
     ID     = %
     VECTOR = 1 TO 100
*TIMES
     READ   = SECONDS
     INPUT  = YEARS
     OUTPUT = YEARS

     TIMES  = 10000
*ITEM
     TYPE   = GLOBAL
     NAME   =
SWASTE1C,SMB39S1C,SMBABS1C,SMB38N1C,SMB38S1C,SMB39N1C,SMBABN1C,SC
ULBR1C,SHUP1C,SURFSH1C,SSHM1C,BHUP1C,SURFBH1C,SSALAD1C

*OUTPUT
     DRIVER = EXCEL
     WRITE  = TIME VS ITEM
     NAME   = SUM_NUT_CRA1_SCN_R1_S1.DAT
```

F.4 NUTS INPUT FILE, UNDISTURBED SCENARIO

```
$ type nut_cra1_iso_r1_s1.inp
** NUTS TITLE **
'NUTS 2.05A RAD. TRANSPORT FOR CRA1 R1S1 (UNDISTURBED SCENARIO)'
** 1.# OF SITES,# OF MATERIAL,(2.SITE NAME,# COMP. TO BE MODELED)1,..,NSITES
**
1,30
'WIPP_SITE'   5
**(1. SITE, 2.COMP., DAUGHTER, PARENT, GROUP NAMES)1,..,NSITES **
'WIPP_SITE'
'AM241L'  'NONE'    'NONE'    'AM241L'
'PU239L'  'NONE'    'NONE'    'PU239L'
'PU238L'  'U234L'   'NONE'    'PU238L'
'U234L'   'TH230L'  'PU238L'  'U234L'
'TH230L'  'TH230D'  'U234L'   'TH230L'
** 1.# OF ELEMENT,(2.ELEM. NAME, TEMP. DEPEND., TABLE LOOK-UP)1,..,NELEMENT
**
5
'AM241L'   .FALSE.  .FALSE.
'PU239L'    .FALSE.  .FALSE.
'PU238L'   .FALSE.  .FALSE.
'U234L'    .FALSE.  .FALSE.
'TH230L'   .FALSE.  .FALSE.
** COLLOIDAL TRANSPORT FLAG (T/F) **
.FALSE.
** PH DEPENDENT SOLUBILITY(IS PH REQUIRED (Y/N)) **
'N'
** ORDER OF THE METHOD **
```

```
1
** DEGREE OF IMPLICITNESS **
1.D0
**  PRECIPITATE IMPLICITNESS; 1.T/F,IF IMPLICIT 2.# OF ITERATION,TOL. **
.TRUE.
40   1.D-6
** IS MATRIX ADSORPTION REQUIRED (Y/N) **
'N'
** DO YOU HAVE DISPERSION IN THE MATRIX (Y/N) **
'N'
** DOES MATRIX HAVE SYMMETRIC DISPERSION (T/F): ANSWER IF DISPERSION IS Y **
** DO YOU HAVE INJECTION/PRODUCTION IN THE MATRIX (Y/N) **
'N'
** DO YOU HAVE DIRICHLET B.CS. IN THE MATRIX (F/T) **
.FALSE.
** IS CONCENTRATION INITIALIZED MANUALLY IN THE MATRIX (F/T) **
.FALSE.
** OPEN NUTS UNDISTURBED CDB FOR INTRUSION TIME OTHER THAN 350,1000 YRS **
.FALSE.
** PRINT FLAGS OF MATRIX VARIABLES IN A BINARY FILE **
0,0,0,0,0,0,1,1,1,0,0,0,0,1
** TEMP. DEPEND. OF Kd (ENTER DATA IF ADSORP. IS (Y) AND TEMP. DEPEND.) **
** PRINTING FREQUENCY IN A BINARY FILE **
1,1.D12
** DO YOU HAVE EXTERNAL NUCLIDE SOURCE? (T/F) **
.FALSE.
** MINIMUM LIMITS OF TIME TO BE SET IF ZERO ENCOUNTERED **
1.D-18
** INTRUSION TIME, ITERPOLATED INTRUSION TIME, TOLERANCE **
*** END MATERIAL MAP AND START NUCLIDES PROPERTIES ***
** IF NOT TEMP. DEPEND. (ELEMENT NAME, SOLUBILITY LIMIT) 1,..,NELEMENT **
** (COMP. NAME, MOL.(ATOMIC) WT., INITIAL INVENTS., HALF LIFE)1,..,NUCLIDE **
** GROUND WATER PH INPUT **
** STANDARD BR. DENS. IF NOT BRAGFLO RUN (READ ASCII FILE FOR FLUX FIELD) **
** MOLECULAR DIFFUSION INPUT **
** ROCK DENSITY INPUT **
** WASTE MATRIX INPUT (LOCATION OF THE WASTE) **
5
'AM241L'   1    1
'PU239L'   2    1
'PU238L'   3    1
'U234L'    4    1
'TH230L'   5    1
*** (1.SITE NAME, NUMBER OF GRIDS IN THE SITE 2.INDECES)1...NSITES ***
'WIPP_SITE' 33
 23,10,1   24,10,1   25,10,1   26,10,1   27,10,1   28,10,1   29,10,1
32,10,1   33,10,1   35,10,1   37,10,1
 23,11,1   24,11,1   25,11,1   26,11,1   27,11,1   28,11,1   29,11,1
32,11,1   33,11,1   35,11,1   37,11,1
 23,12,1   24,12,1   25,12,1   26,12,1   27,12,1   28,12,1   29,12,1
32,12,1   33,12,1   35,12,1   37,12,1
** MATRIX ADSORPTION INPUT **
** MATRIX DISPERSION INPUT **
** MATRIX SOURCE INPUT (INJECTED NUCLIDES IF ANY) **
** MATRIX DIR. B.CS. INPUT (REP.='GENERAL',ANYWHERE= 'NOT_GENERAL') **
** TIME DEPENDENT SOURCE IN THE MATRIX **
** MATRIX CONCENTRATION INITIALIZATION **
```

```
** COLLOID TRANSPORT VELOCITY SCALING FACTORS IN THE MATRIX **
$
```

F.5 ALGEBRA FILE, UNDISTURBED SCENARIO

```
$ type alg_nut_cra1_post_s1.inp
!============================================================================
!
! ALGEBRA file for post-processing NUTS (non-screening runs) output
!
!
! Author:  Joel D. Miller, SNL Org. 9363
! Note:  The EPA calculations use the same mesh for S1 to S5, therefore, the
!       difference in element numbering in Castile and the layer above it
!       is not exist any more. For this version the only difference between
S1
!       and S4-S5 is additional fluxes to report in S1 around the Marker
beds.
!                                                     A.A. Shinta
!
! 20 Dec 02  Modified element and node numbers for the TBM calculation
!            Cliff Hansen
!
! 14 May 03  Modified element numbers for the CRA1 calculation and
uncommented
!            parameters 106-116 to include flux in shaft (not present in TBM)
!            Thomas Lowry
!============================================================================
!
! Eliminate excess output
!
DELETE ALL
!
GRIDVOL = DEL_X * DEL_Y * THICK
!
!****************************************************************************
!****************************************************************************
!
! Activities (integrated fluxes) across the repository boundary (EPA units)
!
!   Param 001: Am-241, activity across repository boundary --> EPA1_REP
!   Param 002: Pu-239, activity across repository boundary --> EPA2_REP
!   Param 003: Pu-238, activity across repository boundary --> EPA3_REP
!   Param 004: U--234, activity across repository boundary --> EPA4_REP
!   Param 005: Th-230, activity across repository boundary --> EPA5_REP
!   Param 006: Total activity across repository boundary ----> EPAT_REP
!
!**************************************
!
! Americium-241 (Am-241) across repository boundary
!
!   Accumulate x-direction outward fluxes from left side of repository
!
FLX1_REP =            IFLT0(FLUXIM1[E:1407],-1.0*FLUXIM1[E:1407],0.0)
FLX1_REP = FLX1_REP + IFLT0(FLUXIM1[E:1414],-1.0*FLUXIM1[E:1414],0.0)
FLX1_REP = FLX1_REP + IFLT0(FLUXIM1[E:1421],-1.0*FLUXIM1[E:1421],0.0)
```

```
!
!   Add x-direction outward flux contributions from right side
!
FLX1_REP = FLX1_REP + IFGT0(FLUXIM1[E:1446],FLUXIM1[E:1446],0.0)
FLX1_REP = FLX1_REP + IFGT0(FLUXIM1[E:1443],FLUXIM1[E:1443],0.0)
FLX1_REP = FLX1_REP + IFGT0(FLUXIM1[E:1440],FLUXIM1[E:1440],0.0)
!
!   Add y-direction outward fluxes from bottom of repository
!
FLX1_REP = FLX1_REP + IFLT0(FLUXJM1[E:1407],-1.0*FLUXJM1[E:1407],0.0)
FLX1_REP = FLX1_REP + IFLT0(FLUXJM1[E:1408],-1.0*FLUXJM1[E:1408],0.0)
FLX1_REP = FLX1_REP + IFLT0(FLUXJM1[E:1409],-1.0*FLUXJM1[E:1409],0.0)
FLX1_REP = FLX1_REP + IFLT0(FLUXJM1[E:1410],-1.0*FLUXJM1[E:1410],0.0)
FLX1_REP = FLX1_REP + IFLT0(FLUXJM1[E:1411],-1.0*FLUXJM1[E:1411],0.0)
FLX1_REP = FLX1_REP + IFLT0(FLUXJM1[E:1412],-1.0*FLUXJM1[E:1412],0.0)
FLX1_REP = FLX1_REP + IFLT0(FLUXJM1[E:1413],-1.0*FLUXJM1[E:1413],0.0)
FLX1_REP = FLX1_REP + IFLT0(FLUXJM1[E:1455],-1.0*FLUXJM1[E:1455],0.0)
FLX1_REP = FLX1_REP + IFLT0(FLUXJM1[E:1466],-1.0*FLUXJM1[E:1466],0.0)
FLX1_REP = FLX1_REP + IFLT0(FLUXJM1[E:1428],-1.0*FLUXJM1[E:1428],0.0)
FLX1_REP = FLX1_REP + IFLT0(FLUXJM1[E:1429],-1.0*FLUXJM1[E:1429],0.0)
FLX1_REP = FLX1_REP + IFLT0(FLUXJM1[E:1458],-1.0*FLUXJM1[E:1458],0.0)
FLX1_REP = FLX1_REP + IFLT0(FLUXJM1[E:1472],-1.0*FLUXJM1[E:1472],0.0)
FLX1_REP = FLX1_REP + IFLT0(FLUXJM1[E:1434],-1.0*FLUXJM1[E:1434],0.0)
FLX1_REP = FLX1_REP + IFLT0(FLUXJM1[E:1435],-1.0*FLUXJM1[E:1435],0.0)
FLX1_REP = FLX1_REP + IFLT0(FLUXJM1[E:1461],-1.0*FLUXJM1[E:1461],0.0)
FLX1_REP = FLX1_REP + IFLT0(FLUXJM1[E:1478],-1.0*FLUXJM1[E:1478],0.0)
!
!   Add Y-direction outward flux contributions from top side
!
FLX1_REP = FLX1_REP + IFGT0(FLUXJM1[E:1165],FLUXJM1[E:1165],0.0)
FLX1_REP = FLX1_REP + IFGT0(FLUXJM1[E:1166],FLUXJM1[E:1166],0.0)
FLX1_REP = FLX1_REP + IFGT0(FLUXJM1[E:1167],FLUXJM1[E:1167],0.0)
FLX1_REP = FLX1_REP + IFGT0(FLUXJM1[E:1168],FLUXJM1[E:1168],0.0)
FLX1_REP = FLX1_REP + IFGT0(FLUXJM1[E:1169],FLUXJM1[E:1169],0.0)
FLX1_REP = FLX1_REP + IFGT0(FLUXJM1[E:1170],FLUXJM1[E:1170],0.0)
FLX1_REP = FLX1_REP + IFGT0(FLUXJM1[E:1171],FLUXJM1[E:1171],0.0)
FLX1_REP = FLX1_REP + IFGT0(FLUXJM1[E:1172],FLUXJM1[E:1172],0.0)
FLX1_REP = FLX1_REP + IFGT0(FLUXJM1[E:1469],FLUXJM1[E:1469],0.0)
FLX1_REP = FLX1_REP + IFGT0(FLUXJM1[E:1197],FLUXJM1[E:1197],0.0)
FLX1_REP = FLX1_REP + IFGT0(FLUXJM1[E:1198],FLUXJM1[E:1198],0.0)
FLX1_REP = FLX1_REP + IFGT0(FLUXJM1[E:1199],FLUXJM1[E:1199],0.0)
FLX1_REP = FLX1_REP + IFGT0(FLUXJM1[E:1475],FLUXJM1[E:1475],0.0)
FLX1_REP = FLX1_REP + IFGT0(FLUXJM1[E:1209],FLUXJM1[E:1209],0.0)
FLX1_REP = FLX1_REP + IFGT0(FLUXJM1[E:1210],FLUXJM1[E:1210],0.0)
FLX1_REP = FLX1_REP + IFGT0(FLUXJM1[E:1211],FLUXJM1[E:1211],0.0)
FLX1_REP = FLX1_REP + IFGT0(FLUXJM1[E:1481],FLUXJM1[E:1481],0.0)
!
!   Integrate over time to get activity (Curies)
!
RAD1_REP = INTRIGHT(FLX1_REP)
!
!**************************************
!
! Plutonium-239 (Pu-239) across repository boundary
!
!   Accumulate x-direction outward fluxes from left side of repository
!
```

```
FLX2_REP =            IFLT0(FLUXIM2[E:1407],-1.0*FLUXIM2[E:1407],0.0)
FLX2_REP = FLX2_REP + IFLT0(FLUXIM2[E:1414],-1.0*FLUXIM2[E:1414],0.0)
FLX2_REP = FLX2_REP + IFLT0(FLUXIM2[E:1421],-1.0*FLUXIM2[E:1421],0.0)
!
!   Add x-direction outward flux contributions from right side
!
FLX2_REP = FLX2_REP + IFGT0(FLUXIM2[E:1446],FLUXIM2[E:1446],0.0)
FLX2_REP = FLX2_REP + IFGT0(FLUXIM2[E:1443],FLUXIM2[E:1443],0.0)
FLX2_REP = FLX2_REP + IFGT0(FLUXIM2[E:1440],FLUXIM2[E:1440],0.0)
!
!   Add y-direction outward fluxes from bottom of repository
!
FLX2_REP = FLX2_REP + IFLT0(FLUXJM2[E:1407],-1.0*FLUXJM2[E:1407],0.0)
FLX2_REP = FLX2_REP + IFLT0(FLUXJM2[E:1408],-1.0*FLUXJM2[E:1408],0.0)
FLX2_REP = FLX2_REP + IFLT0(FLUXJM2[E:1409],-1.0*FLUXJM2[E:1409],0.0)
FLX2_REP = FLX2_REP + IFLT0(FLUXJM2[E:1410],-1.0*FLUXJM2[E:1410],0.0)
FLX2_REP = FLX2_REP + IFLT0(FLUXJM2[E:1411],-1.0*FLUXJM2[E:1411],0.0)
FLX2_REP = FLX2_REP + IFLT0(FLUXJM2[E:1412],-1.0*FLUXJM2[E:1412],0.0)
FLX2_REP = FLX2_REP + IFLT0(FLUXJM2[E:1413],-1.0*FLUXJM2[E:1413],0.0)
FLX2_REP = FLX2_REP + IFLT0(FLUXJM2[E:1455],-1.0*FLUXJM2[E:1455],0.0)
FLX2_REP = FLX2_REP + IFLT0(FLUXJM2[E:1466],-1.0*FLUXJM2[E:1466],0.0)
FLX2_REP = FLX2_REP + IFLT0(FLUXJM2[E:1428],-1.0*FLUXJM2[E:1428],0.0)
FLX2_REP = FLX2_REP + IFLT0(FLUXJM2[E:1429],-1.0*FLUXJM2[E:1429],0.0)
FLX2_REP = FLX2_REP + IFLT0(FLUXJM2[E:1458],-1.0*FLUXJM2[E:1458],0.0)
FLX2_REP = FLX2_REP + IFLT0(FLUXJM2[E:1472],-1.0*FLUXJM2[E:1472],0.0)
FLX2_REP = FLX2_REP + IFLT0(FLUXJM2[E:1434],-1.0*FLUXJM2[E:1434],0.0)
FLX2_REP = FLX2_REP + IFLT0(FLUXJM2[E:1435],-1.0*FLUXJM2[E:1435],0.0)
FLX2_REP = FLX2_REP + IFLT0(FLUXJM2[E:1461],-1.0*FLUXJM2[E:1461],0.0)
FLX2_REP = FLX2_REP + IFLT0(FLUXJM2[E:1478],-1.0*FLUXJM2[E:1478],0.0)
!
!   Add Y-direction outward flux contributions from top side
!
FLX2_REP = FLX2_REP + IFGT0(FLUXJM2[E:1165],FLUXJM2[E:1165],0.0)
FLX2_REP = FLX2_REP + IFGT0(FLUXJM2[E:1166],FLUXJM2[E:1166],0.0)
FLX2_REP = FLX2_REP + IFGT0(FLUXJM2[E:1167],FLUXJM2[E:1167],0.0)
FLX2_REP = FLX2_REP + IFGT0(FLUXJM2[E:1168],FLUXJM2[E:1168],0.0)
FLX2_REP = FLX2_REP + IFGT0(FLUXJM2[E:1169],FLUXJM2[E:1169],0.0)
FLX2_REP = FLX2_REP + IFGT0(FLUXJM2[E:1170],FLUXJM2[E:1170],0.0)
FLX2_REP = FLX2_REP + IFGT0(FLUXJM2[E:1171],FLUXJM2[E:1171],0.0)
FLX2_REP = FLX2_REP + IFGT0(FLUXJM2[E:1172],FLUXJM2[E:1172],0.0)
FLX2_REP = FLX2_REP + IFGT0(FLUXJM2[E:1469],FLUXJM2[E:1469],0.0)
FLX2_REP = FLX2_REP + IFGT0(FLUXJM2[E:1197],FLUXJM2[E:1197],0.0)
FLX2_REP = FLX2_REP + IFGT0(FLUXJM2[E:1198],FLUXJM2[E:1198],0.0)
FLX2_REP = FLX2_REP + IFGT0(FLUXJM2[E:1199],FLUXJM2[E:1199],0.0)
FLX2_REP = FLX2_REP + IFGT0(FLUXJM2[E:1475],FLUXJM2[E:1475],0.0)
FLX2_REP = FLX2_REP + IFGT0(FLUXJM2[E:1209],FLUXJM2[E:1209],0.0)
FLX2_REP = FLX2_REP + IFGT0(FLUXJM2[E:1210],FLUXJM2[E:1210],0.0)
FLX2_REP = FLX2_REP + IFGT0(FLUXJM2[E:1211],FLUXJM2[E:1211],0.0)
FLX2_REP = FLX2_REP + IFGT0(FLUXJM2[E:1481],FLUXJM2[E:1481],0.0)
!
!   Integrate over time to get activity (Curies)
!
RAD2_REP = INTRIGHT(FLX2_REP)
!
!*************************************
!
! Plutonium-238 (Pu-238) across repository boundary
```

```
!
!   Accumulate x-direction outward fluxes from left side of repository
!
FLX3_REP =              IFLT0(FLUXIM3[E:1407],-1.0*FLUXIM3[E:1407],0.0)
FLX3_REP = FLX3_REP + IFLT0(FLUXIM3[E:1414],-1.0*FLUXIM3[E:1414],0.0)
FLX3_REP = FLX3_REP + IFLT0(FLUXIM3[E:1421],-1.0*FLUXIM3[E:1421],0.0)
!
!   Add x-direction outward flux contributions from right side
!
FLX3_REP = FLX3_REP + IFGT0(FLUXIM3[E:1446],FLUXIM3[E:1446],0.0)
FLX3_REP = FLX3_REP + IFGT0(FLUXIM3[E:1443],FLUXIM3[E:1443],0.0)
FLX3_REP = FLX3_REP + IFGT0(FLUXIM3[E:1440],FLUXIM3[E:1440],0.0)
!
!   Accumulate y-direction outward fluxes from bottom of repository
!
FLX3_REP = FLX3_REP + IFLT0(FLUXJM3[E:1407],-1.0*FLUXJM3[E:1407],0.0)
FLX3_REP = FLX3_REP + IFLT0(FLUXJM3[E:1408],-1.0*FLUXJM3[E:1408],0.0)
FLX3_REP = FLX3_REP + IFLT0(FLUXJM3[E:1409],-1.0*FLUXJM3[E:1409],0.0)
FLX3_REP = FLX3_REP + IFLT0(FLUXJM3[E:1410],-1.0*FLUXJM3[E:1410],0.0)
FLX3_REP = FLX3_REP + IFLT0(FLUXJM3[E:1411],-1.0*FLUXJM3[E:1411],0.0)
FLX3_REP = FLX3_REP + IFLT0(FLUXJM3[E:1412],-1.0*FLUXJM3[E:1412],0.0)
FLX3_REP = FLX3_REP + IFLT0(FLUXJM3[E:1413],-1.0*FLUXJM3[E:1413],0.0)
FLX3_REP = FLX3_REP + IFLT0(FLUXJM3[E:1455],-1.0*FLUXJM3[E:1455],0.0)
FLX3_REP = FLX3_REP + IFLT0(FLUXJM3[E:1466],-1.0*FLUXJM3[E:1466],0.0)
FLX3_REP = FLX3_REP + IFLT0(FLUXJM3[E:1428],-1.0*FLUXJM3[E:1428],0.0)
FLX3_REP = FLX3_REP + IFLT0(FLUXJM3[E:1429],-1.0*FLUXJM3[E:1429],0.0)
FLX3_REP = FLX3_REP + IFLT0(FLUXJM3[E:1458],-1.0*FLUXJM3[E:1458],0.0)
FLX3_REP = FLX3_REP + IFLT0(FLUXJM3[E:1472],-1.0*FLUXJM3[E:1472],0.0)
FLX3_REP = FLX3_REP + IFLT0(FLUXJM3[E:1434],-1.0*FLUXJM3[E:1434],0.0)
FLX3_REP = FLX3_REP + IFLT0(FLUXJM3[E:1435],-1.0*FLUXJM3[E:1435],0.0)
FLX3_REP = FLX3_REP + IFLT0(FLUXJM3[E:1461],-1.0*FLUXJM3[E:1461],0.0)
FLX3_REP = FLX3_REP + IFLT0(FLUXJM3[E:1478],-1.0*FLUXJM3[E:1478],0.0)
!
!   Add Y-direction outward flux contributions from top side
!
FLX3_REP = FLX3_REP + IFGT0(FLUXJM3[E:1165],FLUXJM3[E:1165],0.0)
FLX3_REP = FLX3_REP + IFGT0(FLUXJM3[E:1166],FLUXJM3[E:1166],0.0)
FLX3_REP = FLX3_REP + IFGT0(FLUXJM3[E:1167],FLUXJM3[E:1167],0.0)
FLX3_REP = FLX3_REP + IFGT0(FLUXJM3[E:1168],FLUXJM3[E:1168],0.0)
FLX3_REP = FLX3_REP + IFGT0(FLUXJM3[E:1169],FLUXJM3[E:1169],0.0)
FLX3_REP = FLX3_REP + IFGT0(FLUXJM3[E:1170],FLUXJM3[E:1170],0.0)
FLX3_REP = FLX3_REP + IFGT0(FLUXJM3[E:1171],FLUXJM3[E:1171],0.0)
FLX3_REP = FLX3_REP + IFGT0(FLUXJM3[E:1172],FLUXJM3[E:1172],0.0)
FLX3_REP = FLX3_REP + IFGT0(FLUXJM3[E:1469],FLUXJM3[E:1469],0.0)
FLX3_REP = FLX3_REP + IFGT0(FLUXJM3[E:1197],FLUXJM3[E:1197],0.0)
FLX3_REP = FLX3_REP + IFGT0(FLUXJM3[E:1198],FLUXJM3[E:1198],0.0)
FLX3_REP = FLX3_REP + IFGT0(FLUXJM3[E:1199],FLUXJM3[E:1199],0.0)
FLX3_REP = FLX3_REP + IFGT0(FLUXJM3[E:1475],FLUXJM3[E:1475],0.0)
FLX3_REP = FLX3_REP + IFGT0(FLUXJM3[E:1209],FLUXJM3[E:1209],0.0)
FLX3_REP = FLX3_REP + IFGT0(FLUXJM3[E:1210],FLUXJM3[E:1210],0.0)
FLX3_REP = FLX3_REP + IFGT0(FLUXJM3[E:1211],FLUXJM3[E:1211],0.0)
FLX3_REP = FLX3_REP + IFGT0(FLUXJM3[E:1481],FLUXJM3[E:1481],0.0)
!
!   Integrate over time to get activity (Curies)
!
RAD3_REP = INTRIGHT(FLX3_REP)
!
```

```
!*************************************
!
! Uranium-234 (U-234) across repository boundary
!
!   Accumulate x-direction outward fluxes from left side of repository
!
FLX4_REP =            IFLT0(FLUXIM4[E:1407],-1.0*FLUXIM4[E:1407],0.0)
FLX4_REP = FLX4_REP + IFLT0(FLUXIM4[E:1414],-1.0*FLUXIM4[E:1414],0.0)
FLX4_REP = FLX4_REP + IFLT0(FLUXIM4[E:1421],-1.0*FLUXIM4[E:1421],0.0)
!
!   Add x-direction outward flux contributions from right side
!
FLX4_REP = FLX4_REP + IFGT0(FLUXIM4[E:1446],FLUXIM4[E:1446],0.0)
FLX4_REP = FLX4_REP + IFGT0(FLUXIM4[E:1443],FLUXIM4[E:1443],0.0)
FLX4_REP = FLX4_REP + IFGT0(FLUXIM4[E:1440],FLUXIM4[E:1440],0.0)
!
!   Accumulate y-direction outward fluxes from bottom of repository
!
FLX4_REP = FLX4_REP + IFLT0(FLUXJM4[E:1407],-1.0*FLUXJM4[E:1407],0.0)
FLX4_REP = FLX4_REP + IFLT0(FLUXJM4[E:1408],-1.0*FLUXJM4[E:1408],0.0)
FLX4_REP = FLX4_REP + IFLT0(FLUXJM4[E:1409],-1.0*FLUXJM4[E:1409],0.0)
FLX4_REP = FLX4_REP + IFLT0(FLUXJM4[E:1410],-1.0*FLUXJM4[E:1410],0.0)
FLX4_REP = FLX4_REP + IFLT0(FLUXJM4[E:1411],-1.0*FLUXJM4[E:1411],0.0)
FLX4_REP = FLX4_REP + IFLT0(FLUXJM4[E:1412],-1.0*FLUXJM4[E:1412],0.0)
FLX4_REP = FLX4_REP + IFLT0(FLUXJM4[E:1413],-1.0*FLUXJM4[E:1413],0.0)
FLX4_REP = FLX4_REP + IFLT0(FLUXJM4[E:1455],-1.0*FLUXJM4[E:1455],0.0)
FLX4_REP = FLX4_REP + IFLT0(FLUXJM4[E:1466],-1.0*FLUXJM4[E:1466],0.0)
FLX4_REP = FLX4_REP + IFLT0(FLUXJM4[E:1428],-1.0*FLUXJM4[E:1428],0.0)
FLX4_REP = FLX4_REP + IFLT0(FLUXJM4[E:1429],-1.0*FLUXJM4[E:1429],0.0)
FLX4_REP = FLX4_REP + IFLT0(FLUXJM4[E:1458],-1.0*FLUXJM4[E:1458],0.0)
FLX4_REP = FLX4_REP + IFLT0(FLUXJM4[E:1472],-1.0*FLUXJM4[E:1472],0.0)
FLX4_REP = FLX4_REP + IFLT0(FLUXJM4[E:1434],-1.0*FLUXJM4[E:1434],0.0)
FLX4_REP = FLX4_REP + IFLT0(FLUXJM4[E:1435],-1.0*FLUXJM4[E:1435],0.0)
FLX4_REP = FLX4_REP + IFLT0(FLUXJM4[E:1461],-1.0*FLUXJM4[E:1461],0.0)
FLX4_REP = FLX4_REP + IFLT0(FLUXJM4[E:1478],-1.0*FLUXJM4[E:1478],0.0)
!
!   Add Y-direction outward flux contributions from top side
!
FLX4_REP = FLX4_REP + IFGT0(FLUXJM4[E:1165],FLUXJM4[E:1165],0.0)
FLX4_REP = FLX4_REP + IFGT0(FLUXJM4[E:1166],FLUXJM4[E:1166],0.0)
FLX4_REP = FLX4_REP + IFGT0(FLUXJM4[E:1167],FLUXJM4[E:1167],0.0)
FLX4_REP = FLX4_REP + IFGT0(FLUXJM4[E:1168],FLUXJM4[E:1168],0.0)
FLX4_REP = FLX4_REP + IFGT0(FLUXJM4[E:1169],FLUXJM4[E:1169],0.0)
FLX4_REP = FLX4_REP + IFGT0(FLUXJM4[E:1170],FLUXJM4[E:1170],0.0)
FLX4_REP = FLX4_REP + IFGT0(FLUXJM4[E:1171],FLUXJM4[E:1171],0.0)
FLX4_REP = FLX4_REP + IFGT0(FLUXJM4[E:1172],FLUXJM4[E:1172],0.0)
FLX4_REP = FLX4_REP + IFGT0(FLUXJM4[E:1469],FLUXJM4[E:1469],0.0)
FLX4_REP = FLX4_REP + IFGT0(FLUXJM4[E:1197],FLUXJM4[E:1197],0.0)
FLX4_REP = FLX4_REP + IFGT0(FLUXJM4[E:1198],FLUXJM4[E:1198],0.0)
FLX4_REP = FLX4_REP + IFGT0(FLUXJM4[E:1199],FLUXJM4[E:1199],0.0)
FLX4_REP = FLX4_REP + IFGT0(FLUXJM4[E:1475],FLUXJM4[E:1475],0.0)
FLX4_REP = FLX4_REP + IFGT0(FLUXJM4[E:1209],FLUXJM4[E:1209],0.0)
FLX4_REP = FLX4_REP + IFGT0(FLUXJM4[E:1210],FLUXJM4[E:1210],0.0)
FLX4_REP = FLX4_REP + IFGT0(FLUXJM4[E:1211],FLUXJM4[E:1211],0.0)
FLX4_REP = FLX4_REP + IFGT0(FLUXJM4[E:1481],FLUXJM4[E:1481],0.0)
!
!   Integrate over time to get activity (Curies)
```

```
!
RAD4_REP = INTRIGHT(FLX4_REP)
!
!**************************************
!
! Thorium-230 (Th-230) across repository boundary
!
!   Accumulate x-direction outward fluxes from left side of repository
!
FLX5_REP =             IFLT0(FLUXIM5[E:1407],-1.0*FLUXIM5[E:1407],0.0)
FLX5_REP = FLX5_REP + IFLT0(FLUXIM5[E:1414],-1.0*FLUXIM5[E:1414],0.0)
FLX5_REP = FLX5_REP + IFLT0(FLUXIM5[E:1421],-1.0*FLUXIM5[E:1421],0.0)
!
!   Add x-direction outward flux contributions from right side
!
FLX5_REP = FLX5_REP + IFGT0(FLUXIM5[E:1446],FLUXIM5[E:1446],0.0)
FLX5_REP = FLX5_REP + IFGT0(FLUXIM5[E:1443],FLUXIM5[E:1443],0.0)
FLX5_REP = FLX5_REP + IFGT0(FLUXIM5[E:1440],FLUXIM5[E:1440],0.0)
!
!   Accumulate y-direction outward fluxes from bottom of repository
!
FLX5_REP = FLX5_REP + IFLT0(FLUXJM5[E:1407],-1.0*FLUXJM5[E:1407],0.0)
FLX5_REP = FLX5_REP + IFLT0(FLUXJM5[E:1408],-1.0*FLUXJM5[E:1408],0.0)
FLX5_REP = FLX5_REP + IFLT0(FLUXJM5[E:1409],-1.0*FLUXJM5[E:1409],0.0)
FLX5_REP = FLX5_REP + IFLT0(FLUXJM5[E:1410],-1.0*FLUXJM5[E:1410],0.0)
FLX5_REP = FLX5_REP + IFLT0(FLUXJM5[E:1411],-1.0*FLUXJM5[E:1411],0.0)
FLX5_REP = FLX5_REP + IFLT0(FLUXJM5[E:1412],-1.0*FLUXJM5[E:1412],0.0)
FLX5_REP = FLX5_REP + IFLT0(FLUXJM5[E:1413],-1.0*FLUXJM5[E:1413],0.0)
FLX5_REP = FLX5_REP + IFLT0(FLUXJM5[E:1455],-1.0*FLUXJM5[E:1455],0.0)
FLX5_REP = FLX5_REP + IFLT0(FLUXJM5[E:1466],-1.0*FLUXJM5[E:1466],0.0)
FLX5_REP = FLX5_REP + IFLT0(FLUXJM5[E:1428],-1.0*FLUXJM5[E:1428],0.0)
FLX5_REP = FLX5_REP + IFLT0(FLUXJM5[E:1429],-1.0*FLUXJM5[E:1429],0.0)
FLX5_REP = FLX5_REP + IFLT0(FLUXJM5[E:1458],-1.0*FLUXJM5[E:1458],0.0)
FLX5_REP = FLX5_REP + IFLT0(FLUXJM5[E:1472],-1.0*FLUXJM5[E:1472],0.0)
FLX5_REP = FLX5_REP + IFLT0(FLUXJM5[E:1434],-1.0*FLUXJM5[E:1434],0.0)
FLX5_REP = FLX5_REP + IFLT0(FLUXJM5[E:1435],-1.0*FLUXJM5[E:1435],0.0)
FLX5_REP = FLX5_REP + IFLT0(FLUXJM5[E:1461],-1.0*FLUXJM5[E:1461],0.0)
FLX5_REP = FLX5_REP + IFLT0(FLUXJM5[E:1478],-1.0*FLUXJM5[E:1478],0.0)
!
!   Add Y-direction outward flux contributions from top side
!
FLX5_REP = FLX5_REP + IFGT0(FLUXJM5[E:1165],FLUXJM5[E:1165],0.0)
FLX5_REP = FLX5_REP + IFGT0(FLUXJM5[E:1166],FLUXJM5[E:1166],0.0)
FLX5_REP = FLX5_REP + IFGT0(FLUXJM5[E:1167],FLUXJM5[E:1167],0.0)
FLX5_REP = FLX5_REP + IFGT0(FLUXJM5[E:1168],FLUXJM5[E:1168],0.0)
FLX5_REP = FLX5_REP + IFGT0(FLUXJM5[E:1169],FLUXJM5[E:1169],0.0)
FLX5_REP = FLX5_REP + IFGT0(FLUXJM5[E:1170],FLUXJM5[E:1170],0.0)
FLX5_REP = FLX5_REP + IFGT0(FLUXJM5[E:1171],FLUXJM5[E:1171],0.0)
FLX5_REP = FLX5_REP + IFGT0(FLUXJM5[E:1172],FLUXJM5[E:1172],0.0)
FLX5_REP = FLX5_REP + IFGT0(FLUXJM5[E:1469],FLUXJM5[E:1469],0.0)
FLX5_REP = FLX5_REP + IFGT0(FLUXJM5[E:1197],FLUXJM5[E:1197],0.0)
FLX5_REP = FLX5_REP + IFGT0(FLUXJM5[E:1198],FLUXJM5[E:1198],0.0)
FLX5_REP = FLX5_REP + IFGT0(FLUXJM5[E:1199],FLUXJM5[E:1199],0.0)
FLX5_REP = FLX5_REP + IFGT0(FLUXJM5[E:1475],FLUXJM5[E:1475],0.0)
FLX5_REP = FLX5_REP + IFGT0(FLUXJM5[E:1209],FLUXJM5[E:1209],0.0)
FLX5_REP = FLX5_REP + IFGT0(FLUXJM5[E:1210],FLUXJM5[E:1210],0.0)
FLX5_REP = FLX5_REP + IFGT0(FLUXJM5[E:1211],FLUXJM5[E:1211],0.0)
```

```
FLX5_REP = FLX5_REP + IFGT0(FLUXJM5[E:1481],FLUXJM5[E:1481],0.0)
!
!   Integrate over time to get activity (Curies)
!
RAD5_REP = INTRIGHT(FLX5_REP)
!
!***************************************
!
DELETE FLX1_REP, FLX2_REP, FLX3_REP, FLX4_REP, FLX5_REP
!
!***************************************
!
! Convert activities to EPA units and sum to get total
!
!   Conversion factors
!
!     Qi_Ci  = amount of radionuclide i in Curies
!     Qi_EPA = amount of radionuclide i in EPA units
!
!     Qi_Ci*(1/RLi)*(1.0E6_Ci/Total_inventory) = Qi_EPA
!
!     where Total_inventory is the number of Curies of alpha emitters
!           with half lives greater than twenty years placed in repository,
!           and RLi is the EPA release limit for radionuclide i
!
!     Total_inventory = 4.0736E6 Ci
!     RLi (Am, U, Pu) = 100.0    Ci
!     Rli (Th)        = 10.0     Ci
!
!     Thus, for Am, U, and Pu, Qi_EPA = Qi_Ci/407.36
!           for Th,            Qi_EPA = Qi_Ci/40.736
!
!CI_2_EPA = 407.36
!CI_5_EPA = 40.736
!
! CHANGE FROM 4.07 TO 3.44 MJS 22OCT96
!
!CI_2_EPA = 344.0
!CI_5_EPA = 34.4
!
! CHANGE FROM 3.44 TO 2.96 TSL 14MAY03
!
!CI_2_EPA = 296.0
!CI_5_EPA = 29.6
! CHANGE FROM 2.96 TO 2.48 JWG 2SEP 03
!
CI_2_EPA = 248.0
CI_5_EPA = 24.8
!
EPA1_REP = RAD1_REP/CI_2_EPA
EPA2_REP = RAD2_REP/CI_2_EPA
EPA3_REP = RAD3_REP/CI_2_EPA
EPA4_REP = RAD4_REP/CI_2_EPA
EPA5_REP = RAD5_REP/CI_5_EPA
!
EPAT_REP = EPA1_REP + EPA2_REP + EPA3_REP + EPA4_REP + EPA5_REP
!
```

```
! Delete temporary variables
!
DELETE RAD1_REP, RAD2_REP, RAD3_REP, RAD4_REP, RAD5_REP
!
!*****************************************************************************
!*****************************************************************************
!
! Activities (integrated fluxes) into marker beds at repository (EPA units)
!
!   Param 007: Am-241 in marker beds at north repository border ----->
EPA1_MBN
!   Param 008: Pu-239 in marker beds at north repository border ----->
EPA2_MBN
!   Param 009: Pu-238 in marker beds at north repository border ----->
EPA3_MBN
!   Param 010: U--234 in marker beds at north repository border ----->
EPA4_MBN
!   Param 011: Th-230 in marker beds at north repository border ----->
EPA5_MBN
!
!   Param 012: Am-241 in marker beds at south repository border ----->
EPA1_MBS
!   Param 013: Pu-239 in marker beds at south repository border ----->
EPA2_MBS
!   Param 014: Pu-238 in marker beds at south repository border ----->
EPA3_MBS
!   Param 015: U--234 in marker beds at south repository border ----->
EPA4_MBS
!   Param 016: Th-230 in marker beds at south repository border ----->
EPA5_MBS
!
!   Param 017: Am-241 in all marker beds at repository borders ------>
EPA1_MBT
!   Param 018: Pu-239 in all marker beds at repository borders ------>
EPA2_MBT
!   Param 019: Pu-238 in all marker beds at repository borders ------>
EPA3_MBT
!   Param 020: U--234 in all marker beds at repository borders ------>
EPA4_MBT
!   Param 021: Th-230 in all marker beds at repository borders ------>
EPA5_MBT
!   Param 022: Total activity in marker beds at repository borders -->
EPA_MB_T
!
!***************************************
!
! North side of repository activity (Ci)
!
!   Fluxes (Ci/s) into MB 138 away from repository, north (right) side
!
FLX1M38N = IFGT0(FLUXIM1[E:1384],FLUXIM1[E:1384],0.0)
FLX2M38N = IFGT0(FLUXIM2[E:1384],FLUXIM2[E:1384],0.0)
FLX3M38N = IFGT0(FLUXIM3[E:1384],FLUXIM3[E:1384],0.0)
FLX4M38N = IFGT0(FLUXIM4[E:1384],FLUXIM4[E:1384],0.0)
FLX5M38N = IFGT0(FLUXIM5[E:1384],FLUXIM5[E:1384],0.0)
!
!   Fluxes (Ci/s) into Anhydrite A&B away from repository, north side
```

```
!
FLX1AABN = IFGT0(FLUXIM1[E:1316],FLUXIM1[E:1316],0.0)
FLX2AABN = IFGT0(FLUXIM2[E:1316],FLUXIM2[E:1316],0.0)
FLX3AABN = IFGT0(FLUXIM3[E:1316],FLUXIM3[E:1316],0.0)
FLX4AABN = IFGT0(FLUXIM4[E:1316],FLUXIM4[E:1316],0.0)
FLX5AABN = IFGT0(FLUXIM5[E:1316],FLUXIM5[E:1316],0.0)
!
!   Fluxes (Ci/s) into MB 139 away from repository, north (right) side
!
FLX1M39N = IFGT0(FLUXIM1[E:1267],FLUXIM1[E:1267],0.0)
FLX2M39N = IFGT0(FLUXIM2[E:1267],FLUXIM2[E:1267],0.0)
FLX3M39N = IFGT0(FLUXIM3[E:1267],FLUXIM3[E:1267],0.0)
FLX4M39N = IFGT0(FLUXIM4[E:1267],FLUXIM4[E:1267],0.0)
FLX5M39N = IFGT0(FLUXIM5[E:1267],FLUXIM5[E:1267],0.0)
!
!   Total outward fluxes into all anhydrite layers, north side of repository
!
FLX1_MBN = FLX1M38N + FLX1AABN + FLX1M39N
FLX2_MBN = FLX2M38N + FLX2AABN + FLX2M39N
FLX3_MBN = FLX3M38N + FLX3AABN + FLX3M39N
FLX4_MBN = FLX4M38N + FLX4AABN + FLX4M39N
FLX5_MBN = FLX5M38N + FLX5AABN + FLX5M39N
!
!   Total activity (Ci) in anhydrite layers at north repository border
!
RAD1_MBN = INTRIGHT(FLX1_MBN)
RAD2_MBN = INTRIGHT(FLX2_MBN)
RAD3_MBN = INTRIGHT(FLX3_MBN)
RAD4_MBN = INTRIGHT(FLX4_MBN)
RAD5_MBN = INTRIGHT(FLX5_MBN)
!
!   Delete fluxes
!
DELETE FLX1_MBN, FLX1M38N, FLX1AABN, FLX1M39N
DELETE FLX2_MBN, FLX2M38N, FLX2AABN, FLX2M39N
DELETE FLX3_MBN, FLX3M38N, FLX3AABN, FLX3M39N
DELETE FLX4_MBN, FLX4M38N, FLX4AABN, FLX4M39N
DELETE FLX5_MBN, FLX5M38N, FLX5AABN, FLX5M39N
!
!***************************************
!
! South side of repository activity (Ci)
!
!   Fluxes (Ci/s) into MB 138 away from repository, south (left) side
!
FLX1M38S = IFLT0(FLUXIM1[E:1361],-1.0*FLUXIM1[E:1361],0.0)
FLX2M38S = IFLT0(FLUXIM2[E:1361],-1.0*FLUXIM2[E:1361],0.0)
FLX3M38S = IFLT0(FLUXIM3[E:1361],-1.0*FLUXIM3[E:1361],0.0)
FLX4M38S = IFLT0(FLUXIM4[E:1361],-1.0*FLUXIM4[E:1361],0.0)
FLX5M38S = IFLT0(FLUXIM5[E:1361],-1.0*FLUXIM5[E:1361],0.0)
!
!   Fluxes (Ci/s) into Anhydrite A&B away from repository, south side
!
FLX1AABS = IFLT0(FLUXIM1[E:1173],-1.0*FLUXIM1[E:1173],0.0)
FLX2AABS = IFLT0(FLUXIM2[E:1173],-1.0*FLUXIM2[E:1173],0.0)
FLX3AABS = IFLT0(FLUXIM3[E:1173],-1.0*FLUXIM3[E:1173],0.0)
FLX4AABS = IFLT0(FLUXIM4[E:1173],-1.0*FLUXIM4[E:1173],0.0)
```

```
FLX5AABS = IFLT0(FLUXIM5[E:1173],-1.0*FLUXIM5[E:1173],0.0)
!
!   Fluxes (Ci/s) into MB 139 away from repository, south (left) side
!
FLX1M39S = IFLT0(FLUXIM1[E:1108],-1.0*FLUXIM1[E:1108],0.0)
FLX2M39S = IFLT0(FLUXIM2[E:1108],-1.0*FLUXIM2[E:1108],0.0)
FLX3M39S = IFLT0(FLUXIM3[E:1108],-1.0*FLUXIM3[E:1108],0.0)
FLX4M39S = IFLT0(FLUXIM4[E:1108],-1.0*FLUXIM4[E:1108],0.0)
FLX5M39S = IFLT0(FLUXIM5[E:1108],-1.0*FLUXIM5[E:1108],0.0)
!
!   Total outward fluxes into all anhydrite layers, south side of repository
!
FLX1_MBS = FLX1M38S + FLX1AABS + FLX1M39S
FLX2_MBS = FLX2M38S + FLX2AABS + FLX2M39S
FLX3_MBS = FLX3M38S + FLX3AABS + FLX3M39S
FLX4_MBS = FLX4M38S + FLX4AABS + FLX4M39S
FLX5_MBS = FLX5M38S + FLX5AABS + FLX5M39S
!
!   Total activity (Ci) in anhydrite layers at south repository border
!
RAD1_MBS = INTRIGHT(FLX1_MBS)
RAD2_MBS = INTRIGHT(FLX2_MBS)
RAD3_MBS = INTRIGHT(FLX3_MBS)
RAD4_MBS = INTRIGHT(FLX4_MBS)
RAD5_MBS = INTRIGHT(FLX5_MBS)
!
!   Delete fluxes
!
DELETE FLX1_MBS, FLX1M38S, FLX1AABS, FLX1M39S
DELETE FLX2_MBS, FLX2M38S, FLX2AABS, FLX2M39S
DELETE FLX3_MBS, FLX3M38S, FLX3AABS, FLX3M39S
DELETE FLX4_MBS, FLX4M38S, FLX4AABS, FLX4M39S
DELETE FLX5_MBS, FLX5M38S, FLX5AABS, FLX5M39S
!
!***************************************
!
! Total activity (Ci) in anhydrite layers at repository borders
!
RAD1_MBT = RAD1_MBN + RAD1_MBS
RAD2_MBT = RAD2_MBN + RAD2_MBS
RAD3_MBT = RAD3_MBN + RAD3_MBS
RAD4_MBT = RAD4_MBN + RAD4_MBS
RAD5_MBT = RAD5_MBN + RAD5_MBS
!
!***************************************
!
! Convert to EPA units and sum to get total marker bed activity at repository
!
EPA1_MBN = RAD1_MBN/CI_2_EPA
EPA2_MBN = RAD2_MBN/CI_2_EPA
EPA3_MBN = RAD3_MBN/CI_2_EPA
EPA4_MBN = RAD4_MBN/CI_2_EPA
EPA5_MBN = RAD5_MBN/CI_5_EPA
!
EPA1_MBS = RAD1_MBS/CI_2_EPA
EPA2_MBS = RAD2_MBS/CI_2_EPA
EPA3_MBS = RAD3_MBS/CI_2_EPA
```

```
EPA4_MBS = RAD4_MBS/CI_2_EPA
EPA5_MBS = RAD5_MBS/CI_5_EPA
!
EPA1_MBT = RAD1_MBT/CI_2_EPA
EPA2_MBT = RAD2_MBT/CI_2_EPA
EPA3_MBT = RAD3_MBT/CI_2_EPA
EPA4_MBT = RAD4_MBT/CI_2_EPA
EPA5_MBT = RAD5_MBT/CI_5_EPA
!
EPA_MB_T = EPA1_MBT + EPA2_MBT + EPA3_MBT + EPA4_MBT + EPA5_MBT
!
! Delete temporary variables
!
DELETE RAD1_MBN, RAD2_MBN, RAD3_MBN, RAD4_MBN, RAD5_MBN
DELETE RAD1_MBS, RAD2_MBS, RAD3_MBS, RAD4_MBS, RAD5_MBS
DELETE RAD1_MBT, RAD2_MBT, RAD3_MBT, RAD4_MBT, RAD5_MBT
!
!***********************************************************************
!***********************************************************************
!
! Total flux (mRem/yr) in marker beds across l-w boundary
!
!   Param 023: Am-241 flux in marker beds at north l-w boundary ---->
F1LW_MBN
!   Param 024: Pu-239 flux in marker beds at north l-w boundary ---->
F2LW_MBN
!   Param 025: Pu-238 flux in marker beds at north l-w boundary ---->
F3LW_MBN
!   Param 026: U--234 flux in marker beds at north l-w boundary ---->
F4LW_MBN
!   Param 027: Th-230 flux in marker beds at north l-w boundary ---->
F5LW_MBN
!
!   Param 028: Am-241 flux in marker beds at south l-w boundary ---->
F1LW_MBS
!   Param 029: Pu-239 flux in marker beds at south l-w boundary ---->
F2LW_MBS
!   Param 030: Pu-238 flux in marker beds at south l-w boundary ---->
F3LW_MBS
!   Param 031: U--234 flux in marker beds at south l-w boundary ---->
F4LW_MBS
!   Param 032: Th-230 flux in marker beds at south l-w boundary ---->
F5LW_MBS
!
!   Param 033: Am-241 total flux in all marker beds, l-w boundary -->
F1LW_MBC
!   Param 034: Pu-239 total flux in all marker beds, l-w boundary -->
F2LW_MBC
!   Param 035: Pu-238 total flux in all marker beds, l-w boundary -->
F3LW_MBC
!   Param 036: U--234 total flux in all marker beds, l-w boundary -->
F4LW_MBC
!   Param 037: Th-230 total flux in all marker beds, l-w boundary -->
F5LW_MBC
!
!************************************
!
```

```
! Fluxes in marker beds at north land-withdrawal boundary (Ci/s)
!
!   Fluxes in MB 138 across l-w boundary, north (right) side
!
F1LWM38N = IFGT0(FLUXIM1[E:1401],FLUXIM1[E:1401],0.0)
F2LWM38N = IFGT0(FLUXIM2[E:1401],FLUXIM2[E:1401],0.0)
F3LWM38N = IFGT0(FLUXIM3[E:1401],FLUXIM3[E:1401],0.0)
F4LWM38N = IFGT0(FLUXIM4[E:1401],FLUXIM4[E:1401],0.0)
F5LWM38N = IFGT0(FLUXIM5[E:1401],FLUXIM5[E:1401],0.0)
!
!   Fluxes in Anhydrite A&B across l-w boundary, north side
!
F1LWAABN = IFGT0(FLUXIM1[E:1333],FLUXIM1[E:1333],0.0)
F2LWAABN = IFGT0(FLUXIM2[E:1333],FLUXIM2[E:1333],0.0)
F3LWAABN = IFGT0(FLUXIM3[E:1333],FLUXIM3[E:1333],0.0)
F4LWAABN = IFGT0(FLUXIM4[E:1333],FLUXIM4[E:1333],0.0)
F5LWAABN = IFGT0(FLUXIM5[E:1333],FLUXIM5[E:1333],0.0)
!
!   Fluxes in MB 139 across l-w boundary, north (right) side
!
F1LWM39N = IFGT0(FLUXIM1[E:1284],FLUXIM1[E:1284],0.0)
F2LWM39N = IFGT0(FLUXIM2[E:1284],FLUXIM2[E:1284],0.0)
F3LWM39N = IFGT0(FLUXIM3[E:1284],FLUXIM3[E:1284],0.0)
F4LWM39N = IFGT0(FLUXIM4[E:1284],FLUXIM4[E:1284],0.0)
F5LWM39N = IFGT0(FLUXIM5[E:1284],FLUXIM5[E:1284],0.0)
!
!   Total fluxes across north land-withdrawal boundary in all anhydrite
layers
!
F1LWMBN  = F1LWM38N + F1LWAABN + F1LWM39N
F2LWMBN  = F2LWM38N + F2LWAABN + F2LWM39N
F3LWMBN  = F3LWM38N + F3LWAABN + F3LWM39N
F4LWMBN  = F4LWM38N + F4LWAABN + F4LWM39N
F5LWMBN  = F5LWM38N + F5LWAABN + F5LWM39N
!
!   Convert flux units from Ci/s to mRem/yr
!
!     Conversion factors, 1 Ci/s = C_i mRem/yr
!
!          where i = 1 for Am-241
!                i = 2 for Pu-239
!                i = 3 for Pu-238
!                i = 4 for U-234
!                i = 5 for Am-241
!
C_1 = 6.9426E16
C_2 = 1.3570E16
C_3 = 1.7041E19
C_4 = 2.2406E17
C_5 = 1.6725E16
!
F1LW_MBN = F1LWMBN*C_1
F2LW_MBN = F2LWMBN*C_2
F3LW_MBN = F3LWMBN*C_3
F4LW_MBN = F4LWMBN*C_4
F5LW_MBN = F5LWMBN*C_5
!
```

```
!   Delete fluxes not needed (retained for Param 208-210, after which
!                              they are deleted)
!
!!DELETE F1LWM38N, F1LWAABN, F1LWM39N
!!DELETE F2LWM38N, F2LWAABN, F2LWM39N
!!DELETE F3LWM38N, F3LWAABN, F3LWM39N
!!DELETE F4LWM38N, F4LWAABN, F4LWM39N
!!DELETE F5LWM38N, F5LWAABN, F5LWM39N
!
!***************************************
!
! Fluxes in marker beds at south land-withdrawal boundary (Ci/s)
!
!   Fluxes in MB 138 across l-w boundary, south (left) side
!
F1LWM38S = IFLT0(FLUXIM1[E:1344],-1.0*FLUXIM1[E:1344],0.0)
F2LWM38S = IFLT0(FLUXIM2[E:1344],-1.0*FLUXIM2[E:1344],0.0)
F3LWM38S = IFLT0(FLUXIM3[E:1344],-1.0*FLUXIM3[E:1344],0.0)
F4LWM38S = IFLT0(FLUXIM4[E:1344],-1.0*FLUXIM4[E:1344],0.0)
F5LWM38S = IFLT0(FLUXIM5[E:1344],-1.0*FLUXIM5[E:1344],0.0)
!
!   Fluxes in Anhydrite A&B across l-w, south side
!
F1LWAABS = IFLT0(FLUXIM1[E:1295],-1.0*FLUXIM1[E:1295],0.0)
F2LWAABS = IFLT0(FLUXIM2[E:1295],-1.0*FLUXIM2[E:1295],0.0)
F3LWAABS = IFLT0(FLUXIM3[E:1295],-1.0*FLUXIM3[E:1295],0.0)
F4LWAABS = IFLT0(FLUXIM4[E:1295],-1.0*FLUXIM4[E:1295],0.0)
F5LWAABS = IFLT0(FLUXIM5[E:1295],-1.0*FLUXIM5[E:1295],0.0)
!
!   Fluxes in MB 139 across l-w boundary, south (left) side
!
F1LWM39S = IFLT0(FLUXIM1[E:1246],-1.0*FLUXIM1[E:1246],0.0)
F2LWM39S = IFLT0(FLUXIM2[E:1246],-1.0*FLUXIM2[E:1246],0.0)
F3LWM39S = IFLT0(FLUXIM3[E:1246],-1.0*FLUXIM3[E:1246],0.0)
F4LWM39S = IFLT0(FLUXIM4[E:1246],-1.0*FLUXIM4[E:1246],0.0)
F5LWM39S = IFLT0(FLUXIM5[E:1246],-1.0*FLUXIM5[E:1246],0.0)
!
!   Total fluxes across south land-withdrawal boundary in all anhydrite
layers
!
F1LWMBS  = F1LWM38S + F1LWAABS + F1LWM39S
F2LWMBS  = F2LWM38S + F2LWAABS + F2LWM39S
F3LWMBS  = F3LWM38S + F3LWAABS + F3LWM39S
F4LWMBS  = F4LWM38S + F4LWAABS + F4LWM39S
F5LWMBS  = F5LWM38S + F5LWAABS + F5LWM39S
!
!   Convert flux units from Ci/s to mRem/yr
!
F1LW_MBS = F1LWMBS*C_1
F2LW_MBS = F2LWMBS*C_2
F3LW_MBS = F3LWMBS*C_3
F4LW_MBS = F4LWMBS*C_4
F5LW_MBS = F5LWMBS*C_5
!
!   Delete fluxes not needed (retained for Param 208-210, after which
!                              they are deleted)
!
```

```
!!DELETE F1LWM38S, F1LWAABS, F1LWM39S
!!DELETE F2LWM38S, F2LWAABS, F2LWM39S
!!DELETE F3LWM38S, F3LWAABS, F3LWM39S
!!DELETE F4LWM38S, F4LWAABS, F4LWM39S
!!DELETE F5LWM38S, F5LWAABS, F5LWM39S
!
!**************************************
!
! Total fluxes across land-withdrawal boundary in all anhydrite layers
(mRem/yr)
!
F1LW_MBT = F1LW_MBN + F1LW_MBS
F2LW_MBT = F2LW_MBN + F2LW_MBS
F3LW_MBT = F3LW_MBN + F3LW_MBS
F4LW_MBT = F4LW_MBN + F4LW_MBS
F5LW_MBT = F5LW_MBN + F5LW_MBS
!
!************************************************************************
!************************************************************************
!
! Total activity (integrated flux) in marker beds at l-w boundary (EPA units)
!
!   Param 038: Am-241 in all marker beds across north l-w boundary -->
E1LW_MBN
!   Param 039: Pu-239 in all marker beds across north l-w boundary -->
E2LW_MBN
!   Param 040: Pu-238 in all marker beds across north l-w boundary -->
E3LW_MBN
!   Param 041: U--234 in all marker beds across north l-w boundary -->
E4LW_MBN
!   Param 042: Th-230 in all marker beds across north l-w boundary -->
E5LW_MBN
!
!   Param 043: Am-241 in all marker beds across south l-w boundary -->
E1LW_MBS
!   Param 044: Pu-239 in all marker beds across south l-w boundary -->
E2LW_MBS
!   Param 045: Pu-238 in all marker beds across south l-w boundary -->
E3LW_MBS
!   Param 046: U--234 in all marker beds across south l-w boundary -->
E4LW_MBS
!   Param 047: Th-230 in all marker beds across south l-w boundary -->
E5LW_MBS
!
!   Param 048: Am-241 in all marker beds across l-w boundaries ------>
E1LW_MBT
!   Param 049: Pu-239 in all marker beds across l-w boundaries ------>
E2LW_MBT
!   Param 050: Pu-238 in all marker beds across l-w boundaries ------>
E3LW_MBT
!   Param 051: U--234 in all marker beds across l-w boundaries ------>
E4LW_MBT
!   Param 052: Th-230 in all marker beds across l-w boundaries ------>
E5LW_MBT
!   Param 053: Total activity in all marker beds at l-w boundaries -->
EPALWMBT
!
```

```
!***************************************
!
! Activities in marker beds across north land-withdrawal boundary (Ci)
!
R1LW_MBN = INTRIGHT(F1LWMBN)
R2LW_MBN = INTRIGHT(F2LWMBN)
R3LW_MBN = INTRIGHT(F3LWMBN)
R4LW_MBN = INTRIGHT(F4LWMBN)
R5LW_MBN = INTRIGHT(F5LWMBN)
!
DELETE F1LWMBN, F2LWMBN, F3LWMBN, F4LWMBN, F5LWMBN
!
!***************************************
!
! Activities in marker beds across south land-withdrawal boundary (Ci)
!
R1LW_MBS = INTRIGHT(F1LWMBS)
R2LW_MBS = INTRIGHT(F2LWMBS)
R3LW_MBS = INTRIGHT(F3LWMBS)
R4LW_MBS = INTRIGHT(F4LWMBS)
R5LW_MBS = INTRIGHT(F5LWMBS)
!
DELETE F1LWMBS, F2LWMBS, F3LWMBS, F4LWMBS, F5LWMBS
!
!***************************************
!
! Total activity in all anhydrite layers across land-withdrawal boundary
!
R1LW_MBT = R1LW_MBN + R1LW_MBS
R2LW_MBT = R2LW_MBN + R2LW_MBS
R3LW_MBT = R3LW_MBN + R3LW_MBS
R4LW_MBT = R4LW_MBN + R4LW_MBS
R5LW_MBT = R5LW_MBN + R5LW_MBS
!
!***************************************
!
! Convert to EPA units and sum to get total marker bed activity at l-w bndry
!
E1LW_MBN = R1LW_MBN/CI_2_EPA
E2LW_MBN = R2LW_MBN/CI_2_EPA
E3LW_MBN = R3LW_MBN/CI_2_EPA
E4LW_MBN = R4LW_MBN/CI_2_EPA
E5LW_MBN = R5LW_MBN/CI_5_EPA
!
E1LW_MBS = R1LW_MBS/CI_2_EPA
E2LW_MBS = R2LW_MBS/CI_2_EPA
E3LW_MBS = R3LW_MBS/CI_2_EPA
E4LW_MBS = R4LW_MBS/CI_2_EPA
E5LW_MBS = R5LW_MBS/CI_5_EPA
!
E1LW_MBT = R1LW_MBT/CI_2_EPA
E2LW_MBT = R2LW_MBT/CI_2_EPA
E3LW_MBT = R3LW_MBT/CI_2_EPA
E4LW_MBT = R4LW_MBT/CI_2_EPA
E5LW_MBT = R5LW_MBT/CI_5_EPA
!
EPALWMBT = E1LW_MBT + E2LW_MBT + E3LW_MBT + E4LW_MBT + E5LW_MBT
```

```
!
! Delete temporary variables
!
DELETE R1LW_MBN, R2LW_MBN, R3LW_MBN, R4LW_MBN, R5LW_MBN
DELETE R1LW_MBS, R2LW_MBS, R3LW_MBS, R4LW_MBS, R5LW_MBS
DELETE R1LW_MBT, R2LW_MBT, R3LW_MBT, R4LW_MBT, R5LW_MBT
!
!***************************************************************************
!***************************************************************************
!
! Extent of radioactive penetration in marker beds outward from repository
(m)
!
!   Param 054: Am-241 zone length, MB 138 North ---------> XL1_M38N
!   Param 055: Pu-239 zone length, MB 138 North ---------> XL2_M38N
!   Param 056: Pu-238 zone length, MB 138 North ---------> XL3_M38N
!   Param 057: U--234 zone length, MB 138 North ---------> XL4_M38N
!   Param 058: Th-230 zone length, MB 138 North ---------> XL5_M38N
!
!   Param 059: Am-241 zone length, Anhydrite A&B North --> XL1_AABN
!   Param 060: Pu-239 zone length, Anhydrite A&B North --> XL2_AABN
!   Param 061: Pu-238 zone length, Anhydrite A&B North --> XL3_AABN
!   Param 062: U--234 zone length, Anhydrite A&B North --> XL4_AABN
!   Param 063: Th-230 zone length, Anhydrite A&B North --> XL5_AABN
!
!   Param 064: Am-241 zone length, MB 139 North ---------> XL1_M39N
!   Param 065: Pu-239 zone length, MB 139 North ---------> XL2_M39N
!   Param 066: Pu-238 zone length, MB 139 North ---------> XL3_M39N
!   Param 067: U--234 zone length, MB 139 North ---------> XL4_M39N
!   Param 068: Th-230 zone length, MB 139 North ---------> XL5_M39N
!
!   Param 069: Am-241 zone length, MB 138 South ---------> XL1_M38S
!   Param 070: Pu-239 zone length, MB 138 South ---------> XL2_M38S
!   Param 071: Pu-238 zone length, MB 138 South ---------> XL3_M38S
!   Param 072: U--234 zone length, MB 138 South ---------> XL4_M38S
!   Param 073: Th-230 zone length, MB 138 South ---------> XL5_M38S
!
!   Param 074: Am-241 zone length, Anhydrite A&B South --> XL1_AABS
!   Param 075: Pu-239 zone length, Anhydrite A&B South --> XL2_AABS
!   Param 076: Pu-238 zone length, Anhydrite A&B South --> XL3_AABS
!   Param 077: U--234 zone length, Anhydrite A&B South --> XL4_AABS
!   Param 078: Th-230 zone length, Anhydrite A&B South --> XL5_AABS
!
!   Param 079: Am-241 zone length, MB 139 South ---------> XL1_M39S
!   Param 080: Pu-239 zone length, MB 139 South ---------> XL2_M39S
!   Param 081: Pu-238 zone length, MB 139 South ---------> XL3_M39S
!   Param 082: U--234 zone length, MB 139 South ---------> XL4_M39S
!   Param 083: Th-230 zone length, MB 139 South ---------> XL5_M39S
!
! Maximum values of radioactive penetration zones in marker beds (m)
!
!   Param 084: Maximum Pu-239 penetration in north marker beds --> MAX2_MBN
!   Param 085: Maximum U--234 penetration in north marker beds --> MAX4_MBN
!
!   Param 086: Maximum Pu-239 penetration in south marker beds --> MAX2_MBS
!   Param 087: Maximum U--234 penetration in south marker beds --> MAX4_MBS
!
```

```
!*************************************
!
! Radionuclides in MB 138 away from repository, north (right) side
!
LIMIT ELEMENT 1384 TO 1406
!
!   Define meaningful contamination level as exceeding 1E-7 kg
!
MTOL = 1.0E-7
!
!   Set reference point for front length at the north repository border
!
XREF38N  = X[N:3496]
!
!   Determine average x-coordinate of element centroid as element variable
!
XECENT   = NOD2ELE(X)
!
!   Compare radionuclides dissolved masses against contamination limit
!     If criterion met then calculate front length as distance from
!     reference point to centroid of element, otherwise set to zero
!
XDIST1   = IFGT0(BMDISM1-MTOL,XECENT-XREF38N,0.0)
XDIST2   = IFGT0(BMDISM2-MTOL,XECENT-XREF38N,0.0)
XDIST3   = IFGT0(BMDISM3-MTOL,XECENT-XREF38N,0.0)
XDIST4   = IFGT0(BMDISM4-MTOL,XECENT-XREF38N,0.0)
XDIST5   = IFGT0(BMDISM5-MTOL,XECENT-XREF38N,0.0)
!
!   Extract maximum values of front length at each time
!
XL1_M38N = SMAX(XDIST1)
XL2_M38N = SMAX(XDIST2)
XL3_M38N = SMAX(XDIST3)
XL4_M38N = SMAX(XDIST4)
XL5_M38N = SMAX(XDIST5)
!
!   Delete temporary variables (tolerance used below, then deleted)
!
DELETE XREF38N, XECENT, XDIST1, XDIST2, XDIST3, XDIST4, XDIST5
!
!*************************************
!
! Radionuclides in Anhydrite A&B away from repository, north (right) side
!
LIMIT ELEMENT 1316 TO 1338
!
XREFABN  = X[N:3289]
XECENT   = NOD2ELE(X)
!
XDIST1   = IFGT0(BMDISM1-MTOL,XECENT-XREFABN,0.0)
XDIST2   = IFGT0(BMDISM2-MTOL,XECENT-XREFABN,0.0)
XDIST3   = IFGT0(BMDISM3-MTOL,XECENT-XREFABN,0.0)
XDIST4   = IFGT0(BMDISM4-MTOL,XECENT-XREFABN,0.0)
XDIST5   = IFGT0(BMDISM5-MTOL,XECENT-XREFABN,0.0)
!
XL1_AABN = SMAX(XDIST1)
XL2_AABN = SMAX(XDIST2)
```

```
XL3_AABN = SMAX(XDIST3)
XL4_AABN = SMAX(XDIST4)
XL5_AABN = SMAX(XDIST5)
!
DELETE XREFABN, XECENT, XDIST1, XDIST2, XDIST3, XDIST4, XDIST5
!
!***************************************
!
! Radionuclides in MB 139 away from repository, north (right) side
!
LIMIT ELEMENT 1267 TO 1289
!
XREF39N  = X[N:2806]
XECENT   = NOD2ELE(X)
!
XDIST1   = IFGT0(BMDISM1-MTOL,XECENT-XREF39N,0.0)
XDIST2   = IFGT0(BMDISM2-MTOL,XECENT-XREF39N,0.0)
XDIST3   = IFGT0(BMDISM3-MTOL,XECENT-XREF39N,0.0)
XDIST4   = IFGT0(BMDISM4-MTOL,XECENT-XREF39N,0.0)
XDIST5   = IFGT0(BMDISM5-MTOL,XECENT-XREF39N,0.0)
!
XL1_M39N = SMAX(XDIST1)
XL2_M39N = SMAX(XDIST2)
XL3_M39N = SMAX(XDIST3)
XL4_M39N = SMAX(XDIST4)
XL5_M39N = SMAX(XDIST5)
!
DELETE XREF39N, XECENT, XDIST1, XDIST2, XDIST3, XDIST4, XDIST5
!
!***************************************
!***************************************
!
! Radionuclides in MB 138 away from repository, south (left) side
!
LIMIT ELEMENT 1339 TO 1360
!
XREF38S  = X[N:3473]
XECENT   = NOD2ELE(X)
!
XDIST1   = IFGT0(BMDISM1-MTOL,XREF38S-XECENT,0.0)
XDIST2   = IFGT0(BMDISM2-MTOL,XREF38S-XECENT,0.0)
XDIST3   = IFGT0(BMDISM3-MTOL,XREF38S-XECENT,0.0)
XDIST4   = IFGT0(BMDISM4-MTOL,XREF38S-XECENT,0.0)
XDIST5   = IFGT0(BMDISM5-MTOL,XREF38S-XECENT,0.0)
!
XL1_M38S = SMAX(XDIST1)
XL2_M38S = SMAX(XDIST2)
XL3_M38S = SMAX(XDIST3)
XL4_M38S = SMAX(XDIST4)
XL5_M38S = SMAX(XDIST5)
!
DELETE XREF38S, XECENT, XDIST1, XDIST2, XDIST3, XDIST4, XDIST5
!
!***************************************
!
! Radionuclides in Anhydrite A&B away from repository, south (left) side
!
```

```
LIMIT ELEMENT 1290 TO 1311
!
XREFABS  = X[N:3266]
XECENT   = NOD2ELE(X)
!
XDIST1   = IFGT0(BMDISM1-MTOL,XREFABS-XECENT,0.0)
XDIST2   = IFGT0(BMDISM2-MTOL,XREFABS-XECENT,0.0)
XDIST3   = IFGT0(BMDISM3-MTOL,XREFABS-XECENT,0.0)
XDIST4   = IFGT0(BMDISM4-MTOL,XREFABS-XECENT,0.0)
XDIST5   = IFGT0(BMDISM5-MTOL,XREFABS-XECENT,0.0)
!
XL1_AABS = SMAX(XDIST1)
XL2_AABS = SMAX(XDIST2)
XL3_AABS = SMAX(XDIST3)
XL4_AABS = SMAX(XDIST4)
XL5_AABS = SMAX(XDIST5)
!
DELETE XREFABS, XECENT, XDIST1, XDIST2, XDIST3, XDIST4, XDIST5
!
!**************************************
!
! Radionuclides in MB 139 away from repository, south (left) side
!
LIMIT ELEMENT 1241 to 1262
!
XREF39S  = X[N:2783]
XECENT   = NOD2ELE(X)
!
XDIST1   = IFGT0(BMDISM1-MTOL,XREF39S-XECENT,0.0)
XDIST2   = IFGT0(BMDISM2-MTOL,XREF39S-XECENT,0.0)
XDIST3   = IFGT0(BMDISM3-MTOL,XREF39S-XECENT,0.0)
XDIST4   = IFGT0(BMDISM4-MTOL,XREF39S-XECENT,0.0)
XDIST5   = IFGT0(BMDISM5-MTOL,XREF39S-XECENT,0.0)
!
XL1_M39S = SMAX(XDIST1)
XL2_M39S = SMAX(XDIST2)
XL3_M39S = SMAX(XDIST3)
XL4_M39S = SMAX(XDIST4)
XL5_M39S = SMAX(XDIST5)
!
DELETE XREF39S, XECENT, XDIST1, XDIST2, XDIST3, XDIST4, XDIST5
!
!**************************************
!**************************************
!
! Maximum isotope penetration in north marker beds (m), Pu-239 & U-234
!
LIMIT ELEMENT 1267 TO 1289, 1316 TO 1338, 1384 TO 1406
!
XREFMBN  = X[N:2806]
XECENT   = NOD2ELE(X)
!
XDIST2   = IFGT0(BMDISM2-MTOL,XECENT-XREFMBN,0.0)
XDIST4   = IFGT0(BMDISM4-MTOL,XECENT-XREFMBN,0.0)
!
MAX2_MBN = SMAX(XDIST2)
MAX4_MBN = SMAX(XDIST4)
```

```
!
DELETE XREFMBN, XECENT, XDIST2, XDIST4
!
!****************************************
!
! Maximum isotope penetration in south marker beds (m), Pu-239 & U-234
!
LIMIT ELEMENT 1241 to 1262, 1290 TO 1311, 1339 TO 1360
!
XREFMBS  = X[N:2783]
XECENT   = NOD2ELE(X)
!
XDIST2   = IFGT0(BMDISM2-MTOL,XREFMBS-XECENT,0.0)
XDIST4   = IFGT0(BMDISM4-MTOL,XREFMBS-XECENT,0.0)
!
MAX2_MBS = SMAX(XDIST2)
MAX4_MBS = SMAX(XDIST4)
!
DELETE XREFMBS, XECENT, XDIST2, XDIST4
!
!****************************************
!
LIMIT ELEMENT OFF
!
DELETE MTOL
!
!****************************************************************************
!****************************************************************************
!
! Integrated fluxes (Ci) in borehole at Rustler/Culebra (for PANEL
calculations)
!
!   Param 088: Am-241 int. flux up bh at Rustler/Culebra (el.1845) -->
A00AM241
!   Param 089: Pu-239 int. flux up bh at Rustler/Culebra (el.1845) -->
A00PU239
!   Param 090: Pu-238 int. flux up bh at Rustler/Culebra (el.1845) -->
A00PU238
!   Param 091: U--234 int. flux up bh at Rustler/Culebra (el.1845) -->
A00U234
!   Param 092: Th-230 int. flux up bh at Rustler/Culebra (el.1845) -->
A00TH230
!
!****************************************
!
! Fluxes up borehole at Rustler/Culebra (Element 1845), (Ci/s)
!
FL1BHRC  = IFGT0(FLUXJM1[E:1845],FLUXJM1[E:1845],0.0)
FL2BHRC  = IFGT0(FLUXJM2[E:1845],FLUXJM2[E:1845],0.0)
FL3BHRC  = IFGT0(FLUXJM3[E:1845],FLUXJM3[E:1845],0.0)
FL4BHRC  = IFGT0(FLUXJM4[E:1845],FLUXJM4[E:1845],0.0)
FL5BHRC  = IFGT0(FLUXJM5[E:1845],FLUXJM5[E:1845],0.0)
!
! Integrated flux (Ci)
!
A00AM241 = INTRIGHT(FL1BHRC)
A00PU239 = INTRIGHT(FL2BHRC)
```

```
A00PU238 = INTRIGHT(FL3BHRC)
A00U234  = INTRIGHT(FL4BHRC)
A00TH230 = INTRIGHT(FL5BHRC)
!
! Note: Fluxes will be output below as Params 198 to 202
!
!*************************************************************************
!*************************************************************************
!
! Activities (integrated fluxes) up borehole (EPA units)
!
!   Param 093: Am-241 up borehole at Magenta Dolomite (el.1912) ---> EPA1BHMD
!   Param 094: Pu-239 up borehole at Magenta Dolomite (el.1912) ---> EPA2BHMD
!   Param 095: Pu-238 up borehole at Magenta Dolomite (el.1912) ---> EPA3BHMD
!   Param 096: U--234 up borehole at Magenta Dolomite (el.1912) ---> EPA4BHMD
!   Param 097: Th-230 up borehole at Magenta Dolomite (el.1912) ---> EPA5BHMD
!   Param 098: Total activity up borehole at Magenta (el.1912) ----> EPATBHMD
!
!   Param 099: Am-241 up borehole at Rustler/Culebra (el.1845) ----> EPA1BHRC
!   Param 100: Pu-239 up borehole at Rustler/Culebra (el.1845) ----> EPA2BHRC
!   Param 101: Pu-238 up borehole at Rustler/Culebra (el.1845) ----> EPA3BHRC
!   Param 102: U--234 up borehole at Rustler/Culebra (el.1845) ----> EPA4BHRC
!   Param 103: Th-230 up borehole at Rustler/Culebra (el.1845) ----> EPA5BHRC
!   Param 104: Total activity up bh at Rustler/Culebra (el.1845) --> EPATBHRC
!
!**************************************
!
! Radionuclides up borehole at Magenta Dolomite (Ci)
!
!   Fluxes up borehole at Magenta (Ci/s)
!
FL1BH_MD = IFGT0(FLUXJM1[E:1912],FLUXJM1[E:1912],0.0)
FL2BH_MD = IFGT0(FLUXJM2[E:1912],FLUXJM2[E:1912],0.0)
FL3BH_MD = IFGT0(FLUXJM3[E:1912],FLUXJM3[E:1912],0.0)
FL4BH_MD = IFGT0(FLUXJM4[E:1912],FLUXJM4[E:1912],0.0)
FL5BH_MD = IFGT0(FLUXJM5[E:1912],FLUXJM5[E:1912],0.0)
!
!   Integrate flux to get activity
!
RN1BH_MD = INTRIGHT(FL1BH_MD)
RN2BH_MD = INTRIGHT(FL2BH_MD)
RN3BH_MD = INTRIGHT(FL3BH_MD)
RN4BH_MD = INTRIGHT(FL4BH_MD)
RN5BH_MD = INTRIGHT(FL5BH_MD)
!
DELETE FL1BH_MD, FL2BH_MD, FL3BH_MD, FL4BH_MD, FL5BH_MD
!
!**************************************
!
! Convert to EPA units and sum to get total activities up borehole
!
!   At Magenta Dolomite
!
EPA1BHMD = RN1BH_MD/CI_2_EPA
EPA2BHMD = RN2BH_MD/CI_2_EPA
EPA3BHMD = RN3BH_MD/CI_2_EPA
EPA4BHMD = RN4BH_MD/CI_2_EPA
```

```
EPA5BHMD = RN5BH_MD/CI_5_EPA
!
EPATBHMD = EPA1BHMD + EPA2BHMD + EPA3BHMD + EPA4BHMD + EPA5BHMD
!
!   At Rustler/Culebra interface
!
EPA1BHRC = A00AM241/CI_2_EPA
EPA2BHRC = A00PU239/CI_2_EPA
EPA3BHRC = A00PU238/CI_2_EPA
EPA4BHRC = A00U234/CI_2_EPA
EPA5BHRC = A00TH230/CI_5_EPA
!
EPATBHRC = EPA1BHRC + EPA2BHRC + EPA3BHRC + EPA4BHRC + EPA5BHRC
!
!   Delete temporary variables
!
DELETE RN1BH_MD, RN2BH_MD, RN3BH_MD, RN4BH_MD, RN5BH_MD
!
!*****************************************************************************
!*****************************************************************************
!
! Activity down borehole at Castile/Brine interface (EPA units)
!
!   Param 105: Total activity down bh at Castile/Brine (el.1576) --> EPATBHCB
!
!***************************************
!
! Activity at Castile/Brine (EPA units)
!
!   Fluxes down borehole at Castile/Brine interface (Ci/s)
!
FL1BH_CB = IFLT0(FLUXJM1[E:1576],-1.0*FLUXJM1[E:1576],0.0)
FL2BH_CB = IFLT0(FLUXJM2[E:1576],-1.0*FLUXJM2[E:1576],0.0)
FL3BH_CB = IFLT0(FLUXJM3[E:1576],-1.0*FLUXJM2[E:1576],0.0)
FL4BH_CB = IFLT0(FLUXJM4[E:1576],-1.0*FLUXJM2[E:1576],0.0)
FL5BH_CB = IFLT0(FLUXJM5[E:1576],-1.0*FLUXJM2[E:1576],0.0)
!
!   Radionuclides down borehole at Castile/Brine interface (Ci)
!
RN1BH_CB = INTRIGHT(FL1BH_CB)
RN2BH_CB = INTRIGHT(FL2BH_CB)
RN3BH_CB = INTRIGHT(FL3BH_CB)
RN4BH_CB = INTRIGHT(FL4BH_CB)
RN5BH_CB = INTRIGHT(FL5BH_CB)
!
!   Convert to EPA units and sum to get total
!
EPA1BHCB = RN1BH_CB/CI_2_EPA
EPA2BHCB = RN2BH_CB/CI_2_EPA
EPA3BHCB = RN3BH_CB/CI_2_EPA
EPA4BHCB = RN4BH_CB/CI_2_EPA
EPA5BHCB = RN5BH_CB/CI_5_EPA
!
EPATBHCB = EPA1BHCB + EPA2BHCB + EPA3BHCB + EPA4BHCB + EPA5BHCB
!
DELETE FL1BH_CB, FL2BH_CB, FL3BH_CB, FL4BH_CB, FL5BH_CB
DELETE RN1BH_CB, RN2BH_CB, RN3BH_CB, RN4BH_CB, RN5BH_CB
```

```
DELETE EPA1BHCB, EPA2BHCB, EPA3BHCB, EPA4BHCB, EPA5BHCB
!
!***************************************************************************
!***************************************************************************
!
! Fluxes (mRem/yr) in shaft at Salado/Rustler interface
!
!   Param 106: Am-241 flux up shaft at Salado/Rustler (el.1488) ---> FL1SH_SR
!   Param 107: Pu-239 flux up shaft at Salado/Rustler (el.1488) ---> FL2SH_SR
!   Param 108: Pu-238 flux up shaft at Salado/Rustler (el.1488) ---> FL3SH_SR
!   Param 109: U--234 flux up shaft at Salado/Rustler (el.1488) ---> FL4SH_SR
!   Param 110: Th-230 flux up shaft at Salado/Rustler (el.1488) ---> FL5SH_SR
!
!**************************************
!
! Fluxes up shaft at Salado/Rustler interface (Ci/s)
!
FL1SHSR  = IFGT0(FLUXJM1[E:1488],FLUXJM1[E:1488],0.0)
FL2SHSR  = IFGT0(FLUXJM2[E:1488],FLUXJM2[E:1488],0.0)
FL3SHSR  = IFGT0(FLUXJM3[E:1488],FLUXJM3[E:1488],0.0)
FL4SHSR  = IFGT0(FLUXJM4[E:1488],FLUXJM4[E:1488],0.0)
FL5SHSR  = IFGT0(FLUXJM5[E:1488],FLUXJM5[E:1488],0.0)
!
!   Convert flux units from Ci/s to mRem/yr
!
FL1SH_SR = FL1SHSR*C_1
FL2SH_SR = FL2SHSR*C_2
FL3SH_SR = FL3SHSR*C_3
FL4SH_SR = FL4SHSR*C_4
FL5SH_SR = FL5SHSR*C_5
!
!   Delete fluxes not needed
!
DELETE FL1SHSR, FL2SHSR, FL3SHSR, FL4SHSR, FL5SHSR
!
!   Delete flux conversion factors
!
DELETE C_1, C_2, C_3, C_4, C_5
!
!***************************************************************************
!***************************************************************************
!
! Activity (integrated flux) in shaft at Rustler/Culebra interface (EPA
units)
!
!   Param 111: Am-241 up shaft at Rustler/Culebra (el.1489) ---------->
EPA1SHRC
!   Param 112: Pu-239 up shaft at Rustler/Culebra (el.1489) ---------->
EPA2SHRC
!   Param 113: Pu-238 up shaft at Rustler/Culebra (el.1489) ---------->
EPA3SHRC
!   Param 114: U--234 up shaft at Rustler/Culebra (el.1489) ---------->
EPA4SHRC
!   Param 115: Th-230 up shaft at Rustler/Culebra (el.1489) ---------->
EPA5SHRC
!   Param 116: Total activity up shaft at Rustler/Culebra (el.1489) -->
EPATSHRC
```

```
!
!***************************************
!
! Activity at Rustler/Culebra interface
!
!   Fluxes up shaft at Rustler/Culebra interface (Ci/s)
!
FL1SH_RC = IFGT0(FLUXJM1[E:1489],FLUXJM1[E:1489],0.0)
FL2SH_RC = IFGT0(FLUXJM2[E:1489],FLUXJM2[E:1489],0.0)
FL3SH_RC = IFGT0(FLUXJM3[E:1489],FLUXJM3[E:1489],0.0)
FL4SH_RC = IFGT0(FLUXJM4[E:1489],FLUXJM4[E:1489],0.0)
FL5SH_RC = IFGT0(FLUXJM5[E:1489],FLUXJM5[E:1489],0.0)
!
!   Radionuclides up shaft at Rustler/Culebra interface (Ci)
!
RN1SH_RC = INTRIGHT(FL1SH_RC)
RN2SH_RC = INTRIGHT(FL2SH_RC)
RN3SH_RC = INTRIGHT(FL3SH_RC)
RN4SH_RC = INTRIGHT(FL4SH_RC)
RN5SH_RC = INTRIGHT(FL5SH_RC)
!
!   Radionuclides up shaft at Rustler/Culebra interface (EPA units)
!
EPA1SHRC = RN1SH_RC/CI_2_EPA
EPA2SHRC = RN2SH_RC/CI_2_EPA
EPA3SHRC = RN3SH_RC/CI_2_EPA
EPA4SHRC = RN4SH_RC/CI_2_EPA
EPA5SHRC = RN5SH_RC/CI_5_EPA
!
EPATSHRC = EPA1SHRC + EPA2SHRC + EPA3SHRC + EPA4SHRC + EPA5SHRC
!
!   Delete fluxes and activities in Curies
!
DELETE FL1SH_RC, FL2SH_RC, FL3SH_RC, FL4SH_RC, FL5SH_RC
DELETE RN1SH_RC, RN2SH_RC, RN3SH_RC, RN4SH_RC, RN5SH_RC
!
!***************************************************************************
!***************************************************************************
!
! Volume-averaged isotope concentration (EPA units/m^3 brine) in waste panel
!
!   Param 117: Am-241 vol-avg concentration in waste panel --------->
EPAC1_WP
!   Param 118: Pu-239 vol-avg concentration in waste panel --------->
EPAC2_WP
!   Param 119: Pu-238 vol-avg concentration in waste panel --------->
EPAC3_WP
!   Param 120: U--234 vol-avg concentration in waste panel --------->
EPAC4_WP
!   Param 121: Th-230 vol-avg concentration in waste panel --------->
EPAC5_WP
!   Param 122: Total vol-avg isotope concentration in waste panel -->
EPACT_WP
!
! Volume-avg isotope concentration (EPA units/m^3 brine) in rest of
repository
!
```

```
!   Param 123: Am-241 vol-avg concentration in rest of repository -->
EPAC1_RR
!   Param 124: Pu-239 vol-avg concentration in rest of repository -->
EPAC2_RR
!   Param 125: Pu-238 vol-avg concentration in rest of repository -->
EPAC3_RR
!   Param 126: U--234 vol-avg concentration in rest of repository -->
EPAC4_RR
!   Param 127: Th-230 vol-avg concentration in rest of repository -->
EPAC5_RR
!   Param 128: Total vol-avg isotope conc. in rest of repository --->
EPACT_RR
!
!**************************************
!
! Conversion factors (Curies per kilogram), where
!      radionuclides are numbered
!        1 = Am-241
!        2 = Pu-239
!        3 = Pu-238
!        4 = U-234
!        5 = Th-230
!
A1 = 3431.154
A2 = 62.14554
A3 = 17115.25
A4 = 6.247269
A5 = 20.18264
!
!**************************************
!
! Waste panel
!
LIMIT ELEMENT 1407 TO 1427
!
! Total volume of waste area
!
WPVOL = SUM(GRIDVOL)
!
!**************************************
!
! Volume-averaged concentration in waste panel
!
!   Add up individual element concentrations (kg/m^3 brine)
!     weighted by element volume
!
CM1WPSUM = SUM(GRIDVOL*CM1)
CM2WPSUM = SUM(GRIDVOL*CM2)
CM3WPSUM = SUM(GRIDVOL*CM3)
CM4WPSUM = SUM(GRIDVOL*CM4)
CM5WPSUM = SUM(GRIDVOL*CM5)
!
!   Determine average concentration (kg/m^3 brine)
!     by dividing by total volume of waste panel
!
CM1_WP   = CM1WPSUM/WPVOL
CM2_WP   = CM2WPSUM/WPVOL
```

```
CM3_WP   = CM3WPSUM/WPVOL
CM4_WP   = CM4WPSUM/WPVOL
CM5_WP   = CM5WPSUM/WPVOL
!
!   Convert from mass to activity per unit volume (Ci/m^3 brine)
!
CCM1_WP  = CM1_WP*A1
CCM2_WP  = CM2_WP*A2
CCM3_WP  = CM3_WP*A3
CCM4_WP  = CM4_WP*A4
CCM5_WP  = CM5_WP*A5
!
!   Convert to EPA units
!
EPAC1_WP = CCM1_WP/CI_2_EPA
EPAC2_WP = CCM2_WP/CI_2_EPA
EPAC3_WP = CCM3_WP/CI_2_EPA
EPAC4_WP = CCM4_WP/CI_2_EPA
EPAC5_WP = CCM5_WP/CI_5_EPA
!
!   Add up total
!
EPACT_WP = EPAC1_WP + EPAC2_WP + EPAC3_WP + EPAC4_WP + EPAC5_WP
!
!   Delete temporary variables
!
DELETE WPVOL
DELETE CM1WPSUM, CM2WPSUM, CM3WPSUM, CM4WPSUM, CM5WPSUM
DELETE CM1_WP,   CM2_WP,   CM3_WP,   CM4_WP,   CM5_WP
DELETE CCM1_WP,  CCM2_WP,  CCM3_WP,  CCM4_WP,  CCM5_WP
!
!***************************************
!***************************************
!
! South Rest of repository
!
LIMIT ELEMENT 1428 TO 1433
!
! Total volume of South rest of repository
!
SRRVOL = SUM(GRIDVOL)
!
!***************************************
!
! Volume-averaged concentration South rest of repository
!
!   Add up individual element concentrations (kg/m^3 brine)
!     weighted by element volume
!
CM1SRSUM = SUM(GRIDVOL*CM1)
CM2SRSUM = SUM(GRIDVOL*CM2)
CM3SRSUM = SUM(GRIDVOL*CM3)
CM4SRSUM = SUM(GRIDVOL*CM4)
CM5SRSUM = SUM(GRIDVOL*CM5)
!
!   Determine average concentration (kg/m^3 brine)
!     by dividing by total volume of South rest of repository
```

```
!
CM1_SRR   = CM1SRSUM/SRRVOL
CM2_SRR   = CM2SRSUM/SRRVOL
CM3_SRR   = CM3SRSUM/SRRVOL
CM4_SRR   = CM4SRSUM/SRRVOL
CM5_SRR   = CM5SRSUM/SRRVOL
!
!   Convert from mass to activity per unit volume (Ci/m^3 brine)
!
CCM1_SRR  = CM1_SRR*A1
CCM2_SRR  = CM2_SRR*A2
CCM3_SRR  = CM3_SRR*A3
CCM4_SRR  = CM4_SRR*A4
CCM5_SRR  = CM5_SRR*A5
!
!   Convert to EPA units
!
EPAC1_SR = CCM1_SRR/CI_2_EPA
EPAC2_SR = CCM2_SRR/CI_2_EPA
EPAC3_SR = CCM3_SRR/CI_2_EPA
EPAC4_SR = CCM4_SRR/CI_2_EPA
EPAC5_SR = CCM5_SRR/CI_5_EPA
!
!   Add up total
!
EPACT_SR = EPAC1_SR + EPAC2_SR + EPAC3_SR + EPAC4_SR + EPAC5_SR
!
!   Delete temporary variables
!
DELETE CM1_SRR,   CM2_SRR,   CM3_SRR,   CM4_SRR,   CM5_SRR
DELETE CCM1_SRR,  CCM2_SRR,  CCM3_SRR,  CCM4_SRR,  CCM5_SRR
!
!***************************************
!***************************************
!
! North Rest of repository
!
LIMIT ELEMENT 1434 TO 1439
!
! Total volume of North rest of repository
!
NRRVOL = SUM(GRIDVOL)
!
!***************************************
!
! Volume-averaged concentration North rest of repository
!
!   Add up individual element concentrations (kg/m^3 brine)
!     weighted by element volume
!
CM1NRSUM = SUM(GRIDVOL*CM1)
CM2NRSUM = SUM(GRIDVOL*CM2)
CM3NRSUM = SUM(GRIDVOL*CM3)
CM4NRSUM = SUM(GRIDVOL*CM4)
CM5NRSUM = SUM(GRIDVOL*CM5)
!
!   Determine average concentration (kg/m^3 brine)
```

```
!     by dividing by total volume of North rest of repository
!
CM1_NRR   = CM1NRSUM/NRRVOL
CM2_NRR   = CM2NRSUM/NRRVOL
CM3_NRR   = CM3NRSUM/NRRVOL
CM4_NRR   = CM4NRSUM/NRRVOL
CM5_NRR   = CM5NRSUM/NRRVOL
!
!   Convert from mass to activity per unit volume (Ci/m^3 brine)
!
CCM1_NRR  = CM1_NRR*A1
CCM2_NRR  = CM2_NRR*A2
CCM3_NRR  = CM3_NRR*A3
CCM4_NRR  = CM4_NRR*A4
CCM5_NRR  = CM5_NRR*A5
!
!   Convert to EPA units
!
EPAC1_NR = CCM1_NRR/CI_2_EPA
EPAC2_NR = CCM2_NRR/CI_2_EPA
EPAC3_NR = CCM3_NRR/CI_2_EPA
EPAC4_NR = CCM4_NRR/CI_2_EPA
EPAC5_NR = CCM5_NRR/CI_5_EPA
!
!   Add up total
!
EPACT_NR = EPAC1_NR + EPAC2_NR + EPAC3_NR + EPAC4_NR + EPAC5_NR
!
!   Delete temporary variables
!
DELETE CM1_NRR,   CM2_NRR,   CM3_NRR,   CM4_NRR,   CM5_NRR
DELETE CCM1_NRR,  CCM2_NRR,  CCM3_NRR,  CCM4_NRR,  CCM5_NRR
!
!**************************************
!**************************************
!
! Rest of repository = South Rest of repository + North Rest of repository
!
RRVOL = SRRVOL + NRRVOL
!
!   Determine average concentration (kg/m^3 brine)
!     by dividing by total volume of rest of repository
!
CM1RRSUM = CM1SRSUM + CM1NRSUM
CM2RRSUM = CM2SRSUM + CM2NRSUM
CM3RRSUM = CM3SRSUM + CM3NRSUM
CM4RRSUM = CM4SRSUM + CM4NRSUM
CM5RRSUM = CM5SRSUM + CM5NRSUM
!
CM1_RR   = CM1RRSUM/RRVOL
CM2_RR   = CM2RRSUM/RRVOL
CM3_RR   = CM3RRSUM/RRVOL
CM4_RR   = CM4RRSUM/RRVOL
CM5_RR   = CM5RRSUM/RRVOL
!
CCM1_RR  = CM1_RR*A1
CCM2_RR  = CM2_RR*A2
```

```
CCM3_RR  = CM3_RR*A3
CCM4_RR  = CM4_RR*A4
CCM5_RR  = CM5_RR*A5
!
!   Convert to EPA units
!
EPAC1_RR = CCM1_RR/CI_2_EPA
EPAC2_RR = CCM2_RR/CI_2_EPA
EPAC3_RR = CCM3_RR/CI_2_EPA
EPAC4_RR = CCM4_RR/CI_2_EPA
EPAC5_RR = CCM5_RR/CI_5_EPA
!
!   Add up total
!
EPACT_RR = EPAC1_RR + EPAC2_RR + EPAC3_RR + EPAC4_RR + EPAC5_RR
!
DELETE CM1SRSUM, CM2SRSUM, CM3SRSUM, CM4SRSUM, CM5SRSUM
DELETE CM1NRSUM, CM2NRSUM, CM3NRSUM, CM4NRSUM, CM5NRSUM
DELETE CM1RRSUM, CM2RRSUM, CM3RRSUM, CM4RRSUM, CM5RRSUM
DELETE RRVOL, SRRVOL, NRRVOL
!***************************************************************************
!***************************************************************************
!
! Activity of dissolved mass of isotopes in waste panel (EPA units)
!
!   Param 129: Am-241 dissolved mass activity in waste panel --------->
DMEPA1WP
!   Param 130: Pu-239 dissolved mass activity in waste panel --------->
DMEPA2WP
!   Param 131: Pu-238 dissolved mass activity in waste panel --------->
DMEPA3WP
!   Param 132: U--234 dissolved mass activity in waste panel --------->
DMEPA4WP
!   Param 133: Th-230 dissolved mass activity in waste panel --------->
DMEPA5WP
!   Param 134: Total dissolved mass activity in waste panel ---------->
DMEPATWP
!
! Activity of dissolved mass of isotopes in rest of repository (EPA units)
!
!   Param 135: Am-241 dissolved mass activity in rest of repository -->
DMEPA1RR
!   Param 136: Pu-239 dissolved mass activity in rest of repository -->
DMEPA2RR
!   Param 137: Pu-238 dissolved mass activity in rest of repository -->
DMEPA3RR
!   Param 138: U--234 dissolved mass activity in rest of repository -->
DMEPA4RR
!   Param 139: Th-230 dissolved mass activity in rest of repository -->
DMEPA5RR
!   Param 140: Total dissolved mass activity in rest of repository --->
DMEPATRR
!
!**************************************
!
! Waste panel
!
```

```
LIMIT ELEMENT 1407 TO 1427
!
!***************************************
!
! Activity of dissolved mass of isotopes in waste panel
!
!   Dissolved masses in waste panel (kg)
!
DM1_WP = SUM(BMDISM1)
DM2_WP = SUM(BMDISM2)
DM3_WP = SUM(BMDISM3)
DM4_WP = SUM(BMDISM4)
DM5_WP = SUM(BMDISM5)
!
!   Activities of dissolved masses (Ci)
!
DMC1_WP  = DM1_WP*A1
DMC2_WP  = DM2_WP*A2
DMC3_WP  = DM3_WP*A3
DMC4_WP  = DM4_WP*A4
DMC5_WP  = DM5_WP*A5
!
!   Activities converted to EPA units
!
DMEPA1WP = DMC1_WP/CI_2_EPA
DMEPA2WP = DMC2_WP/CI_2_EPA
DMEPA3WP = DMC3_WP/CI_2_EPA
DMEPA4WP = DMC4_WP/CI_2_EPA
DMEPA5WP = DMC5_WP/CI_5_EPA
!
!   Total EPA activity
!
DMEPATWP = DMEPA1WP + DMEPA2WP + DMEPA3WP + DMEPA4WP + DMEPA5WP
!
!   Delete temporary variables
!
DELETE DM1_WP,  DM2_WP,  DM3_WP,  DM4_WP,  DM5_WP
DELETE DMC1_WP, DMC2_WP, DMC3_WP, DMC4_WP, DMC5_WP
!
!***************************************
!***************************************
!
! Rest of repository
!
LIMIT ELEMENT 1428 TO 1439
!
!***************************************
!
! Activity of dissolved mass of isotopes in rest of repository
!
!   Dissolved masses in rest of repository (kg)
!
DM1_RR = SUM(BMDISM1)
DM2_RR = SUM(BMDISM2)
DM3_RR = SUM(BMDISM3)
DM4_RR = SUM(BMDISM4)
DM5_RR = SUM(BMDISM5)
```

```
!
!   Activities of dissolved masses (Ci)
!
DMC1_RR  = DM1_RR*A1
DMC2_RR  = DM2_RR*A2
DMC3_RR  = DM3_RR*A3
DMC4_RR  = DM4_RR*A4
DMC5_RR  = DM5_RR*A5
!
!   Activities converted to EPA units
!
DMEPA1RR = DMC1_RR/CI_2_EPA
DMEPA2RR = DMC2_RR/CI_2_EPA
DMEPA3RR = DMC3_RR/CI_2_EPA
DMEPA4RR = DMC4_RR/CI_2_EPA
DMEPA5RR = DMC5_RR/CI_5_EPA
!
!   Total EPA activity
!
DMEPATRR = DMEPA1RR + DMEPA2RR + DMEPA3RR + DMEPA4RR + DMEPA5RR
!
!   Delete temporary variables
!
DELETE DM1_RR,  DM2_RR,  DM3_RR,  DM4_RR,  DM5_RR
DELETE DMC1_RR, DMC2_RR, DMC3_RR, DMC4_RR, DMC5_RR
!
!****************************************************************************
!****************************************************************************
!
! Activity of undissolved mass of isotopes in waste panel (EPA units)
!
!   Param 141: Am-241 undissolved mass activity in waste panel ------->
PMEPA1WP
!   Param 142: Pu-239 undissolved mass activity in waste panel ------->
PMEPA2WP
!   Param 143: Pu-238 undissolved mass activity in waste panel ------->
PMEPA3WP
!   Param 144: U--234 undissolved mass activity in waste panel ------->
PMEPA4WP
!   Param 145: Th-230 undissolved mass activity in waste panel ------->
PMEPA5WP
!   Param 146: Total undissolved mass activity in waste panel -------->
PMEPATWP
!
! Activity of undissolved mass of isotopes in rest of repository (EPA units)
!
!   Param 147: Am-241 undisslvd mass activity in rest of repository -->
PMEPA1RR
!   Param 148: Pu-239 undisslvd mass activity in rest of repository -->
PMEPA2RR
!   Param 149: Pu-238 undisslvd mass activity in rest of repository -->
PMEPA3RR
!   Param 150: U--234 undisslvd mass activity in rest of repository -->
PMEPA4RR
!   Param 151: Th-230 undisslvd mass activity in rest of repository -->
PMEPA5RR
!   Param 152: Total undisslvd mass activity in rest of repository --->
```

```
PMEPATRR
!
!**************************************
!
! Waste panel
!
LIMIT ELEMENT 1407 TO 1427
!
!**************************************
!
! Activity of undissolved mass of isotopes in waste panel
!
!   undissolved masses in waste panel (kg)
!
PM1_WP = SUM(BMPRCM1)
PM2_WP = SUM(BMPRCM2)
PM3_WP = SUM(BMPRCM3)
PM4_WP = SUM(BMPRCM4)
PM5_WP = SUM(BMPRCM5)
!
!   Activities of undissolved masses (Ci)
!
PMC1_WP  = PM1_WP*A1
PMC2_WP  = PM2_WP*A2
PMC3_WP  = PM3_WP*A3
PMC4_WP  = PM4_WP*A4
PMC5_WP  = PM5_WP*A5
!
!   Activities converted to EPA units
!
PMEPA1WP = PMC1_WP/CI_2_EPA
PMEPA2WP = PMC2_WP/CI_2_EPA
PMEPA3WP = PMC3_WP/CI_2_EPA
PMEPA4WP = PMC4_WP/CI_2_EPA
PMEPA5WP = PMC5_WP/CI_5_EPA
!
!   Total EPA activity
!
PMEPATWP = PMEPA1WP + PMEPA2WP + PMEPA3WP + PMEPA4WP + PMEPA5WP
!
!   Delete temporary variables
!
DELETE PM1_WP,  PM2_WP,  PM3_WP,  PM4_WP,  PM5_WP
DELETE PMC1_WP, PMC2_WP, PMC3_WP, PMC4_WP, PMC5_WP
!
!**************************************
!**************************************
!
! Rest of repository
!
LIMIT ELEMENT 1428 TO 1439
!
!**************************************
!
! Activity of undissolved mass of isotopes in rest of repository
!
!   Undissolved masses in rest of repository (kg)
```

```
!
PM1_RR = SUM(BMPRCM1)
PM2_RR = SUM(BMPRCM2)
PM3_RR = SUM(BMPRCM3)
PM4_RR = SUM(BMPRCM4)
PM5_RR = SUM(BMPRCM5)
!
!   Activities of undissolved masses (Ci)
!
PMC1_RR  = PM1_RR*A1
PMC2_RR  = PM2_RR*A2
PMC3_RR  = PM3_RR*A3
PMC4_RR  = PM4_RR*A4
PMC5_RR  = PM5_RR*A5
!
!   Activities converted to EPA units
!
PMEPA1RR = PMC1_RR/CI_2_EPA
PMEPA2RR = PMC2_RR/CI_2_EPA
PMEPA3RR = PMC3_RR/CI_2_EPA
PMEPA4RR = PMC4_RR/CI_2_EPA
PMEPA5RR = PMC5_RR/CI_5_EPA
!
!   Total EPA activity
!
PMEPATRR = PMEPA1RR + PMEPA2RR + PMEPA3RR + PMEPA4RR + PMEPA5RR
!
!   Delete temporary variables
!
DELETE PM1_RR,  PM2_RR,  PM3_RR,  PM4_RR,  PM5_RR
DELETE PMC1_RR, PMC2_RR, PMC3_RR, PMC4_RR, PMC5_RR
!
DELETE A1, A2, A3, A4, A5
!
!****************************************************************************
!****************************************************************************
!
! Total activities of isotopes in marker beds (Ci)
!
!   Param 153: Am-241 total activity in north marker beds --> TA1_MBN
!   Param 154: Pu-239 total activity in north marker beds --> TA2_MBN
!   Param 155: Pu-238 total activity in north marker beds --> TA3_MBN
!   Param 156: U--234 total activity in north marker beds --> TA4_MBN
!   Param 157: Th-230 total activity in north marker beds --> TA5_MBN
!
!   Param 158: Am-241 total activity in south marker beds --> TA1_MBS
!   Param 159: Pu-239 total activity in south marker beds --> TA2_MBS
!   Param 160: Pu-238 total activity in south marker beds --> TA3_MBS
!   Param 161: U--234 total activity in south marker beds --> TA4_MBS
!   Param 162: Th-230 total activity in south marker beds --> TA5_MBS
!
!   Param 163: Am-241 total activity in all marker beds ----> TA1_MBT
!   Param 164: Pu-239 total activity in all marker beds ----> TA2_MBT
!   Param 165: Pu-238 total activity in all marker beds ----> TA3_MBT
!   Param 166: U--234 total activity in all marker beds ----> TA4_MBT
!   Param 167: Th-230 total activity in all marker beds ----> TA5_MBT
!
```

```
! Total activities of isotopes in marker beds (EPA units)
!
!   Param 168: Am-241 total activity in north marker beds --> TEPA1MBN
!   Param 169: Pu-239 total activity in north marker beds --> TEPA2MBN
!   Param 170: Pu-238 total activity in north marker beds --> TEPA3MBN
!   Param 171: U--234 total activity in north marker beds --> TEPA4MBN
!   Param 172: Th-230 total activity in north marker beds --> TEPA5MBN
!
!   Param 173: Am-241 total activity in south marker beds --> TEPA1MBS
!   Param 174: Pu-239 total activity in south marker beds --> TEPA2MBS
!   Param 175: Pu-238 total activity in south marker beds --> TEPA3MBS
!   Param 176: U--234 total activity in south marker beds --> TEPA4MBS
!   Param 177: Th-230 total activity in south marker beds --> TEPA5MBS
!
!   Param 178: Am-241 total activity in all marker beds ----> TEPA1MBT
!   Param 179: Pu-239 total activity in all marker beds ----> TEPA2MBT
!   Param 180: Pu-238 total activity in all marker beds ----> TEPA3MBT
!   Param 181: U--234 total activity in all marker beds ----> TEPA4MBT
!   Param 182: Th-230 total activity in all marker beds ----> TEPA5MBT
!
!   Param 183: Total activity in all marker beds, north ----> TEPATMBN
!   Param 184: Total activity in all marker beds, south ----> TEPATMBS
!   Param 185: Total activity in all marker beds, overall --> TEPATMBT
!
!**************************************
!
! Total activities of isotopes in north marker beds (Ci)
!
LIMIT ELEMENT 1267 TO 1289, 1316 TO 1338, 1384 TO 1406
!
TA1_MBN = SUM(TOTMMC1)
TA2_MBN = SUM(TOTMMC2)
TA3_MBN = SUM(TOTMMC3)
TA4_MBN = SUM(TOTMMC4)
TA5_MBN = SUM(TOTMMC5)
!
!**************************************
!
! Total activities of isotopes in south marker beds (Ci)
!
LIMIT ELEMENT 1241 TO 1262, 1290 TO 1311, 1339 TO 1360
!
TA1_MBS = SUM(TOTMMC1)
TA2_MBS = SUM(TOTMMC2)
TA3_MBS = SUM(TOTMMC3)
TA4_MBS = SUM(TOTMMC4)
TA5_MBS = SUM(TOTMMC5)
!
!**************************************
!
! Total activities of isotopes in north and south marker beds (Ci)
!
TA1_MBT = TA1_MBN + TA1_MBS
TA2_MBT = TA2_MBN + TA2_MBS
TA3_MBT = TA3_MBN + TA3_MBS
TA4_MBT = TA4_MBN + TA4_MBS
TA5_MBT = TA5_MBN + TA5_MBS
```

```
!
!***************************************
!***************************************
!
! Total activities of isotopes in north marker beds (EPA units)
!
TEPA1MBN = TA1_MBN/CI_2_EPA
TEPA2MBN = TA2_MBN/CI_2_EPA
TEPA3MBN = TA3_MBN/CI_2_EPA
TEPA4MBN = TA4_MBN/CI_2_EPA
TEPA5MBN = TA5_MBN/CI_5_EPA
!
!***************************************
!
! Total activities of isotopes in south marker beds (EPA units)
!
TEPA1MBS = TA1_MBS/CI_2_EPA
TEPA2MBS = TA2_MBS/CI_2_EPA
TEPA3MBS = TA3_MBS/CI_2_EPA
TEPA4MBS = TA4_MBS/CI_2_EPA
TEPA5MBS = TA5_MBS/CI_5_EPA
!
!***************************************
!
! Total activities of isotopes in north and south marker beds (EPA units)
!
TEPA1MBT = TA1_MBT/CI_2_EPA
TEPA2MBT = TA2_MBT/CI_2_EPA
TEPA3MBT = TA3_MBT/CI_2_EPA
TEPA4MBT = TA4_MBT/CI_2_EPA
TEPA5MBT = TA5_MBT/CI_5_EPA
!
!***************************************
!
! Sum of activity in north marker beds (EPA units)
!
TEPATMBN = TEPA1MBN +  TEPA2MBN +  TEPA3MBN +  TEPA4MBN +  TEPA5MBN
!
! Sum of activity in south marker beds (EPA units)
!
TEPATMBS = TEPA1MBS +  TEPA2MBS +  TEPA3MBS +  TEPA4MBS +  TEPA5MBS
!
! Sum of activities in north and south marker beds (EPA units)
!
TEPATMBT = TEPATMBN + TEPATMBS
!
!*****************************************************************************
!*****************************************************************************
!
! Total activities of isotopes in waste panel (EPA units)
!
!   Param 186: Am-241 total activity in waste panel ----------> TEPA1_WP
!   Param 187: Pu-239 total activity in waste panel ----------> TEPA2_WP
!   Param 188: Pu-238 total activity in waste panel ----------> TEPA3_WP
!   Param 189: U--234 total activity in waste panel ----------> TEPA4_WP
!   Param 190: Th-230 total activity in waste panel ----------> TEPA5_WP
!   Param 191: Total isotope activity in waste panel ---------> TEPAT_WP
```

```
!
! Total activities of isotopes in rest of repository (EPA units)
!
!   Param 192: Am-241 total activity in rest of repository ---> TEPA1_RR
!   Param 193: Pu-239 total activity in rest of repository ---> TEPA2_RR
!   Param 194: Pu-238 total activity in rest of repository ---> TEPA3_RR
!   Param 195: U--234 total activity in rest of repository ---> TEPA4_RR
!   Param 196: Th-230 total activity in rest of repository ---> TEPA5_RR
!   Param 197: Total isotope activity in rest of repository --> TEPAT_RR
!
!**************************************
!
! Waste panel
!
LIMIT ELEMENT 1407 TO 1427
!
!**************************************
!
! Total activities in waste panel (Curies)
!
TA1_WP = SUM(TOTMMC1)
TA2_WP = SUM(TOTMMC2)
TA3_WP = SUM(TOTMMC3)
TA4_WP = SUM(TOTMMC4)
TA5_WP = SUM(TOTMMC5)
!
! Convert to EPA units
!
TEPA1_WP = TA1_WP/CI_2_EPA
TEPA2_WP = TA2_WP/CI_2_EPA
TEPA3_WP = TA3_WP/CI_2_EPA
TEPA4_WP = TA4_WP/CI_2_EPA
TEPA5_WP = TA5_WP/CI_5_EPA
!
! Add isotope activities together for EPA total
!
TEPAT_WP = TEPA1_WP + TEPA2_WP + TEPA3_WP + TEPA4_WP + TEPA5_WP
!
! Delete temporary variables
!
DELETE TA1_WP, TA2_WP, TA3_WP, TA4_WP, TA5_WP
!
!**************************************
!**************************************
!
! Rest of repository
!
LIMIT ELEMENT 1428 TO 1439
!
!**************************************
!
! Total activities in rest of repository (Curies)
!
TA1_RR = SUM(TOTMMC1)
TA2_RR = SUM(TOTMMC2)
TA3_RR = SUM(TOTMMC3)
TA4_RR = SUM(TOTMMC4)
```

```
TA5_RR = SUM(TOTMMC5)
!
! Convert to EPA units
!
TEPA1_RR = TA1_RR/CI_2_EPA
TEPA2_RR = TA2_RR/CI_2_EPA
TEPA3_RR = TA3_RR/CI_2_EPA
TEPA4_RR = TA4_RR/CI_2_EPA
TEPA5_RR = TA5_RR/CI_5_EPA
!
! Add isotope activities together for EPA total
!
TEPAT_RR = TEPA1_RR + TEPA2_RR + TEPA3_RR + TEPA4_RR + TEPA5_RR
!
! Delete temporary variables
!
DELETE TA1_RR, TA2_RR, TA3_RR, TA4_RR, TA5_RR
!
DELETE CI_2_EPA, CI_5_EPA
!
!*****************************************************************************
!*****************************************************************************
!
! Fluxes (Ci/s) in borehole at Rustler/Culebra Interface
!
!   Param 198: Am-241 flux up borehole at Rustler/Culebra (el.1845) -->
FL1BH_RC
!   Param 199: Pu-239 flux up borehole at Rustler/Culebra (el.1845) -->
FL2BH_RC
!   Param 200: Pu-238 flux up borehole at Rustler/Culebra (el.1845) -->
FL3BH_RC
!   Param 201: U--234 flux up borehole at Rustler/Culebra (el.1845) -->
FL4BH_RC
!   Param 202: Th-230 flux up borehole at Rustler/Culebra (el.1845) -->
FL5BH_RC
!
!****************************************
!
FL1BH_RC  = FL1BHRC
FL2BH_RC  = FL2BHRC
FL3BH_RC  = FL3BHRC
FL4BH_RC  = FL4BHRC
FL5BH_RC  = FL5BHRC
!
DELETE FL1BHRC, FL2BHRC, FL3BHRC, FL4BHRC, FL5BHRC
!
!*****************************************************************************
!*****************************************************************************
!
! Concentration (kg/m^3 brine) of isotopes in borehole at Rustler/Culebra
!
!   Param 203: Am-241 concen. in bh at Rustler/Culebra (el.1845) --> CON1BHRC
!   Param 204: Pu-239 concen. in bh at Rustler/Culebra (el.1845) --> CON2BHRC
!   Param 205: Pu-238 concen. in bh at Rustler/Culebra (el.1845) --> CON3BHRC
!   Param 206: U--234 concen. in bh at Rustler/Culebra (el.1845) --> CON4BHRC
!   Param 207: Th-230 concen. in bh at Rustler/Culebra (el.1845) --> CON5BHRC
!
```

```
!**************************************
!
LIMIT ELEMENT OFF
!
CON1BHRC = CM1[E:1845]
CON2BHRC = CM2[E:1845]
CON3BHRC = CM3[E:1845]
CON4BHRC = CM4[E:1845]
CON5BHRC = CM5[E:1845]
!
!************************************************************************
!************************************************************************
!
! Total activity (int. flux) in each South side m. bed at l-w bndry (EPA
units)
!
!   Param 208: Total activity in MB 138 at South l-w boundary ------>
EPALWM8S
!   Param 209: Total activity in Anyhd. A/B at South l-w boundary -->
EPALWABS
!   Param 210: Total activity in MB 139 at South l-w boundary ------>
EPALWM9S
!
!**************************************
!
! Activities in marker beds across south land-withdrawal boundary (Ci)
!
!   Integrate previously defined fluxes
!
R1LWMB8S = INTRIGHT(F1LWM38S)
R2LWMB8S = INTRIGHT(F2LWM38S)
R3LWMB8S = INTRIGHT(F3LWM38S)
R4LWMB8S = INTRIGHT(F4LWM38S)
R5LWMB8S = INTRIGHT(F5LWM38S)
!
R1LWAABS = INTRIGHT(F1LWAABS)
R2LWAABS = INTRIGHT(F2LWAABS)
R3LWAABS = INTRIGHT(F3LWAABS)
R4LWAABS = INTRIGHT(F4LWAABS)
R5LWAABS = INTRIGHT(F5LWAABS)
!
R1LWMB9S = INTRIGHT(F1LWM39S)
R2LWMB9S = INTRIGHT(F2LWM39S)
R3LWMB9S = INTRIGHT(F3LWM39S)
R4LWMB9S = INTRIGHT(F4LWM39S)
R5LWMB9S = INTRIGHT(F5LWM39S)
!
DELETE F1LWM38S, F1LWAABS, F1LWM39S
DELETE F2LWM38S, F2LWAABS, F2LWM39S
DELETE F3LWM38S, F3LWAABS, F3LWM39S
DELETE F4LWM38S, F4LWAABS, F4LWM39S
DELETE F5LWM38S, F5LWAABS, F5LWM39S
!
!   Convert activities to EPA units
!
E1LWMB8S = R1LWMB8S/CI_2_EPA
E2LWMB8S = R2LWMB8S/CI_2_EPA
```

```
E3LWMB8S = R3LWMB8S/CI_2_EPA
E4LWMB8S = R4LWMB8S/CI_2_EPA
E5LWMB8S = R5LWMB8S/CI_5_EPA
!
E1LWAABS = R1LWAABS/CI_2_EPA
E2LWAABS = R2LWAABS/CI_2_EPA
E3LWAABS = R3LWAABS/CI_2_EPA
E4LWAABS = R4LWAABS/CI_2_EPA
E5LWAABS = R5LWAABS/CI_5_EPA
!
E1LWMB9S = R1LWMB9S/CI_2_EPA
E2LWMB9S = R2LWMB9S/CI_2_EPA
E3LWMB9S = R3LWMB9S/CI_2_EPA
E4LWMB9S = R4LWMB9S/CI_2_EPA
E5LWMB9S = R5LWMB9S/CI_5_EPA
!
DELETE R1LWMB8S, R2LWMB8S, R3LWMB8S, R4LWMB8S, R5LWMB8S
DELETE R1LWAABS, R2LWAABS, R3LWAABS, R4LWAABS, R5LWAABS
DELETE R1LWMB9S, R2LWMB9S, R3LWMB9S, R4LWMB9S, R5LWMB9S
!
!   Sum individual species activities to get total for each marker bed
!
EPALWM8S = E1LWMB8S + E2LWMB8S + E3LWMB8S + E4LWMB8S + E5LWMB8S
EPALWABS = E1LWAABS + E2LWAABS + E3LWAABS + E4LWAABS + E5LWAABS
EPALWM9S = E1LWMB9S + E2LWMB9S + E3LWMB9S + E4LWMB9S + E5LWMB9S
!
DELETE E1LWMB8S, E2LWMB8S, E3LWMB8S, E4LWMB8S, E5LWMB8S
DELETE E1LWAABS, E2LWAABS, E3LWAABS, E4LWAABS, E5LWAABS
DELETE E1LWMB9S, E2LWMB9S, E3LWMB9S, E4LWMB9S, E5LWMB9S
!
!***************************************************************************
!***************************************************************************
!
DELETE GRIDVOL
!
!***************************************************************************
!***************************************************************************
END
$
```

APPENDIX G: REPRESENTATIVE SECOTP2D INPUT FILES

G.1 GENMESH FILE –sets up grid

```
$ type gm_st2d_cra1.inp
!===========================================================================
=
!  Grid for 2003 CRA calculations
!  Created for SECOTP2D by Joshua Stein
!  June 25, 2003
!===========================================================================
=
!
!
*SETUP
DIM=2
ORIG=0.0000E+00,0.0000E+00
IJKMAX=151, 109
!
*GRID,
DEL,  COORD=X, DEL=50., INRANGE=1,151
!
DEL,  COORD=Y, DEL=50., INRANGE=1,109
!
!
*REGions
REG=1, IRANGE=1,151, JRANGE=1,109
!
!
*ELEV
LOC,  THICK=4.0, ELEVAT=0.0, IRANGE=1,151 JRANGE=1,109
!
*END
```

G.2 MATSET FILE calls parameters, defines paraemeters/assigns blocks

```
$ cfe ms_st2d_cra1.inp
Your CMS library list consists of:
  PACMS2:[CMS_CRA1.CRA1_MS]

%CMS-S-FETCHED, generation 2 of element
PACMS2:[CMS_CRA1.CRA1_MS]MS_ST2D_CRA1.IN
P fetched
$ type ms_st2d_cra1.inp
!=========================================================================
! TITLE:    SECO INPUT 1996: The WIPP PA CCA Calculation
! ANALYSTS: C. T. STOCKMAN, R. L. BLAINE
! CREATED:  JUNE 12, 1996
! MODIFIED:
! PURPOSE:  PREPARE DATABASE FOR PRESECO
!======================================================================
!
*HEADING
RUN=0
SCALE=SOURCE
```

```
SCENARIO=00
TITLE=SECO
!
*PRINT_ASSIGNED_VALUES
!
*UNITS=SI
!
*CREATE_BLOCK
 BLOCKID=      2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13
*RETRIEVE*NAME
COORDINATE, DIM=2, NAMES=X, Y
MATERIAL,   1=CULEBRA, 2=GLOBAL, 3=REFCON, &
   4=AM241, 5=PU239, 6=TH230, 7=U234,  &
   8=AM+3,  9=PU+3, 10=PU+4, 11=TH+4, 12=U+4, 13=U+6
!
PROPERTY,  MATERIAL=CULEBRA,   NAMES =APOROS,DPOROS,DISP_L,DISPT_L
PROPERTY,  MATERIAL=CULEBRA,   NAMES =FTORT,DTORT
PROPERTY,  MATERIAL=CULEBRA,   NAMES =HMBLKLT,SKIN_RES,DNSGRAIN
PROPERTY,  MATERIAL=GLOBAL,    NAMES =OXSTAT,CLIMTIDX, TRANSIDX
PROPERTY,  MATERIAL=REFCON,    NAMES =YRSEC
!ISOTOPES
PROPERTY   MATERIAL=Am241,     NAMES =ATWEIGHT,HALFLIFE
PROPERTY   MATERIAL=Pu239,     NAMES =ATWEIGHT,HALFLIFE
PROPERTY   MATERIAL=Th230,     NAMES =ATWEIGHT,HALFLIFE
PROPERTY   MATERIAL=U234,      NAMES =ATWEIGHT,HALFLIFE
!
PROPERTY   MATERIAL=AM+3,      NAMES =MKD_AM, MD0
PROPERTY   MATERIAL=PU+3,      NAMES =MKD_PU, MD0
PROPERTY   MATERIAL=PU+4,      NAMES =MKD_PU, MD0
PROPERTY   MATERIAL=TH+4,      NAMES =MKD_TH, MD0
PROPERTY   MATERIAL=U+4,       NAMES =MKD_U,  MD0
PROPERTY   MATERIAL=U+6,       NAMES =MKD_U,  MD0
!

*END
!------
```

G.3 LHS FILE–calls up sampled parameters

```
$ type lhs1_st2d_cra1_a1.inp
! TITLE:    BRAGFLO 2003 CRA1 (LHS1)
! SCENARIO: S1, S2, S3, S4, S5, and S6
! ANALYSTS: Joshua Stein and Bill Zelinski
! CREATED:  April  2003
! MODIFIED: April 7
!
!  LHSCALC = CRA1 REALIZATION 1
!==========================================================================
!
!  DESCRIPTION:
!
!  WIPP 2003 Compliance Recertification Analyses (CRA)
!
!  This input file to PRELHS is used to generate, as an output file, an LHS
!  input file containing all distribution information and execution options
!  required to create a sample for Replicate R1 for the WIPP 2003 CRA
!
```

```
!  Modifed for CRA analyses:  LHSBLANK dummy changed to LHSBLANK and
!            REFCON MATERIAL (LHSBLANK) changed to REFCON
!            #59 dummy replaced with VOLSPALL
!========= No Comments Allowed between *ECHO and *ENDECHO ================
!
*ECHOLHS
TITLE 2002 TBM PA Calculation, Replicate R1 Input File for the LHS Code
NOBS           100
RANDOM SEED    921196800
CORRELATION MATRIX
   3
   18  19 -0.99
   20  21 -0.99
   28  29 -0.75
OUTPUT CORR HIST DATA
*ENDECHO
!
!== PROPERTIES TO BE RETRIEVED FROM WIPP 1997 PA CALCULATION DATABASE ==
!
*RETRIEVE
!1
  MATERIALS,  STEEL
  PROPERTIES, CORRMCO2
!2
  MATERIALS,  WAS_AREA
  PROPERTIES, PROBDEG
!3
  MATERIALS,  WAS_AREA
  PROPERTIES, GRATMICI
!4
  MATERIALS,  WAS_AREA
  PROPERTIES, GRATMICH
!5
  MATERIALS,  CELLULS
  PROPERTIES, FBETA
!6
  MATERIALS,  WAS_AREA
  PROPERTIES, SAT_RGAS
!7
  MATERIALS,  WAS_AREA
  PROPERTIES, SAT_RBRN
!8
  MATERIALS,  WAS_AREA
  PROPERTIES, SAT_WICK
!9
  MATERIALS,  DRZ_PCS
  PROPERTIES, PRMX_LOG
!10
  MATERIALS,  CONC_PCS
  PROPERTIES, PRMX_LOG
!11
  MATERIALS,  SOLU4
  PROPERTIES, SOLCIM
!12
  MATERIALS,  SOLTH4
  PROPERTIES, SOLCIM
!13 dummy placeholder
```

```
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!14
  MATERIALS,  CONC_PCS
  PROPERTIES, SAT_RGAS
!15
  MATERIALS,  CONC_PCS
  PROPERTIES, SAT_RBRN
!16
  MATERIALS,  CONC_PCS
  PROPERTIES, PORE_DIS
!17
  MATERIALS,  S_HALITE
  PROPERTIES, POROSITY
!18
  MATERIALS,  S_HALITE
  PROPERTIES, PRMX_LOG
!19
  MATERIALS,  S_HALITE
  PROPERTIES, COMP_RCK
!20
  MATERIALS,  S_MB139
  PROPERTIES, PRMX_LOG
!21
  MATERIALS,  S_MB139
  PROPERTIES, COMP_RCK
!22
  MATERIALS,  S_MB139
  PROPERTIES, RELP_MOD
!23
  MATERIALS,  S_MB139
  PROPERTIES, SAT_RBRN
!24
  MATERIALS,  S_MB139
  PROPERTIES, SAT_RGAS
!25
  MATERIALS,  S_MB139
  PROPERTIES, PORE_DIS
!26
  MATERIALS,  S_HALITE
  PROPERTIES, PRESSURE
!27
  MATERIALS,  CASTILER
  PROPERTIES, PRESSURE
!28
  MATERIALS,  CASTILER
  PROPERTIES, PRMX_LOG
!29
  MATERIALS,  CASTILER
  PROPERTIES, COMP_RCK
!30
  MATERIALS,  BH_SAND
  PROPERTIES, PRMX_LOG
!31
  MATERIALS,  DRZ_1
  PROPERTIES, PRMX_LOG
!32
```

```
  MATERIALS,  CONC_PLG
  PROPERTIES, PRMX_LOG
!33 dummy placeholder
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!34
  MATERIALS,  SOLAM3
  PROPERTIES, SOLSIM
!35
  MATERIALS,  SOLAM3
  PROPERTIES, SOLCIM
!36
  MATERIALS,  SOLPU3
  PROPERTIES, SOLSIM
!37
  MATERIALS,  SOLPU3
  PROPERTIES, SOLCIM
!38
  MATERIALS,  SOLPU4
  PROPERTIES, SOLSIM
!39
  MATERIALS,  SOLPU4
  PROPERTIES, SOLCIM
!40
  MATERIALS,  SOLU4
  PROPERTIES, SOLSIM
!41
  MATERIALS,  SOLU6
  PROPERTIES, SOLSIM
!42
  MATERIALS,  SOLU6
  PROPERTIES, SOLCIM
!43
  MATERIALS,  SOLTH4
  PROPERTIES, SOLSIM
!44
  MATERIALS,  PHUMOX3
  PROPERTIES, PHUMCIM
!45
  MATERIALS,  GLOBAL
  PROPERTIES, OXSTAT
!46
  MATERIALS,  CULEBRA
  PROPERTIES, MINP_FAC
!47
  MATERIALS,  GLOBAL
  PROPERTIES, TRANSIDX
!48
  MATERIALS,  GLOBAL
  PROPERTIES, CLIMTIDX
!49
  MATERIALS,  CULEBRA
  PROPERTIES, HMBLKLT
!50
  MATERIALS,  CULEBRA
  PROPERTIES, APOROS
!51
```

```
  MATERIALS,  CULEBRA
  PROPERTIES, DPOROS
!52
  MATERIALS,  U+6
  PROPERTIES, MKD_U
!53
  MATERIALS,  U+4
  PROPERTIES, MKD_U
!54
  MATERIALS,  PU+3
  PROPERTIES, MKD_PU
!55
  MATERIALS,  PU+4
  PROPERTIES, MKD_PU
!56
  MATERIALS,  TH+4
  PROPERTIES, MKD_TH
!57
  MATERIALS,  AM+3
  PROPERTIES, MKD_AM
!58
  MATERIALS,  BOREHOLE
  PROPERTIES, TAUFAIL
!59 dummy placeholder for VOLSPALL
  MATERIALS,  WAS_AREA
  PROPERTIES, VOLSPALL
!60
  MATERIALS,  GLOBAL
  PROPERTIES, PBRINE
!61
  MATERIALS,  BOREHOLE
  PROPERTIES, DOMEGA
!62
  MATERIALS,  SHFTU
  PROPERTIES, SAT_RBRN
!63
  MATERIALS,  SHFTU
  PROPERTIES, SAT_RGAS
!64
  MATERIALS,  SHFTU
  PROPERTIES, PRMX_LOG
!65
  MATERIALS,  SHFTL_T1
  PROPERTIES, PRMX_LOG
!66
  MATERIALS,  SHFTL_T2
  PROPERTIES, PRMX_LOG
!67
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!68
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!69
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!70
```

```
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!71
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!72
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!73
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!74
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!75
  MATERIALS,  REFCON
  PROPERTIES, LHSBLANK
!
```

G.4 ALGEBRA FILE–defines parameters, manipulates parameters

```
$ cfe alg_st2d_cra1.inp
Your CMS library list consists of:
  PACMS2:[CMS_CRA1.CRA1_ALG]

%CMS-S-FETCHED, generation 2 of element
PACMS2:[CMS_CRA1.CRA1_ALG]ALG_ST2D_CRA1.
INP fetched
$ type alg_st2d_cra1.inp
!=================================================================
!TITLE: PREPARE CDB FOR PRESECO
!ANALYSTS: C.T. STOCKMAN, R.L.BLAINE
!CREATED:  JUNE 13, 1996
!MODIFIED:
!MODIFIED:
!=======================================================================
!OX IS NEG AND 0 FOR LOW OX STATE AND POSITIVE FOR HIGH OX STATE
OX=OXSTAT[B:2]-0.5
ACTCONST=1.128E+13
!   Convert the transmissivity index to an integer
!   between 1 and 100 to correspond to a given t-field
TRANSIDX = AINT(TRANSIDX*100) + 1
!
!USE CULEBRA BLOCK=1
LIMIT BLOCK 1
!
!AM241=4,AM+3=8
DC_AM241=MAKEPROP(LOG(2)/HALFLIFE[B:4])
SA_AM241=MAKEPROP(ACTCONST/ATWEIGHT[B:4]/HALFLIFE[B:4])
MKD_AM=MAKEPROP(MKD_AM[B:8])
MD0_AM=MAKEPROP(MD0[B:8])
MRTRD_AM=1.0 + DNSGRAIN*(1-DPOROS)*MKD_AM/DPOROS
ZRTRD_AM=MAKEPROP(1.0)
!
!PU239=5,PU+3=9,PU+4=10
DC_PU239=MAKEPROP(LOG(2)/HALFLIFE[B:5])
```

```
SA_PU239=MAKEPROP(ACTCONST/ATWEIGHT[B:5]/HALFLIFE[B:5])
MKD_PU=MAKEPROP(IFGT0(OX,MKD_PU[B:10],MKD_PU[B:9]))
MD0_PU=MAKEPROP(IFGT0(OX,MD0[B:10],MD0[B:9]))
MRTRD_PU=1.0 + DNSGRAIN*(1-DPOROS)*MKD_PU/DPOROS
ZRTRD_PU=MAKEPROP(1.0)
!
!TH230=6, TH+4=11
DC_TH230=MAKEPROP(LOG(2)/HALFLIFE[B:6])
SA_TH230=MAKEPROP(ACTCONST/ATWEIGHT[B:6]/HALFLIFE[B:6])
MKD_TH=MAKEPROP(MKD_TH[B:11])
MD0_TH=MAKEPROP(MD0[B:11])
MRTRD_TH=1.0 + DNSGRAIN*(1-DPOROS)*MKD_TH/DPOROS
ZRTRD_TH=MAKEPROP(1.0)
!
!U234=7,U+4=12,U+6=13
DC_U234=MAKEPROP(LOG(2)/HALFLIFE[B:7])
SA_U234=MAKEPROP(ACTCONST/ATWEIGHT[B:7]/HALFLIFE[B:7])
MKD_U=MAKEPROP(IFGT0(OX,MKD_U[B:13],MKD_U[B:12]))
MD0_U=MAKEPROP(IFGT0(OX,MD0[B:13],MD0[B:12]))
MRTRD_U=1.0 + DNSGRAIN*(1-DPOROS)*MKD_U/DPOROS
ZRTRD_U=MAKEPROP(1.0)
!
LIMIT BLOCK 1
DISP_TRN=MAKEATTR(DISP_L*DISPT_L)
DISP_LNG=MAKEATTR(DISP_L)
FPOROS=MAKEATTR(APOROS)
MPOROS=MAKEATTR(DPOROS)
MTORT=MAKEATTR(DTORT)
F_TORT=MAKEATTR(FTORT)
END
```

G.5 RELATE INPUT FILE FOR SECOTP2D

```
$ type rel_st2d_cra1.inp
!===========================================================================
!  Input file to run RELATE for PRESECOTP preparation
!  Need to remove all elements blocks except for CULEBRA
!  Created by Rebecca Blaine
!  June 15, 1996
!===========================================================================
*LOCATION,
  XOBJ=0.0, YOBJ=0.0, ANGLE=0.0, UNITS=1.0
*ATTRIBUTE
DISP_TRN = NEAREST CULEBRA DISP_TRN
DISP_LNG = NEAREST CULEBRA DISP_LNG
FPOROS   = NEAREST CULEBRA FPOROS
MPOROS   = NEAREST CULEBRA MPOROS
F_TORT   = NEAREST CULEBRA F_TORT
MTORT    = NEAREST CULEBRA MTORT
*PROPERTY
HMBLKLT  = XFERED CULEBRA HMBLKLT
SKIN_RES = XFERED CULEBRA SKIN_RES
DC_AM241 = XFERED CULEBRA DC_AM241
DC_PU239 = XFERED CULEBRA DC_PU239
DC_TH230 = XFERED CULEBRA DC_TH230
```

```
DC_U234  = XFERED CULEBRA DC_U234
SA_AM241 = XFERED CULEBRA SA_AM241
SA_PU239 = XFERED CULEBRA SA_PU239
SA_TH230 = XFERED CULEBRA SA_TH230
SA_U234  = XFERED CULEBRA SA_U234
MD0_AM   = XFERED CULEBRA MD0_AM
MD0_PU   = XFERED CULEBRA MD0_PU
MD0_TH   = XFERED CULEBRA MD0_TH
MD0_U    = XFERED CULEBRA MD0_U
MRTRD_AM = XFERED CULEBRA MRTRD_AM
MRTRD_PU = XFERED CULEBRA MRTRD_PU
MRTRD_TH = XFERED CULEBRA MRTRD_TH
MRTRD_U  = XFERED CULEBRA MRTRD_U
ZRTRD_AM = XFERED CULEBRA ZRTRD_AM
ZRTRD_PU = XFERED CULEBRA ZRTRD_PU
ZRTRD_TH = XFERED CULEBRA ZRTRD_TH
ZRTRD_U  = XFERED CULEBRA ZRTRD_U
CLIMTIDX = XFERED GLOBAL CLIMTIDX
```

G.6 PRESECOTP2D INPUT FILE

```
$ type st2d1_cra1.inp
!=============================================================================
==
! Input file used to run PRESECOTP2D for the CRA1 calculations.
!
! This input file:
!  1) Applies source coefficient only in y direction.
!  2) Uses fixed time steps
!
! Created by Joseph Kanney
! Oct. 8, 2003
! Input file version 05
!=============================================================================
==
!
*CONTROL
   MEDIUM=DUAL
   TIME_SCHEME=EULER
   LIMITER=MUSCL
   CLIMATE=CLIMTIDX
   SOURCE_COEFF, AX=0.0, AY=1.0
!-----------------------------------------------------------------------------
---
*VELOCITY
   STEADY=YES
   STEP=1
!-----------------------------------------------------------------------------
---
*OUTPUT
   STEP=2000
   SCREEN_IO=OFF
   DISCHARGE_STEP=20
!-----------------------------------------------------------------------------
---
*TIME
```

```
   TIME_GEN=AUTO
   START_TIME=0.0
   STOP_TIME =3.15569E+11
   NUM_STEP=20000
!----------------------------------------------------------------------------
---
*SPECIES
NUCLIDE SYMBOL=PU239, INDEX=1, LAMBDA=DC_PU239, FREE_H2O_DIFF=MD0_PU &

NUCLIDE SYMBOL=U234,  INDEX=2, LAMBDA=DC_U234,  FREE_H2O_DIFF=MD0_U &
        CURIE=SA_U234
NUCLIDE SYMBOL=TH230, INDEX=3, LAMBDA=DC_TH230, FREE_H2O_DIFF=MD0_TH &
        CURIE=SA_TH230
NUCLIDE SYMBOL=AM241, INDEX=4, LAMBDA=DC_AM241, FREE_H2O_DIFF=MD0_AM &
        CURIE=SA_AM241
NUCLIDE SYMBOL=TH23A, INDEX=5, LAMBDA=DC_TH230, FREE_H2O_DIFF=MD0_TH &
        CURIE=SA_TH230
CHAIN CHAIN_NUM=1  NUM_SPECIES=1 NUC_INDICES=1
CHAIN CHAIN_NUM=2  NUM_SPECIES=2 NUC_INDICES=2,3
CHAIN CHAIN_NUM=3  NUM_SPECIES=1 NUC_INDICES=4
CHAIN CHAIN_NUM=4  NUM_SPECIES=1 NUC_INDICES=5
!----------------------------------------------------------------------------
---
*PROPERTY
DIFF   TORT=MTORT, POROSITY=MPOROS, RETARD=MRTRD
DUAL   BLOCK_LEN=HMBLKLT SKIN_RESIST=SKIN_RES
ADVEC  DISP_LNG=DISP_LNG, DISP_TRN=DISP_TRN, TORT= F_TORT, &
       POROSITY=FPOROS, RETARD=ZRTRD
!----------------------------------------------------------------------------
---
*SOURCE
TERM_DEF SYMBOL=PU239, NUM_POINTS= 2, &
         TIMES= 0.0, 1.577845E+9, &
         VALUES= 0.0, 1.0, &
         IRANGE=67,67 JRANGE=76,76
TERM_DEF SYMBOL=U234, NUM_POINTS= 2, &
         TIMES= 0.0, 1.577845E+9, &
         VALUES= 0.0, 1.0, &
         IRANGE=67,67 JRANGE=76,76
TERM_DEF SYMBOL=TH23A, NUM_POINTS= 2, &
         TIMES= 0.0, 1.577845E+9, &
         VALUES= 0.0, 1.0, &
         IRANGE=67,67 JRANGE=76,76
TERM_DEF SYMBOL=AM241, NUM_POINTS= 2, &
         TIMES= 0.0, 1.577845E+9, &
         VALUES= 0.0, 1.0, &
         IRANGE=67,67 JRANGE=76,76
!----------------------------------------------------------------------------
---
*DP_MESH
 AUTO INIT_DIST=.001, NUM_NODES=21
!----------------------------------------------------------------------------
---
*DISCHARGE_BOUND
  NUM_BNDS=2
! Waste Panel Area
  BOUND_DEF TOP_LEFT=60,82, BOTTOM_RIGHT=75,70
```

```
! LWB
  BOUND_DEF TOP_LEFT=7,100, BOTTOM_RIGHT=136,22
!----------------------------------------------------------------------------
---
*END
$
```

APPPENDIX H: MODFLOW INPUT FILES
(and Associated PEST/DTRKMF Input Files)

Listed below are the MODFLOW/PEST/DTRKMF INPUT FILES from McKenna, et al. (2004) that are used to input or define original source data for the CRA1 T-Field and flow analyses. All other input files defined in McKenna, et al. (2004) are run control files or contain parameters derived from the following files.

File Name	Description
d##r##t.out	Original base T field in 4 column Arc-Info format (input to base2mod program which converts file to MODFLOW format) Holt and Yarbrough (2002; 2003) and McKenna andHart (2003) document the development of the original base T field and provide original source data or reference to original source data
culebra.bot	Elevations of the bottom of the Culebra in MODFLOW format (Data/parameter input) from Powers (2002) and described in Holt and Yarbrough (2002; 2003)
culebra.ibd	MODFLOW input ibound array (specifies which cells are active/ boundary (constant head) /inactive) in grid; from Powers (2002), Hold and Yarbrough (2002; 2003)
culebra.ihd	MODFLOW input initial heads (data/parameter input) grid populated statistically (kriging) from original head data documented in Beauheim (2002)file TfieldHeads.xls; process described in McKenna and Hart (2003)
culebra.top	Elevations of the top of the Culebra in MODFLOW format (data/ parameter input) from Powers (2002) and described in Holt and Yarbrough (2002; 2003)
*.dis	MODFLOW discretization file; used to define grid, documented in Holt and Yarbrough (2002; 2003) and McKenna and Hart (2003)
measured.*	Measured heads at an output location; contains observation well name, date, time, and head; one file for each hydraulic test period.
Zones.inf	Input file for PEST defining high and low transmissivity zones in grid; Derivation of transmissivity zones is documented in Holt and Yarbrough (2002; 2003)

*.well MODFLOW well information input file; contains grid coordinates and pumping rate for wells; documented in McKenna and Hart (2003)

wells.crd Listing of well names and X-Y coordinates

mfR*.txt Mining factors file; contains random values between 1-1000 used as multipliers to evaluate influence of mining on T-fields (Lowry, 2003b).

Full_mining.dat Input file specifying which cells are located in a potential mining area covering potential mining areas inside and outside the land withdrawal area; documented in Lowry (2003b)

Part_mining.dat Input file specifying which cells are located in a potential mining area covering potential mining areas outside the land withdrawal area; documented in Lowry (2003b)

Representative input files for the above files for T-Field D01r07 are reproduced below:

H.1 ***.NAM

Modflow name file, identifies output, input files for specific analysis; first word in file name defines analysis. Steady for Modflow analysis with steady state heads, well name such as h3 for the transient analyses. There is one of these files for each MODFLOW analysis.

H.1.1 STEADY.NAM

```
# MF2K NAME file
#
# Output Files
LIST         40 steady.lst
DATA         17 steady.hed
DATA         19 steady.drw
DATA(BINARY) 15 steady.bud
#
# Global Input Files
DIS          41 steady.dis
DATA         45 culebra.ihd
DATA         47 culebra.ibd
DATA         33 culebra.top
DATA         34 culebra.bot
DATA         30 Tupdate.mod
#
# Flow Process Input Files----[These are run control files defined in
MODFLOW/PEST User Manual]
BAS6          1 steady.ba6
BCF6         11 steady.bc6
OC           42 steady.oc
LMG           8 steady.lmg
```

H.1.2 H3.NAM

```
# MF2K NAME file
# h3 WIPP transient model
# Created 05/02/2003 - Thomas Lowry
# Output Files
LIST         40 h3.lst
DATA         17 h3.hed
DATA(BINARY) 19 h3.drw
DATA(BINARY) 15 h3.bud
#
# Global Input Files
DIS          41 h3.dis
DATA         45 steady.hed
DATA         47 culebra.ibd
DATA         33 culebra.top
DATA         34 culebra.bot
DATA         30 Tupdate.mod
#
# Flow Process Input Files  ----[These are run control filesdefined in
MODFLOW/PEST User Manual]

BAS6          1 transient.ba6
BCF6         11 transient.bc6
OC           42 h3.oc
WEL          10 h3.wel
LMG           8 transient.lmg
```

H.2 ****.DIS

This is a discretization filedefines grid and time steps for a MODFLOW run: 100 x 100 grid; 307 rows by 224 columns. First word in file defines MODFLOW analysis, i.e., steady, h3, etc.

H.2.1 STEADY.DIS

```
# MF2K DISCRETIZATION FILE
#
#
# NLAY NROW NCOL NPER TIMEUNITS LENUNITS
1 307 224 1 1 2
0
CONSTANT 100.0
CONSTANT 100.0
EXTERNAL 33 1.0 (FREE)  -1 (calls culebra.top)
EXTERNAL 34 1.0 (FREE)  -1 (calls culebra.btm)
86400.0 1 1.0 SS  (length, time in seconds; # time steps, time step
multiplier; steady state)
```

H.2.2 H3.DIS

```
# Discretization file for WIPP transient data
# h3 WIPP transient model
# Created 05/05/2003 - Thomas Lowry
```

```
1 307 224 3 1 2
0
CONSTANT 100.0
CONSTANT 100.0
EXTERNAL 33 1 (FREE)  -1
EXTERNAL 34 1 (FREE)  -1
5356800.0   8 2.0 TR          (Stress period 1; time in seconds, # time
steps, multiplier transient)
10892700.0   8 2.0 TR         (Stress period 2; time in seconds, # time
steps,multiplier transient)
22976100.0   1 1.0 TR   (stress period 3; time in seconds, # time steps,
multiplier, transient)
```

H.3 CULEBRA.ihd (partial listing only due to length of file)

MODFLOW initial heads input file (partial filefile contains ~ 70,000 data points/nodes (active) for a 100 x 100 gridstatistical extrapolation of actual measured heads to assign head to all active cells in grid

```
900.000000 900.000000 900.000000 900.000000 900.000000 900.000000 900.000000
900.000000 900.000000 900.000000 900.000000 900.000000 900.000000 900.000000
900.000000 900.000000 900.000000 900.000000 900.000000 900.000000 900.000000
900.000000 900.000000 900.000000 900.000000 900.000000 900.000000 900.000000
900.000000 900.000000 900.000000 900.000000 900.000000 900.000000 900.000000
900.000000 900.000000 900.000000 900.000000 900.000000 900.000000 900.000000
900.000000 900.000000 900.000000 900.000000 900.000000 900.000000 900.000000
900.000000 900.000000 900.000000 900.000000 900.000000 900.000000 900.000000
900.000000 900.000000 900.000000 900.000000 900.000000 900.000000 900.000000
900.000000 900.000000 900.000000 900.000000 900.000000 900.000000 900.000000
900.000000 900.000000 900.000000 900.000000 900.000000 900.000000 900.000000
900.000000 900.000000 900.000000 900.000000 900.000000 900.000000 900.000000
900.000000 900.000000 900.000000 900.000000 900.000000 900.000000 900.000000
900.000000 900.000000 900.000000 900.000000 900.000000 900.000000 900.000000
955.460022 955.450012 955.440002 955.419983 955.409973 955.390015 955.369995
955.349976 955.330017 955.299988 955.280029 955.250000 955.219971 955.190002
955.159973 955.119995 955.090027 955.049988 955.010010 954.969971 954.919983
954.880005 954.830017 954.780029 954.729980 954.679993 954.630005 954.570007
954.510010 954.450012 954.390015 954.330017 954.260010 954.200012 954.130005
954.059998 953.989990 953.909973 953.840027 953.760010 953.679993 953.599976
953.520020 953.440002 953.349976 953.260010 953.179993 953.080017 952.989990
952.900024 952.799988 952.700012 952.599976 952.500000 952.400024 952.289978
952.190002 952.080017 951.969971 951.859985 951.739990 951.630005 951.510010
951.390015 951.270020 951.150024 951.020020 950.900024 950.770020 950.640015
950.510010 950.380005 950.239990 950.109985 949.969971 949.830017 949.690002
949.539978 949.400024 949.250000 949.099976 948.950012 948.799988 948.650024
948.489990 948.340027 948.179993 948.020020 947.849976 947.690002 947.520020
947.359985 947.190002 947.020020 946.840027 946.669983 946.489990 946.320007
946.140015 945.950012 945.770020 945.590027 945.400024 945.210022 945.020020
944.830017 944.640015 944.440002 944.250000 944.049988 943.849976 943.650024
943.440002 943.239990 943.030029 942.820007 942.609985 942.400024 942.190002
941.969971 941.760010 941.539978 941.320007 941.090027 940.869995 940.650024
```

H.4 MEASURED.***

Input files containing measured head and drawdown data at a specific location. The four columns contain observation well name, date, time and measured head.

H.4.1 MEASURED.STEADY

Measured heads at specific well locations for steady state analysis. (Basis for statistical extrapolation heads for CULEBRA.ihd file)

```
AEC-7 8/7/1981 12:00:00 933.19
DOE-1 8/7/1981 12:00:00 916.55
DOE-2 8/7/1981 12:00:00 940.03
ERDA-9      8/7/1981 12:00:00 921.59
H-1   8/7/1981 12:00:00 927.19
H-2b2 8/7/1981 12:00:00 926.62
H-3b2 8/7/1981 12:00:00 917.16
H-4b  8/7/1981 12:00:00 915.55
H-5b  8/7/1981 12:00:00 936.26
H-6b  8/7/1981 12:00:00 934.20
H-7b1 8/7/1981 12:00:00 913.86
H-9b  8/7/1981 12:00:00 911.57
H-11b4      8/7/1981 12:00:00 915.47
H-12  8/7/1981 12:00:00 914.66
H-14  8/7/1981 12:00:00 920.24
H-15  8/7/1981 12:00:00 919.87
H-17  8/7/1981 12:00:00 915.37
H-18  8/7/1981 12:00:00 937.22
H-19b0      8/7/1981 12:00:00 917.13
P-17  8/7/1981 12:00:00 915.20
WIPP-12     8/7/1981 12:00:00 935.30
WIPP-13     8/7/1981 12:00:00 935.17
WIPP-18     8/7/1981 12:00:00 936.08
WIPP-19     8/7/1981 12:00:00 932.66
WIPP-21     8/7/1981 12:00:00 927.00
WIPP-22     8/7/1981 12:00:00 930.96
WIPP-25     8/7/1981 12:00:00 932.70
WIPP-26     8/7/1981 12:00:00 921.06
WIPP-30     8/7/1981 12:00:00 936.88
WQSP-1      8/7/1981 12:00:00 935.64
WQSP-2      8/7/1981 12:00:00 938.82
WQSP-3      8/7/1981 12:00:00 935.89
WQSP-4      8/7/1981 12:00:00 917.49
WQSP-5      8/7/1981 12:00:00 917.22
WQSP-6      8/7/1981 12:00:00 920.02
```

H.4.2 MEASURED.H3

```
doe-1 10/15/1985  9:00:00     -0.010383297
doe-1 10/15/1985  11:00:00    -0.045552527
doe-1 10/15/1985  13:04:01    -0.045552527
doe-1 10/15/1985  15:04:01    -0.010383297
doe-1 10/15/1985  23:05:01    -0.024450989
doe-1 10/16/1985  1:05:01     -0.045552527
doe-1 10/16/1985  3:05:01     -0.038518681
```

doe-1	10/16/1985	11:00:00	-0.003349451
doe-1	10/18/1985	10:25:59	-0.052586374
doe-1	10/18/1985	16:51:00	-0.038518681
doe-1	10/19/1985	2:51:00	-0.087755604
doe-1	10/19/1985	12:17:59	-0.15106022
doe-1	10/19/1985	22:00:00	-0.129958681
doe-1	10/20/1985	8:00:00	-0.193263297
doe-1	10/20/1985	18:00:00	-0.165127912
doe-1	10/22/1985	0:06:00	-0.249534066
doe-1	10/22/1985	11:36:00	-0.305804835
doe-1	10/22/1985	20:06:00	-0.291737143
doe-1	10/23/1985	6:06:00	-0.348007912
doe-1	10/23/1985	16:06:00	-0.390210989
doe-1	10/24/1985	2:06:00	-0.42538022
doe-1	10/24/1985	12:06:00	-0.551989451
doe-1	10/24/1985	22:06:00	-0.573090989
doe-1	10/29/1985	11:13:00	-1.079527912
doe-1	10/29/1985	23:13:00	-1.128764835
doe-1	10/30/1985	9:13:00	-1.15690022
doe-1	10/30/1985	19:13:00	-1.107663297
doe-1	10/31/1985	5:13:00	-1.128764835
doe-1	11/14/1985	9:19:48	-2.634007912
doe-1	11/16/1985	0:01:12	-2.908327912
doe-1	11/16/1985	21:19:48	-2.936463297
doe-1	12/15/1985	4:30:00	-5.243564835
doe-1	12/16/1985	0:56:01	-5.257632527
doe-1	12/16/1985	8:57:01	-5.299835604
doe-1	12/16/1985	9:00:00	-5.292801758
doe-1	12/16/1985	10:00:00	-5.278734066
doe-1	12/16/1985	11:00:00	-5.285767912
doe-1	12/16/1985	21:01:48	-5.285767912
doe-1	12/17/1985	7:01:48	-5.313903297
doe-1	12/17/1985	17:04:12	-5.306869451
doe-1	12/18/1985	3:04:12	-5.356106374
doe-1	12/18/1985	13:12:00	-5.412377143
doe-1	12/18/1985	23:12:00	-5.391275604
doe-1	12/19/1985	9:12:00	-5.426444835
doe-1	12/19/1985	19:12:00	-5.384241758
doe-1	12/20/1985	5:12:00	-5.391275604
doe-1	12/20/1985	15:12:00	-5.398309451
doe-1	12/21/1985	1:12:00	-5.398309451
doe-1	12/21/1985	21:06:00	-5.398309451
doe-1	12/23/1985	13:06:00	-5.349072527
doe-1	12/24/1985	9:10:12	-5.398309451
doe-1	12/25/1985	5:10:12	-5.306869451
doe-1	12/31/1985	11:10:12	-5.039583297
doe-1	½/1986	13:10:12	-4.920007912
doe-1	1/15/1986	2:37:12	-4.343232527
doe-1	1/17/1986	4:37:12	-4.251792527
doe-1	2/17/1986	9:34:48	-3.337392527
h-1	10/15/1985	9:00:00	0
h-1	10/17/1985	11:19:48	-0.035169231
h-1	10/19/1985	12:00:00	-0.056270769
h-1	10/23/1985	18:15:00	-0.070338462
h-1	10/29/1985	23:07:12	-0.126609231
h-1	10/30/1985	22:08:24	-0.133643077
h-1	10/31/1985	23:30:00	-0.154744615

h-1	11/14/1985	9:04:12	-0.682283077
h-1	11/15/1985	9:55:48	-0.752621538
h-1	11/16/1985	9:36:00	-0.82296
h-1	12/16/1985	10:00:00	-4.171070769
h-1	12/17/1985	8:10:48	-4.311747692
h-1	12/18/1985	8:45:00	-4.48056
h-1	12/19/1985	9:18:00	-4.649372308
h-1	12/20/1985	9:01:12	-4.811150769
h-1	12/21/1985	8:46:48	-4.972929231
h-1	12/23/1985	11:33:00	-5.331655385
h-1	12/24/1985	8:12:00	-5.479366154
h-1	12/25/1985	8:16:48	-5.655212308
h-1	12/31/1985	8:34:48	-6.632916923
h-1	1/1/1986	11:19:48	-6.794695385
h-1	½/1986	8:28:48	-6.928338462
h-1	1/15/1986	8:49:12	-8.567224615
h-1	1/16/1986	9:04:12	-8.665698462
h-1	1/17/1986	8:45:00	-8.757138462
h-1	2/17/1986	9:37:12	-10.39602462
h-11b1	10/15/1985	18:25:12	0
h-11b1	10/16/1985	10:01:48	-0.014067692
h-11b1	10/17/1985	9:15:00	-0.007033846
h-11b1	10/19/1985	16:49:48	-0.035169231
h-11b1	10/20/1985	15:52:48	-0.119575385
h-11b1	10/22/1985	20:34:48	-0.189913846
h-11b1	10/23/1985	19:19:48	-0.218049231
h-11b1	10/24/1985	17:48:00	-0.281353846
h-11b1	10/30/1985	10:01:48	-0.604910769
h-11b1	11/15/1985	13:30:00	-1.631852308
h-11b1	12/16/1985	11:25:48	-3.495821538
h-11b1	12/18/1985	11:43:48	-3.608363077
h-11b1	12/20/1985	11:46:12	-3.608363077
h-11b1	12/24/1985	11:30:00	-3.622430769
h-11b1	12/31/1985	10:46:12	-3.523956923
h-11b1	½/1986	11:00:00	-3.502855385
h-11b1	1/16/1986	10:25:48	-3.010486154
h-11b1	1/18/1986	10:46:48	-2.736166154
h-11b1	4/21/1986	10:45:00	-2.074984615
h-2b2	10/18/1985	8:19:12	-0.031652308
h-2b2	10/19/1985	7:42:00	-0.031652308
h-2b2	10/20/1985	16:16:48	-0.024618462
h-2b2	11/14/1985	9:07:48	-0.214532308
h-2b2	11/15/1985	9:09:00	-0.235633846
h-2b2	11/16/1985	9:37:48	-0.256735385
h-2b2	12/15/1985	9:01:12	-1.522827692
h-2b2	12/16/1985	9:16:48	-1.586132308
h-2b2	12/17/1985	9:34:12	-1.656470769
h-2b2	12/18/1985	9:40:12	-1.754944615
h-2b2	12/19/1985	9:10:48	-1.797147692
h-2b2	12/20/1985	11:07:48	-1.839350769
h-2b2	12/21/1985	14:06:00	-1.895621538
h-2b2	12/23/1985	13:52:12	-1.951892308
h-2b2	12/24/1985	12:55:12	-2.008163077
h-2b2	12/31/1985	9:07:48	-2.380956923
h-2b2	½/1986	8:43:48	-2.535701538
h-2b2	1/15/1986	11:27:00	-3.140612308
h-2b2	1/17/1986	9:24:00	-3.232052308

```
h-2b2 2/17/1986   14:37:12    -3.780692308
```

H.4.3 MEASURED.H19

```
doe-1 12/15/1995 12:13:04     -1.100
doe-1 12/16/1995 12:13:04     -1.027
doe-1 12/17/1995 12:13:04     -1.069
doe-1 12/19/1995 12:13:04     -1.656
doe-1 12/23/1995 12:13:04     -2.735
doe-1 1/1/1996 12:13:04 -3.038
doe-1 1/17/1996 12:13:04      -4.108
doe-1 1/18/1996 12:13:04      -4.154
doe-1 1/19/1996 12:13:04      -4.214
doe-1 ½1/1996 12:13:04  -4.313
doe-1 ½5/1996 11:13:04  -4.527
doe-1 ½6/1996 12:13:04  -4.568
doe-1 ½8/1996 12:13:04  -4.661
doe-1 ½9/1996 12:13:04  -4.701
doe-1 1/30/1996 12:13:04      -4.739
doe-1 2/2/1996 12:13:04 -4.853
doe-1 2/7/1996 12:13:04 -5.057
doe-1 2/8/1996 12:13:04 -5.108
doe-1 2/10/1996 13:13:04      -5.368
doe-1 2/13/1996 12:13:04      -5.980
doe-1 2/19/1996 12:13:04      -7.343
doe-1 2/20/1996 12:13:04      -7.590
doe-1 2/21/1996 10:13:04      -7.812
doe-1 2/22/1996 12:13:04      -8.058
doe-1 2/24/1996 12:13:04      -8.481
doe-1 2/25/1996 12:13:04      -8.669
doe-1 2/26/1996 12:13:04      -8.849
doe-1 2/28/1996 12:13:04      -9.179
doe-1 3/3/1996 12:13:04 -9.730
doe-1 3/11/1996 12:13:04      -10.499
doe-1 3/12/1996 12:13:04      -10.569
doe-1 3/13/1996 12:13:04      -10.663
doe-1 3/15/1996 12:13:04      -10.957
doe-1 3/19/1996 12:13:04      -11.874
doe-1 3/28/1996 12:13:04      -13.463
doe-1 3/29/1996 12:13:04      -13.463
doe-1 3/30/1996 12:13:04      -13.335
doe-1 3/31/1996 12:13:04      -13.011
doe-1 4/3/1996 12:13:04 -10.419
doe-1 4/4/1996 11:13:04 -10.151
doe-1 4/5/1996 12:13:04 -9.894
doe-1 4/6/1996 12:13:04 -9.594
doe-1 4/11/1996 12:13:04      -8.451
doe-1 4/12/1996 12:13:04      -8.295
doe-1 4/13/1996 12:13:04      -8.054
doe-1 4/15/1996 12:13:04      -7.758
doe-1 4/16/1996 12:13:04      -7.499
doe-1 4/17/1996 12:13:04      -7.259
doe-1 4/19/1996 12:13:04      -6.890
doe-1 4/26/1996 12:13:04      -5.842
doe-1 4/27/1996 12:13:04      -5.650
doe-1 4/28/1996 12:13:04      -5.557
```

doe-1 5/11/1996 12:13:04 -4.320
doe-1 5/12/1996 12:13:04 -4.198
doe-1 5/13/1996 12:13:04 -4.101
doe-1 5/14/1996 12:13:04 -4.006
doe-1 5/15/1996 12:13:04 -3.936
doe-1 6/10/1996 12:13:04 -2.593
doe-1 6/11/1996 12:13:04 -2.548
doe-1 6/12/1996 12:13:04 -2.508
doe-1 6/13/1996 12:13:04 -2.482
doe-1 6/14/1996 12:13:04 -2.445
doe-1 7/15/1996 12:13:04 -1.398
doe-1 7/16/1996 12:13:04 -1.368
doe-1 7/17/1996 12:13:04 -1.336
doe-1 8/13/1996 9:02:00 -0.559
doe-1 9/5/1996 12:30:00 -0.187
doe-1 10/15/1996 10:23:00 0.155
doe-1 11/12/1996 11:52:00 0.411
doe-1 12/10/1996 11:37:00 0.647
erda-9 12/15/1995 12:06:23 -2.053781904
erda-9 12/16/1995 12:06:23 -2.034781904
erda-9 12/17/1995 12:06:23 -1.986781904
erda-9 12/19/1995 12:06:23 -1.982781904
erda-9 12/23/1995 12:06:23 -2.165781904
erda-9 1/1/1996 12:06:23 -3.128781904
erda-9 1/17/1996 12:06:23 -5.284781904
erda-9 1/18/1996 12:06:23 -5.446781904
erda-9 1/19/1996 12:06:23 -5.600781904
erda-9 ½1/1996 12:06:23 -5.862781904
erda-9 ½5/1996 10:06:23 -6.310781904
erda-9 ½6/1996 12:06:23 -6.413781904
erda-9 ½8/1996 12:06:23 -6.650781904
erda-9 ½9/1996 12:06:23 -6.750781904
erda-9 1/30/1996 12:06:23 -6.846781904
erda-9 2/2/1996 12:06:23 -7.153781904
erda-9 2/7/1996 10:06:23 -7.702781904
erda-9 2/8/1996 12:06:23 -7.790781904
erda-9 2/10/1996 13:06:23 -7.967781904
erda-9 2/13/1996 12:06:23 -8.278781904
erda-9 2/19/1996 12:06:23 -8.708781904
erda-9 2/20/1996 12:06:23 -8.795781904
erda-9 2/21/1996 10:06:23 -8.882781904
erda-9 2/22/1996 12:06:23 -8.976781904
erda-9 2/24/1996 12:06:23 -9.140781904
erda-9 2/25/1996 12:06:23 -9.199781904
erda-9 2/26/1996 12:06:23 -9.247781904
erda-9 2/28/1996 12:06:23 -9.368781904
erda-9 3/3/1996 12:01:18 -9.535781904
erda-9 3/11/1996 12:01:18 -9.817781904
erda-9 3/12/1996 12:01:18 -9.819781904
erda-9 3/13/1996 12:01:18 -9.821781904
erda-9 3/15/1996 12:01:18 -9.868781904
erda-9 3/19/1996 12:01:18 -9.980781904
erda-9 3/28/1996 12:01:18 -10.2057819
erda-9 3/29/1996 12:01:18 -10.2177819
erda-9 3/30/1996 12:01:18 -10.2437819
erda-9 3/31/1996 12:01:18 -10.2927819
erda-9 4/3/1996 12:01:18 -10.3597819

erda-9	4/4/1996 12:01:18	-10.3867819
erda-9	4/5/1996 12:01:18	-10.4287819
erda-9	4/6/1996 12:01:18	-10.4707819
erda-9	4/11/1996 12:01:18	-10.5137819
erda-9	4/12/1996 12:01:18	-10.5177819
erda-9	4/13/1996 12:01:18	-10.5227819
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p-17	2/7/1996	11:28:00	0.504212966
p-17	2/8/1996	8:18:00	0.613332966
p-17	2/21/1996	8:15:00	0.766100966
p-17	3/1/1996	13:38:00	0.864308966
p-17	3/7/1996	8:36:00	1.082548966
p-17	3/12/1996	12:29:00	1.021075123
p-17	3/14/1996	8:31:00	1.137108966
p-17	3/21/1996	9:10:00	1.300788966
p-17	3/28/1996	12:25:00	1.420820966
p-17	4/4/1996	13:45:00	1.628148966
p-17	4/16/1996	11:48:00	1.606447181
p-17	5/14/1996	11:53:00	1.440148301
p-17	6/11/1996	13:37:00	1.174070093
p-17	7/16/1996	11:31:00	0.937925683
p-17	8/13/1996	9:50:00	0.698455296
p-17	9/4/1996	12:53:00	0.56874217
p-17	10/16/1996	9:33:00	0.432377088
p-17	11/12/1996	11:30:00	0.435703066
p-17	12/10/1996	11:22:00	0.302663962

H.4.5 MEASURED.P14

d-268	2/14/1989	10:00:03	0
d-268	2/14/1989	10:59:57	0
d-268	2/14/1989	12:00:00	-0.004220308
d-268	2/14/1989	13:59:57	-0.008440615
d-268	2/14/1989	15:09:56	-0.008440615
d-268	2/14/1989	16:59:57	-0.009144
d-268	2/14/1989	18:00:00	-0.018288
d-268	2/14/1989	19:09:59	-0.031159938
d-268	2/14/1989	21:40:02	-0.036083631
d-268	2/14/1989	23:25:01	-0.036083631
d-268	2/15/1989	6:00:00	-0.0192024
d-268	2/15/1989	10:47:00	-0.032777723
d-268	2/15/1989	19:09:59	-0.055567385
d-268	2/16/1989	7:32:01	-0.095378954
d-268	2/16/1989	19:04:57	-0.134346462
d-268	2/17/1989	10:32:01	-0.187311323
d-268	2/17/1989	12:09:56	-0.191531631
d-268	2/17/1989	12:14:59	-0.191531631
d-268	2/17/1989	12:29:57	-0.195751938
d-268	2/17/1989	12:44:56	-0.195751938
d-268	2/17/1989	13:00:03	-0.177463938
d-268	2/17/1989	15:44:56	-0.195048554
d-268	2/17/1989	16:00:03	-0.195048554
d-268	2/17/1989	18:00:00	-0.204895938
d-268	2/17/1989	19:00:03	-0.217064492
d-268	2/18/1989	1:30:00	-0.287191938

d-268	2/18/1989	4:04:57	-0.279173354
d-268	2/18/1989	8:30:03	-0.300556246
d-268	2/18/1989	12:44:56	-0.321657785
d-268	2/18/1989	16:30:00	-0.312232431
d-268	2/20/1989	9:00:00	-0.418935877
d-268	2/20/1989	13:00:03	-0.4315968
d-268	2/20/1989	16:35:02	-0.406063938
d-268	2/22/1989	8:39:59	-0.410987631
d-268	2/22/1989	14:34:57	-0.419428246
d-268	2/28/1989	8:15:04	-0.2660904
d-268	2/28/1989	14:30:03	-0.261870092
d-268	3/7/1989	8:30:03	-0.167827569
h-18	2/14/1989	14:34:57	0
h-18	2/14/1989	22:50:01	-0.01
H-18	2/16/1989	9:15:59	-0.015
h-18	2/16/1989	19:50:01	-0.018
h-18	2/17/1989	9:22:02	-0.01
H-18	2/17/1989	14:45:01	-0.004
h-18	2/17/1989	20:19:58	0
h-18	2/18/1989	0:26:56	-0.018
h-18	2/18/1989	3:22:02	-0.018
h-18	2/18/1989	9:00:00	-0.004
h-18	2/18/1989	13:35:02	-0.02
H-18	2/18/1989	16:59:57	-0.019
h-18	2/20/1989	10:09:59	-0.003
h-18	2/20/1989	13:39:56	-0.011
h-18	2/20/1989	16:15:01	-0.007
h-18	2/22/1989	9:40:02	-0.027
h-18	2/22/1989	15:12:58	-0.054
h-18	2/28/1989	9:35:00	-0.04
H-18	2/28/1989	15:25:03	-0.062
h-18	2/28/1989	15:25:03	-0.062
h-18	3/10/1989	13:20:04	-0.113
h-6b	2/14/1989	14:25:01	0
h-6b	2/14/1989	22:39:56	-0.071041846
h-6b	2/15/1989	9:33:59	-0.078568062
h-6b	2/15/1989	21:20:01	-0.180277477
h-6b	2/16/1989	9:08:04	-0.255469292
h-6b	2/16/1989	19:39:56	-0.350707569
h-6b	2/17/1989	9:12:58	-0.459732185
h-6b	2/17/1989	14:50:04	-0.504115754
h-6b	2/17/1989	17:19:58	-0.526342708
h-6b	2/17/1989	20:30:03	-0.595204062
h-6b	2/18/1989	0:15:59	-0.636492738
h-6b	2/18/1989	3:11:57	-0.636492738
h-6b	2/18/1989	9:09:56	-0.672435692
h-6b	2/18/1989	13:44:59	-0.685096615
h-6b	2/18/1989	17:10:02	-0.687136431
h-6b	2/20/1989	10:20:04	-0.700711754
h-6b	2/20/1989	13:50:01	-0.686925415
h-6b	2/22/1989	9:35:00	-0.578252492
h-6b	2/28/1989	9:09:56	-0.273124246
h-6b	2/28/1989	15:14:59	-0.282619938
h-6b	3/10/1989	13:39:56	-0.134487138
wipp-25	2/14/1989	15:29:57	0
wipp-25	2/14/1989	21:00:00	-0.015052431
wipp-25	2/15/1989	10:30:00	-0.047900492

wipp-25	2/15/1989	19:39:56	-0.109939015
wipp-25	2/16/1989	7:49:01	-0.168882646
wipp-25	2/16/1989	18:20:01	-0.230780492
wipp-25	2/17/1989	10:15:01	-0.3273552
wipp-25	2/17/1989	13:20:04	-0.340016123
wipp-25	2/17/1989	16:20:04	-0.349230462
wipp-25	2/17/1989	19:20:04	-0.3758184
wipp-25	2/18/1989	1:47:00	-0.415840985
wipp-25	2/18/1989	4:22:57	-0.398537723
wipp-25	2/18/1989	7:59:57	-0.406626646
wipp-25	2/18/1989	12:14:59	-0.431948492
wipp-25	2/18/1989	16:00:03	-0.413027446
wipp-25	2/20/1989	8:39:59	-0.366252369
wipp-25	2/20/1989	12:14:59	-0.374692985
wipp-25	2/20/1989	16:09:59	-0.343955077
wipp-25	2/22/1989	9:20:01	-0.248435446
wipp-25	2/22/1989	14:48:03	-0.247661723
wipp-25	2/28/1989	8:45:01	-0.115425415
wipp-25	2/28/1989	15:00:00	-0.106140738
wipp-26	2/14/1989	16:00:03	0
wipp-26	2/14/1989	22:04:57	-0.013856677
wipp-26	2/15/1989	12:29:57	-0.007737231
wipp-26	2/15/1989	18:49:58	-0.021664246
wipp-26	2/16/1989	10:25:58	-0.02286
wipp-26	2/16/1989	18:44:56	-0.030526892
wipp-26	2/17/1989	9:21:01	-0.013223631
wipp-26	2/17/1989	19:39:56	-0.021664246
wipp-26	2/18/1989	1:11:00	-0.038967508
wipp-26	2/18/1989	4:47:00	-0.025884554
wipp-26	2/18/1989	8:15:04	-0.012379569
wipp-26	2/18/1989	12:29:57	-0.0027432
wipp-26	2/18/1989	16:15:01	-0.009636369
wipp-26	2/20/1989	9:25:03	-0.073714708
wipp-26	2/20/1989	12:35:00	-0.086375631
wipp-26	2/20/1989	16:50:01	-0.091369662
wipp-26	2/22/1989	9:00:00	-0.128156677
wipp-26	2/22/1989	14:16:57	-0.136597292
wipp-26	2/28/1989	8:30:03	-0.136808308
wipp-26	2/28/1989	14:45:01	-0.136808308
wipp-26	3/7/1989	8:50:04	-0.059647015

H.4.6 MEASURED.W13

doe-2	1/12/1987	9:00:00	0
doe-2	1/12/1987	9:30:00	0
doe-2	1/12/1987	10:00:00	-0.01267968
doe-2	1/12/1987	10:30:00	-0.02218944
doe-2	1/12/1987	11:00:00	-0.04437888
doe-2	1/12/1987	11:30:00	-0.0633984
doe-2	1/12/1987	12:00:00	-0.0950976
doe-2	1/12/1987	12:30:00	-0.1267968
doe-2	1/12/1987	13:00:00	-0.158496
doe-2	1/12/1987	13:30:00	-0.18702528
doe-2	1/12/1987	14:00:00	-0.23140416
doe-2	1/12/1987	15:00:00	-0.30431232
doe-2	1/12/1987	16:00:00	-0.37722048

doe-2 1/12/1987 17:00:00-0.46914816
doe-2 1/12/1987 18:00:00-0.53254656
doe-2 1/12/1987 19:00:00-0.63715392
doe-2 1/12/1987 20:00:00-0.71957184
doe-2 1/12/1987 21:00:00-0.80198976
doe-2 1/12/1987 22:00:00-0.88440768
doe-2 1/12/1987 23:00:00-0.95731584
doe-2 1/13/1987 0:00:00 -1.02071424
doe-2 1/13/1987 1:00:00 -1.08411264
doe-2 1/13/1987 2:00:00 -1.13483136
doe-2 1/13/1987 3:00:00 -1.18555008
doe-2 1/13/1987 4:00:00 -1.23943872
doe-2 1/13/1987 5:00:00 -1.30283712
doe-2 1/13/1987 6:00:00 -1.3630656
doe-2 1/13/1987 7:44:00 -1.46767296
doe-2 1/13/1987 10:07:00-1.61348928
doe-2 1/13/1987 12:00:00-1.6959072
doe-2 1/13/1987 14:00:00-1.77832512
doe-2 1/13/1987 16:00:00-1.87342272
doe-2 1/13/1987 18:00:00-1.97803008
doe-2 1/13/1987 20:00:00-2.0921472
doe-2 1/13/1987 22:11:00-2.22845376
doe-2 1/14/1987 0:00:00 -2.31087168
doe-2 1/14/1987 1:50:00 -2.38377984
doe-2 1/14/1987 4:55:00 -2.4883872
doe-2 1/14/1987 7:00:00 -2.57080512
doe-2 1/14/1987 10:00:00-2.71662144
doe-2 1/14/1987 12:00:00-2.7895296
doe-2 1/14/1987 16:00:00-2.95436544
doe-2 1/14/1987 19:50:00-3.1223712
doe-2 1/14/1987 23:41:00-3.19527936
doe-2 1/16/1987 11:55:00-4.50445632
doe-2 ½1/198711:50:00-7.06258176
doe-2 ½1/198723:50:00-7.3225152
doe-2 1/30/1987 11:45:00-9.69361536
doe-2 1/30/1987 23:50:00-9.76652352
doe-2 2/17/1987 7:29:00 -12.10592448
doe-2 2/17/1987 9:00:00 -12.12811392
doe-2 2/17/1987 9:30:00 -12.13762368
doe-2 2/17/1987 10:00:00-12.13762368
doe-2 2/17/1987 10:30:00-12.12811392
doe-2 2/17/1987 11:00:00-12.10592448
doe-2 2/17/1987 11:30:00-12.07422528
doe-2 2/17/1987 12:00:00-12.045696
doe-2 2/17/1987 12:30:00-12.0139968
doe-2 2/17/1987 13:00:00-11.9822976
doe-2 2/17/1987 13:30:00-11.94108864
doe-2 2/17/1987 14:00:00-11.89987968
doe-2 2/17/1987 14:30:00-11.86818048
doe-2 2/17/1987 15:00:00-11.82697152
doe-2 2/17/1987 15:30:00-11.78576256
doe-2 2/17/1987 16:00:00-11.73187392
doe-2 2/17/1987 16:30:00-11.69066496
doe-2 2/17/1987 17:00:00-11.649456
doe-2 2/17/1987 17:30:00-11.60824704
doe-2 2/17/1987 18:00:00-11.56703808

doe-2	2/17/1987	18:30:00-11.52582912
doe-2	2/17/1987	19:00:00-11.49412992
doe-2	2/17/1987	19:30:00-11.44024128
doe-2	2/17/1987	20:00:00-11.39903232
doe-2	2/17/1987	21:00:00-11.33880384
doe-2	2/17/1987	22:00:00-11.26589568
doe-2	2/17/1987	23:00:00-11.19298752
doe-2	2/18/1987	0:00:00 -11.12958912
doe-2	2/18/1987	1:00:00 -11.0788704
doe-2	2/18/1987	2:00:00 -11.02498176
doe-2	2/18/1987	3:00:00 -10.9520736
doe-2	2/18/1987	4:00:00 -10.8886752
doe-2	2/18/1987	5:05:00 -10.81576704
doe-2	2/18/1987	6:00:00 -10.7460288
doe-2	2/18/1987	7:00:00 -10.6826304
doe-2	2/18/1987	8:00:00 -10.62874176
doe-2	2/18/1987	9:00:00 -10.5875328
doe-2	2/18/1987	11:00:00-10.47341568
doe-2	2/18/1987	13:00:00-10.36880832
doe-2	2/18/1987	15:00:00-10.26737088
doe-2	2/18/1987	17:00:00-10.16276352
doe-2	2/18/1987	19:00:00-10.0486464
doe-2	2/18/1987	21:00:00-9.94403904
doe-2	2/18/1987	23:05:00-9.86162112
doe-2	2/20/1987	0:00:00 -8.91381504
doe-2	2/20/1987	8:00:00 -8.67607104
doe-2	2/20/1987	12:00:00-8.56195392
doe-2	2/20/1987	16:00:00-8.44466688
doe-2	2/22/1987	0:00:00 -7.5919584
doe-2	2/22/1987	10:10:00-7.3542144
doe-2	2/22/1987	14:00:00-7.24009728
doe-2	2/28/1987	8:20:00 -5.03383296
doe-2	2/28/1987	20:00:00-4.88801664
doe-2	3/11/1987	8:39:00 -3.04946304
doe-2	5/15/1987	14:35:00-0.50084736
h-2b2	1/12/1987	16:47:000
h-2b2	1/13/1987	0:48:00 -0.014067692
h-2b2	1/13/1987	12:07:00-0.007033846
h-2b2	1/14/1987	0:46:00 -0.014067692
h-2b2	1/30/1987	22:25:00-0.021101538
h-2b2	2/17/1987	7:13:00 -0.253218462
h-2b2	2/17/1987	10:46:00-0.260252308
h-2b2	2/17/1987	14:10:00-0.27432
h-2b2	2/17/1987	20:55:00-0.27432
h-2b2	2/18/1987	2:07:00 -0.288387692
h-2b2	2/18/1987	8:26:00 -0.295421538
h-2b2	2/18/1987	14:06:00-0.316523077
h-2b2	2/18/1987	20:44:00-0.309489231
h-2b2	2/20/1987	7:35:00 -0.316523077
h-2b2	2/20/1987	15:14:00-0.344658462
h-2b2	2/20/1987	23:05:00-0.358726154
h-2b2	2/22/1987	9:40:00 -0.379827692
h-2b2	2/22/1987	15:20:00-0.407963077
h-2b2	2/22/1987	23:00:00-0.429064615
h-2b2	2/28/1987	9:58:00 -0.527538462
h-2b2	2/28/1987	21:25:00-0.534572308

h-2b2	3/11/1987	9:05:00	-0.780756923
h-2b2	5/15/1987	15:25:00	-0.745587692
h-6b	1/12/1987	9:13:00	0
h-6b	1/12/1987	10:00:00	-0.009528048
h-6b	1/12/1987	11:05:00	-0.009528048
h-6b	1/12/1987	12:00:00	0
h-6b	1/12/1987	18:11:00	0
h-6b	1/12/1987	18:55:00	-0.022232112
h-6b	1/12/1987	20:36:00	-0.041288208
h-6b	1/12/1987	21:37:00	-0.06352032
h-6b	1/12/1987	22:09:00	-0.073048368
h-6b	1/12/1987	23:05:00	-0.09528048
h-6b	1/13/1987	0:21:00	-0.104808528
h-6b	1/13/1987	1:53:00	-0.104808528
h-6b	1/13/1987	3:05:00	-0.114336576
h-6b	1/13/1987	4:09:00	-0.114336576
h-6b	1/13/1987	4:55:00	-0.12704064
h-6b	1/13/1987	6:11:00	-0.146096736
h-6b	1/13/1987	6:55:00	-0.155624784
h-6b	1/13/1987	8:28:00	-0.200089008
h-6b	1/13/1987	9:32:00	-0.219145104
h-6b	1/13/1987	10:29:00	-0.228673152
h-6b	1/13/1987	11:27:00	-0.241377216
h-6b	1/13/1987	12:37:00	-0.241377216
h-6b	1/13/1987	13:25:00	-0.241377216
h-6b	1/13/1987	14:35:00	-0.260433312
h-6b	1/13/1987	15:36:00	-0.26996136
h-6b	1/13/1987	16:35:00	-0.292193472
h-6b	1/13/1987	17:35:00	-0.314425584
h-6b	1/13/1987	18:34:00	-0.33348168
h-6b	1/13/1987	19:35:00	-0.36524184
h-6b	1/13/1987	20:30:00	-0.397002
h-6b	1/13/1987	21:37:00	-0.438290208
h-6b	1/13/1987	23:40:00	-0.479578416
h-6b	1/14/1987	1:35:00	-0.501810528
h-6b	1/14/1987	4:45:00	-0.530394672
h-6b	1/14/1987	7:10:00	-0.562154832
h-6b	1/14/1987	9:46:00	-0.625675152
h-6b	1/14/1987	11:04:00	-0.657435312
h-6b	1/14/1987	13:20:00	-0.689195472
h-6b	1/14/1987	15:04:00	-0.708251568
h-6b	1/14/1987	17:30:00	-0.76224384
h-6b	1/14/1987	19:30:00	-0.822588144
h-6b	1/14/1987	21:30:00	-0.863876352
h-6b	1/14/1987	23:28:00	-0.886108464
h-6b	1/16/1987	7:30:00	-1.448263296
h-6b	1/16/1987	19:35:00	-1.626120192
h-6b	1/16/1987	23:40:00	-1.73092872
h-6b	½1/1987	7:30:00	-2.855238384
h-6b	½1/1987	19:30:00	-3.00133512
h-6b	1/30/1987	11:00:00	-4.27174152
h-6b	1/30/1987	20:30:00	-4.27174152
h-6b	2/17/1987	9:05:00	-5.500859712
h-6b	2/17/1987	9:55:00	-5.513563776
h-6b	2/17/1987	11:00:00	-5.523091824
h-6b	2/17/1987	12:00:00	-5.532619872

h-6b	2/17/1987	12:57:00-5.545323936
h-6b	2/17/1987	13:58:00-5.545323936
h-6b	2/17/1987	15:08:00-5.532619872
h-6b	2/17/1987	16:04:00-5.523091824
h-6b	2/17/1987	17:00:00-5.513563776
h-6b	2/17/1987	18:00:00-5.500859712
h-6b	2/17/1987	18:55:00-5.491331664
h-6b	2/17/1987	19:58:00-5.481803616
h-6b	2/17/1987	21:15:00-5.481803616
h-6b	2/17/1987	21:55:00-5.472275568
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p-14	1/14/1987	19:20:000
p-14	1/16/1987	8:30:00 -0.014067692
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H.4.7 MEASURED.WQSP1

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h-18 ½8/199612:39:06-1.430897
h-18 ½8/199618:39:06-1.398073
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h-18 2/8/199618:39:06-0.261151
h-18 2/10/1996 0:39:06 -0.214257

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h-18	2/13/1996	0:39:06	-0.186423
h-18	2/13/1996	6:39:06	-0.175812
h-18	2/13/1996	12:39:06	-0.173585
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H.4.8 MEASURED.WQSP2

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doe-2 2/26/1996 0:21:34 -0.739
doe-2 2/28/1996 0:21:34 -0.533
doe-2 3/3/19960:21:34 -0.329
doe-2 3/11/1996 0:21:34 -0.133
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doe-2 3/3/199612:21:34-0.308
doe-2 3/11/1996 12:21:34-0.126
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Doe-2 2/22/1996 6:21:34 -0.709
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doe-2 2/26/1996 6:21:34 -0.701
doe-2 2/28/1996 6:21:34 -0.482
doe-2 3/3/19966:21:34 -0.298

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doe-2	2/22/1996	18:21:34	-0.831
doe-2	2/24/1996	18:21:34	-1.104
doe-2	2/25/1996	18:21:34	-0.789
doe-2	2/26/1996	18:21:34	-0.643
doe-2	2/28/1996	18:21:34	-0.475
doe-2	3/3/1996	18:21:34	-0.281
doe-2	3/11/1996	18:21:34	-0.135
h-18	2/21/1996	0:27:20	-0.027441355
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h-18	2/28/1996	6:27:19	-0.446200871
h-18	3/3/1996	6:27:19	-0.333375029
h-18	3/11/1996	6:27:19	-0.188120204
h-18	2/20/1996	18:27:20	-0.012639249
h-18	2/21/1996	18:27:20	-0.081589547
h-18	2/22/1996	18:27:20	-0.199509482
h-18	2/24/1996	18:27:19	-0.474710752
h-18	2/25/1996	18:27:19	-0.52866489
h-18	2/26/1996	18:27:19	-0.503171736
h-18	2/28/1996	18:27:19	-0.455280319
h-18	3/3/1996	18:27:19	-0.317906353
h-18	3/11/1996	18:27:19	-0.184538729
wipp-13	2/21/1996	0:05:12	-0.254224818
wipp-13	2/22/1996	0:05:12	-0.572384963
wipp-13	2/24/1996	0:05:12	-0.969856939
wipp-13	2/25/1996	0:05:12	-0.874419897
wipp-13	2/26/1996	0:05:12	-0.656917488
wipp-13	2/28/1996	0:05:12	-0.431057052
wipp-13	3/3/1996	0:05:11	-0.115159747
wipp-13	3/11/1996	0:05:11	0.165287211
wipp-13	2/20/1996	12:05:12	-0.017223798
wipp-13	2/21/1996	12:05:12	-0.433998466
wipp-13	2/22/1996	12:05:12	-0.685097922
wipp-13	2/24/1996	12:05:12	-1.053273929

wipp-13 2/25/1996 12:05:12-0.745815662
wipp-13 2/26/1996 12:05:12-0.581341419
wipp-13 2/28/1996 12:05:12-0.379086571
wipp-13 3/3/199612:05:11-0.072438773
wipp-13 3/11/1996 12:05:110.174076911
wipp-13 2/21/1996 6:05:12 -0.327515282
wipp-13 2/22/1996 6:05:12 -0.621964332
wipp-13 2/24/1996 6:05:12 -1.009103588
wipp-13 2/25/1996 6:05:12 -0.808039278
wipp-13 2/26/1996 6:05:12 -0.622175109
wipp-13 2/28/1996 6:05:12 -0.406598156
wipp-13 3/3/19966:05:11 -0.072349546
wipp-13 3/11/1996 6:05:11 0.155209922
wipp-13 2/20/1996 18:05:12-0.097920902
wipp-13 2/21/1996 18:05:12-0.48433749
wipp-13 2/22/1996 18:05:12-0.743518835
wipp-13 2/24/1996 18:05:12-0.972023759
wipp-13 2/25/1996 18:05:12-0.716292397
wipp-13 2/26/1996 18:05:12-0.566096862
wipp-13 2/28/1996 18:05:12-0.374413884
wipp-13 3/3/199618:05:11-0.016207994
wipp-13 3/11/1996 18:05:110.160475665
wqsp-1 2/20/1996 12:15:15-0.005627077
wqsp-1 2/20/1996 12:45:14-0.025321846
wqsp-1 2/24/1996 12:00:14-1.128228923
wqsp-1 2/24/1996 12:30:14-1.131745846
wqsp-1 2/20/1996 18:43:14-0.099177231
wqsp-1 2/24/1996 18:28:14-1.094466462
wqsp-3 2/21/1996 0:00:00 0
wqsp-3 2/22/1996 0:00:00 0
wqsp-3 2/24/1996 0:00:00 0
wqsp-3 2/25/1996 0:00:00 0
wqsp-3 2/26/1996 0:00:00 0
wqsp-3 2/28/1996 0:00:00 0
wqsp-3 3/3/19960:00:00 0
wqsp-3 3/11/1996 0:00:00 0
wqsp-3 2/20/1996 12:00:000
wqsp-3 2/21/1996 12:00:000
wqsp-3 2/22/1996 12:00:000
wqsp-3 2/24/1996 12:00:000
wqsp-3 2/25/1996 12:00:000
wqsp-3 2/26/1996 12:00:000
wqsp-3 2/28/1996 12:00:000
wqsp-3 3/3/199612:00:000
wqsp-3 3/11/1996 12:00:000
wqsp-3 3/24/1996 12:00:000

H.5 WELLS.CRD

File listing coordinates for all wells used in steady and transient analyses.

```
H-1   613423       3581684     1
H-3b1 613729       3580895     1
DOE-1 615203       3580333     1
```

H-2b2	612661	3581649	1
H-11b1	615346	3579131	1
DOE-2	613683	3585294	1
H-6b	610594	3585008	1
P-14	609084	3581976	1
WIPP-12	613710	3583524	1
WIPP-18	613735	3583179	1
WIPP-19	613739	3582782	1
WIPP-25	606385	3584028	1
WIPP-30	613721	3589701	1
D-268	608702	3578877	1
H-18	612264	3583166	1
WIPP-26	604014	3581162	1
ERDA-9	613696	3581958	1
H-3b2	613701	3580906	1
H-15	615315	3581859	1
WIPP-21	613743	3582319	1
WQSP-5	613668	3580353	1
WIPP-13	612644	3584247	1
H-4b	612406	3578499	1
H-17	615718	3577513	1
WQSP-1	612561	3583427	1
H-14	612341	3580354	1
WQSP-3	614686	3583518	1
AEC-7	621126	3589381	1
H-5b	616872	3584801	1
H-7b1	608124	3574648	1
H-9b	613989	3568261	1
H-11b4	615301	3579131	1
H-12	617023	3575452	1
H-19b0	614514	3580716	1
P-17	613926	3577466	1
WIPP-22	613739	3582653	1
WQSP-2	613776	3583973	1
WQSP-4	614728	3580766	1
WQSP-6	612605	3580736	1

H.6 CULEBRA.ibd (partial listing only)

Input boundary arrayspecifies whether a cell is active (1), inactive (0) or fixed boundary (-1)

```
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1
-1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1
-1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1
-1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1
-1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1
-1 -1 -1 -1 -1 -1 -1 -1 -1 -1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

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1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

H.7 CULEBRA.TOP (partial listing only)

Elevations to top of Culebra (from Task 1 maps)

```
900.000000 900.000000 900.000000 900.000000 900.000000 900.000000 900.000000
900.000000 900.000000 900.000000 900.000000 900.000000 900.000000 900.000000
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900.000000 900.000000 900.000000 900.000000 900.000000 900.000000 900.000000
879.619995 878.929993 878.140015 877.169983 876.109985 874.989990 873.809998
872.469971 871.090027 869.849976 868.900024 867.700012 866.270020 864.630005
863.190002 861.989990 861.059998 860.270020 858.960022 856.520020 853.419983
850.659973 848.489990 846.080017 843.280029 840.570007 838.440002 836.859985
835.510010 834.369995 833.440002 832.530029 831.489990 830.219971 828.640015
826.820007 825.109985 823.690002 822.539978 821.539978 820.580017 819.409973
815.979980 810.789978 805.489990 801.309998 799.539978 797.979980 797.020020
795.929993 793.979980 791.530029 789.359985 786.969971 784.229980 781.429993
779.039978 776.840027 774.530029 772.179993 769.979980 767.919983 765.659973
763.320007 761.059998 758.530029 755.530029 752.450012 749.590027 747.000000
744.520020 741.900024 739.020020 735.710022 732.130005 728.099976 723.609985
719.020020 714.109985 708.609985 702.750000 697.369995 692.090027 686.400024
681.469971 679.520020 678.539978 677.900024 677.380005 677.020020 676.780029
676.619995 676.489990 676.260010 675.880005 675.289978 674.530029 673.650024
672.630005 671.500000 670.409973 669.450012 668.429993 667.340027 666.229980
665.130005 664.090027 663.119995 662.210022 661.359985 660.599976 659.950012
659.349976 658.710022 658.010010 657.239990 656.340027 655.359985 654.320007
653.179993 651.979980 650.830017 649.869995 648.640015 647.229980 645.770020
```

900.000000	900.000000	900.000000	900.000000	900.000000	900.000000	900.000000
900.000000	900.000000	900.000000	900.000000	900.000000	900.000000	900.000000
900.000000	900.000000	900.000000	900.000000	900.000000	900.000000	900.000000
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900.000000	900.000000	900.000000	900.000000	900.000000	900.000000	900.000000
900.000000	900.000000	900.000000	900.000000	900.000000	900.000000	900.000000
900.000000	900.000000	900.000000	900.000000	900.000000	900.000000	900.000000
900.000000	900.000000	900.000000	900.000000	900.000000	900.000000	881.500000
880.880005	880.440002	879.859985	879.090027	878.099976	877.030029	875.940002
874.669983	873.359985	872.250000	871.289978	870.210022	868.859985	866.789978
864.900024	863.210022	862.039978	861.739990	861.419983	859.849976	856.729980
853.460022	850.830017	848.340027	845.320007	842.229980	839.809998	838.190002
836.789978	835.500000	834.320007	833.179993	831.979980	830.669983	829.440002
827.869995	826.239990	824.750000	823.369995	822.219971	821.320007	820.299988
817.059998	811.619995	805.510010	800.619995	798.719971	797.219971	796.150024
795.179993	793.739990	791.859985	789.969971	787.840027	785.190002	782.429993
780.010010	777.979980	775.770020	773.380005	771.049988	769.000000	766.890015
764.599976	762.299988	759.909973	757.190002	754.260010	751.390015	748.640015
746.010010	743.340027	740.559998	737.659973	734.520020	730.989990	727.039978
722.849976	718.440002	713.320007	707.460022	701.539978	695.909973	690.030029
684.349976	680.640015	678.650024	677.570007	676.909973	676.400024	676.020020
675.760010	675.539978	675.260010	674.859985	674.320007	673.619995	672.830017
671.969971	671.049988	670.229980	669.390015	668.340027	667.270020	666.190002
665.130005	664.109985	663.150024	662.229980	661.380005	660.609985	659.969971
659.489990	658.840027	658.099976	657.299988	656.400024	655.409973	654.390015
653.309998	652.169983	651.030029	649.979980	648.960022	647.580017	646.099976
900.000000	900.000000	900.000000	900.000000	900.000000	900.000000	900.000000
900.000000	900.000000	900.000000	900.000000	900.000000	900.000000	900.000000
900.000000	900.000000	900.000000	900.000000	900.000000	900.000000	900.000000
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900.000000	900.000000	900.000000	900.000000	900.000000	900.000000	900.000000
900.000000	900.000000	900.000000	900.000000	900.000000	900.000000	883.090027
882.390015	881.830017	881.250000	880.580017	879.729980	878.760010	877.690002
876.429993	875.059998	873.830017	872.650024	871.289978	869.799988	867.789978
865.719971	863.539978	861.849976	861.520020	861.630005	860.599976	857.929993
854.619995	851.789978	849.489990	846.640015	843.599976	841.010010	839.250000
837.869995	836.469971	835.049988	833.599976	832.150024	830.799988	829.789978
828.280029	826.789978	825.309998	823.760010	822.609985	821.900024	820.739990
817.619995	812.390015	806.369995	801.299988	798.630005	797.150024	796.020020
795.049988	793.859985	792.309998	790.619995	788.659973	786.260010	783.770020
781.400024	779.320007	777.140015	774.739990	772.260010	769.979980	767.919983
765.710022	763.429993	761.150024	758.739990	756.049988	753.270020	750.469971
747.679993	744.929993	742.159973	739.440002	736.559998	733.359985	729.830017

```
726.109985 722.289978 717.979980 712.719971 706.900024 700.969971 695.119995
689.369995 684.190002 680.479980 678.260010 677.000000 676.229980 675.700012
675.309998 674.979980 674.640015 674.219971 673.710022 673.059998 672.309998
671.530029 670.710022 669.950012 669.210022 668.260010 667.250000 666.219971
665.210022 664.219971 663.270020 662.359985 661.500000 660.750000 660.169983
659.659973 658.989990 658.239990 657.409973 656.500000 655.510010 654.479980
653.419983 652.349976 651.289978 650.320007 649.299988 647.940002 646.460022
```

H.8 CULEBRA.BOT (partial listing only)

Measured elevations to bottom of Culebra

```
892.250000 892.250000 892.250000 892.250000 892.250000 892.250000 892.250000
892.250000 892.250000 892.250000 892.250000 892.250000 892.250000 892.250000
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892.250000 892.250000 892.250000 892.250000 892.250000 892.250000 892.250000
871.869995 871.179993 870.390015 869.419983 868.359985 867.239990 866.059998
864.719971 863.340027 862.099976 861.150024 859.950012 858.520020 856.880005
855.440002 854.239990 853.309998 852.520020 851.210022 848.770020 845.669983
842.909973 840.739990 838.330017 835.530029 832.820007 830.690002 829.109985
827.760010 826.619995 825.690002 824.780029 823.739990 822.469971 820.890015
819.070007 817.359985 815.940002 814.789978 813.789978 812.830017 811.659973
808.229980 803.039978 797.739990 793.559998 791.789978 790.229980 789.270020
788.179993 786.229980 783.780029 781.609985 779.219971 776.479980 773.679993
771.289978 769.090027 766.780029 764.429993 762.229980 760.169983 757.909973
755.570007 753.309998 750.780029 747.780029 744.700012 741.840027 739.250000
736.770020 734.150024 731.270020 727.960022 724.380005 720.349976 715.859985
711.270020 706.359985 700.859985 695.000000 689.619995 684.340027 678.650024
673.719971 671.770020 670.789978 670.150024 669.630005 669.270020 669.030029
668.869995 668.739990 668.510010 668.130005 667.539978 666.780029 665.900024
664.880005 663.750000 662.659973 661.700012 660.679993 659.590027 658.479980
657.380005 656.340027 655.369995 654.460022 653.609985 652.849976 652.200012
651.599976 650.960022 650.260010 649.489990 648.590027 647.609985 646.570007
645.429993 644.229980 643.080017 642.119995 640.890015 639.479980 638.020020
892.250000 892.250000 892.250000 892.250000 892.250000 892.250000 892.250000
892.250000 892.250000 892.250000 892.250000 892.250000 892.250000 892.250000
892.250000 892.250000 892.250000 892.250000 892.250000 892.250000 892.250000
892.250000 892.250000 892.250000 892.250000 892.250000 892.250000 892.250000
892.250000 892.250000 892.250000 892.250000 892.250000 892.250000 892.250000
892.250000 892.250000 892.250000 892.250000 892.250000 892.250000 892.250000
892.250000 892.250000 892.250000 892.250000 892.250000 892.250000 892.250000
892.250000 892.250000 892.250000 892.250000 892.250000 892.250000 892.250000
892.250000 892.250000 892.250000 892.250000 892.250000 892.250000 892.250000
892.250000 892.250000 892.250000 892.250000 892.250000 892.250000 892.250000
892.250000 892.250000 892.250000 892.250000 892.250000 892.250000 892.250000
892.250000 892.250000 892.250000 892.250000 892.250000 892.250000 892.250000
```

```
892.250000 892.250000 892.250000 892.250000 892.250000 892.250000 892.250000
892.250000 892.250000 892.250000 892.250000 892.250000 892.250000 873.750000
873.130005 872.690002 872.109985 871.340027 870.349976 869.280029 868.190002
866.919983 865.609985 864.500000 863.539978 862.460022 861.109985 859.039978
857.150024 855.460022 854.289978 853.989990 853.669983 852.099976 848.979980
845.710022 843.080017 840.590027 837.570007 834.479980 832.059998 830.440002
829.039978 827.750000 826.570007 825.429993 824.229980 822.919983 821.690002
820.119995 818.489990 817.000000 815.619995 814.469971 813.570007 812.549988
809.309998 803.869995 797.760010 792.869995 790.969971 789.469971 788.400024
787.429993 785.989990 784.109985 782.219971 780.090027 777.440002 774.679993
772.260010 770.229980 768.020020 765.630005 763.299988 761.250000 759.140015
756.849976 754.549988 752.159973 749.440002 746.510010 743.640015 740.890015
738.260010 735.590027 732.809998 729.909973 726.770020 723.239990 719.289978
715.099976 710.690002 705.570007 699.710022 693.789978 688.159973 682.280029
676.599976 672.890015 670.900024 669.820007 669.159973 668.650024 668.270020
668.010010 667.789978 667.510010 667.109985 666.570007 665.869995 665.080017
664.219971 663.299988 662.479980 661.640015 660.590027 659.520020 658.440002
657.380005 656.359985 655.400024 654.479980 653.630005 652.859985 652.219971
651.739990 651.090027 650.349976 649.549988 648.650024 647.659973 646.640015
645.559998 644.419983 643.280029 642.229980 641.210022 639.830017 638.349976
```

H.9 ***.WEL

MODFLOW well definition file, contains well grid coordinates and pumping rate information (documented in McKenna and Hart, 2003).

H.9.1 H3.WEL

```
# Transient testing well package file   Contains data from 1981 to 1996
# h3 WIPP transient model
# Created 05/05/2003 - Thomas Lowry
1 15
1 0
1 163 121  -3.03E-04
0 0
0 0
```

H.9.2 H19.WEL

```
3 15
1 0
1 165 129 -0.000226
0 0
1 0
1 165 129 -0.000236
0 0
1 0
1 181 137 -0.000244
0 0
1 0
1 165 129 -0.000271
1 0
1 165 129 -0.000252
2 0
1 138 110 -0.00043
```

```
1 165 129 -0.000252
1 0
1 165 129 -0.000252
2 0
1 165 129 -0.000252
1 181 137 -0.000223
2 0
1 165 129 -0.000155
1 181 137 -0.000223
3 0
1 132 122 -0.00045
1 165 129 -0.000155
1 181 137 -0.000223
2 0
1 165 129 -0.000155
1 181 137 -0.000223
2 0
1 165 129 -0.000155
1 181 137 -0.000376
1 0
1 165 129 -0.000155
0 0
```

H.9.3 P14.WELL

```
# Transient testing well package file   Contains data from 1981 to 1996
# p14 WIPP transient model
# Created 05/05/2003 - Thomas Lowry
1 15
1 0
1 152   75  -3.92E-03
1 0
1 152   75  -3.64E-03
1 0
1 152   75  -3.37E-03
0 0
0 0
```

H.9.4 W13.WELL

```
# Transient testing well package file   Contains data from 1981 to 1996
# w13 WIPP transient model
# Created 05/05/2003 - Thomas Lowry
1 15
1 0
1 130 110  -1.89E-03
0 0
0 0
```

H.10 TUPDATE.MOD (partial listing only)

Final calibrated transmissivity field (an output file that is used as input to subsequent analysesinitial file for each realization is a seed file generated as documented in Holt and Yarbrough (2002; 2003) and McKenna and Hart (2003).

```
4.60469E-04 4.65479E-04 4.68490E-04 4.55617E-04 4.47920E-04
4.30130E-04 3.51884E-04 3.30065E-04 3.53427E-04 4.54151E-04
4.58987E-04 4.62488E-04 4.58564E-04 4.51232E-04 4.41266E-04
4.08602E-04 3.62994E-04 3.91562E-04 9.28753E-07 8.72971E-07
7.79651E-07 7.65597E-07 7.66479E-07 7.69662E-07 7.73036E-07
7.78753E-07 7.82168E-07 7.87227E-07 7.86321E-07 7.84693E-07
7.79651E-07 7.71259E-07 7.60677E-07 7.52662E-07 7.45418E-07
7.37564E-07 7.29625E-07 7.20444E-07 7.14990E-07 7.03720E-07
6.91831E-07 6.83754E-07 6.77174E-07 6.67882E-07 6.56448E-07
5.46009E-05 5.31129E-05 5.11564E-05 4.90795E-05 4.85065E-05
4.84507E-05 4.81948E-05 4.81948E-05 4.78300E-05 4.78851E-05
4.82948E-05 4.98655E-05 5.22035E-05 5.21555E-05 5.02921E-05
5.02921E-05 5.27716E-05 5.40256E-05 5.46009E-05 5.53605E-05
5.57828E-05 5.61436E-05 5.66761E-05 5.68591E-05 5.68068E-05
5.72269E-05 5.91562E-05 6.12068E-05 6.23304E-05 7.14990E-07
7.08925E-07 7.12033E-07 7.12689E-07 7.11214E-07 7.12689E-04
7.18125E-04 7.15814E-04 7.15814E-04 7.24269E-04 7.16638E-04
7.13510E-04 7.17299E-04 7.05992E-04 6.92468E-04 6.75772E-04
6.53732E-04 6.60693E-04 6.57204E-04 6.15744E-04 6.38557E-04
6.37823E-04 6.25029E-04 6.11787E-04 5.98963E-04 1.06341E-06
1.24277E-06 1.48114E-06 1.77656E-06 2.10730E-06 2.46204E-06
2.75435E-06 2.98627E-06 3.10338E-06 3.07068E-06 2.84183E-06
2.51629E-06 2.12271E-06 1.72531E-06 1.38827E-06 1.11940E-06
8.71615E-07 6.51392E-07 4.69305E-07 3.28466E-07 2.11925E-07
1.61769E-07 1.25358E-07 1.00436E-07 8.10484E-08 6.74023E-08
5.71152E-08 5.05291E-08 4.63911E-08 4.55130E-08 4.65235E-08
4.97061E-08 5.49010E-08 6.34312E-08 2.00309E-08 1.99251E-08
1.99894E-08 1.99664E-08 1.97560E-08 1.94626E-08 1.97970E-08
1.95659E-08 1.90722E-08 1.82936E-08 1.75307E-08 1.76604E-08
1.76604E-08 1.76970E-08 1.76970E-08 1.74341E-08 1.71396E-08
1.68345E-08 1.64589E-08 1.59074E-08 1.54703E-08 1.50314E-08
1.46994E-08 1.42495E-08 1.39508E-08 1.35957E-08 1.32526E-08
1.27409E-08 1.22462E-08 1.17085E-08 1.12928E-08 1.06586E-08
1.04016E-08 9.81748E-09 9.31751E-09 8.88178E-09 8.41977E-09
8.05008E-09 7.63133E-09 7.28954E-09 6.94704E-09 6.58567E-09
6.26470E-09 5.93882E-09 5.57571E-09 5.22396E-09 4.88427E-09
4.57720E-09 4.22474E-09 4.00959E-09 3.90391E-09 3.86189E-09
3.83354E-09 3.80102E-09 3.77225E-09 3.76097E-09 3.74024E-09
3.72821E-09 3.69318E-09 3.66944E-09 3.63078E-09 3.58426E-09
3.52371E-09 3.44509E-09 3.36202E-09 3.30522E-09 3.22107E-09
3.14992E-09 3.09030E-09 3.04719E-09 2.98951E-09 2.95121E-09
2.91407E-09 2.87078E-09 2.84315E-09 2.80996E-09 2.77396E-09
2.72396E-09 2.68102E-09 2.64667E-09 2.58523E-09 2.53338E-09
2.49058E-09 2.43276E-09 2.38122E-09 2.33346E-09 2.27719E-09
2.23152E-09 2.18877E-09 2.12667E-09 2.07730E-09
```

H.11 Other MODFLOW/PEST/DTRKMF input files containing input parameters

H.11.1 Control.inp

Input control file for particle track to boundary; porosity is an input parameter and is the same value as used in the CCA (documented in McKenna and Hart, 2003).

```
*/ SECO steady_state no_echo actual_area whole_steps Analytic
*/ Sim_Time, Tol_Save, SS_Step, No_SS, Nsubcl, Nintgrl
*CONTROL
MODFLOW steady no_echo average_area no_history_steps Analytic
debug1
1.0E10 0.     1   1    3    100
*GRID
steady.dis
*FLOW
CONSTANT 0.16 Porosity
*END

*PARTICLES
1    0    1   0
1000.     0.
L 0.     118.175    158.148
*END

*BOUNDARY
Z    0.       1.
L    1.1        1.1
L    1.1      305.1
L 222.1      305.1
L 222.1        1.1
L    1.1        1.1
*END
```

H.11.2 ZONES.inf (partial listing only)

Input zone definition file for PEST, 1= high transmissivity and 2= low transmissivityassigned to grid.

```
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

```
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

H.12 MINING Scenario Input Files (influence of potash mining on flow fields)

H.12.1 PART_MINING.DAT (partial listing only)

Partial Mining Zone Input Fileassigns values to each cell in grid to define potential potash mining zones; 0 = inactive cell; 1 = cell is within a potential mining zone; 2 = cell outside a potential mining zone. Potential mining zones are considered only outside land withdrawal area for partial mining scenario. Derivation and basis for grid assignments are documented in Lowry (2003).

```
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
```

```
0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  2  2  2  2  2  2  2  2  2  2  2  2  2
2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2
```

H.12.2 Full Mining

```
0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2
2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2
0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2
2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2
0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2
2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2
0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2
2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2
0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  2  2  2  2  2  2  2  2  2  2  2  2  2
2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2
```

H.12.3 Mining Factors

Mining factors are random values between 1 and 1000 used as mutliplier to evaluate effect of potential potash mining on T-fields. There are three replicates run: mfR1. Txt; mfR2.txt and mfR3.txt. The mining factors are in the PAPDB: CULEBRA:MINP_FAC, parameter ID # 3419.

```
mfR1.txt

100
1      905.50
2      508.40
3      340.30
4      615.20
5      575.30
6      104.00
7      94.06
```

8	913.30
9	630.50
10	208.90
11	769.30
12	130.20
13	351.90
14	46.87
15	194.60
16	806.90
17	264.40
18	931.50
19	897.90
20	32.56
21	394.10
22	998.20
23	790.00
24	384.10
25	258.50
26	432.50
27	10.02
28	514.10
29	282.90
30	927.30
31	691.30
32	738.40
33	450.20
34	609.60
35	557.70
36	538.60
37	713.60
38	849.30
39	569.70
40	419.50
41	160.00
42	971.90
43	118.80
44	741.30
45	729.70
46	483.00
47	580.60
48	228.50
49	474.10
50	887.20
51	66.07
52	375.70
53	521.10
54	181.60
55	298.50
56	705.30
57	84.20
58	627.30
59	403.20
60	464.20
61	821.40
62	307.60
63	236.50
64	249.90

65	543.50
66	18.75
67	215.40
68	73.60
69	317.40
70	958.60
71	686.00
72	860.70
73	363.80
74	660.40
75	940.20
76	132.50
77	983.00
78	672.80
79	643.20
80	425.80
81	961.10
82	346.10
83	838.60
84	491.00
85	755.40
86	172.60
87	591.50
88	322.70
89	855.70
90	272.00
91	652.50
92	790.50
93	163.20
94	812.70
95	144.70
96	26.04
97	870.30
98	773.60
99	53.04
100	460.40

The table provided below lists the source data used to generate initial T-fields and heads as documented in Holt and Yarbrough (2002, 2003) and McKenna and Hart (2003).

Appendix H: Parameters Used in MODFLOW/PEST

Well	UTMX Coord	UTMY Coord	Eleva-tion m asml	Elev. to Culebra Middle m	Log T m/s	Salado Disso-lution m	Culebra Depth m	2000 Freshwater Head, m asml	CCA Freshwater Head, m asml
AEC-7	621126	3589381	1114.73	845.59	-6.8	0	269.14	933.19	932.00
CB-1	613191	3578049	1014.15	856.88	-6.5	0	157.27		911.10
D-268	608702	3578877	999.30	883.32	-5.7	0	115.98		915.20
DOE-1	615203	3580333	1056.16	802.72	-4.9	0	253.44	916.55	914.30
DOE-2	613683	3585294	1041.89	787.38	-4.0	0	254.51	940.03	934.70
Engel	614953	3567454	1042.00	837.78	-4.3	9	204.22		
ERDA-9	613696	3581958	1039.00	820.92	-6.3	0	218.08	921.59	NU

Well	UTMX Coord	UTMY Coord	Eleva-tion m asml	Elev. to Culebra Middle m	Log T m/s	Salado Disso-lution m	Culebra Depth m	2000 Freshwater Head, m asml	CCA Freshwater Head, m asml
H-1	613423	3581684	1035.68	826.13	-6.0	0	209.55	927.19	921.60
H2b2	612661	3581649		836.25				926.62	924.80
H-2c	612666	3581668	1029.52	836.58	-6.2	0	192.94		
H3b1	613729	3580895	1033.04	825.17	-4.7	0	207.87		914.80
H-3b2	613701	3580906		823.37				917.16	914.80
H-4b	612380	3578483		862.48				915.55	911.40
H-4c	612406	3578499	1016.04	862.73	-6.1	0	153.31		
H-5b	616872	3584801		791.53				936.26	934.20
H-5c	616903	3584802	1068.56	790.74	-6.7	0	277.82		
H-6b	610594	3585008		832.73				934.20	932.00
H-6c	610610	3584983	1020.45	832.84	-4.4	0	187.61		
H-7b1	608124	3574648		886.37				913.86	912.70
H-7c	608095	3574640	964.21	886.33	-2.8	30	77.88		
H-8b				863.16					NU
H-9b	613989	3568261		836.43				911.57	906.40
H-9c	613974	3568234	1038.31	836.53	-4.0	7	201.78		
H-10b	622975	3572473	1124.32	705.07	-7.4	0	419.25		921.30
H-11b2				812.67					912.40
H-11b4	615301	3579131	1039.37	815.44	-4.3	0	223.93	915.47	912.40
H-12	617023	3575452	1044.24	789.27	-6.7	0	254.97	914.66	913.50
H-14	612341	3580354	1019.70	849.47	-6.5	0	170.23	920.24	916.90
H-15	615315	3581859	1060.77	794.98	-6.8	0	265.79	919.87	916.10
H-16	613369	3582212	1039.52	321.79	-6.1	0	217.46		
H-17	615718	3577513	1031.45	812.42	-6.6	0	219.03	915.37	911.00
H-18	612264	3583166	1040.39	826.82	-5.7	0	213.57	937.22	932.40
H-19b0	614514	3580716	1041.50	812.30	-5.2	0	229.20	917.13	NU
P-14			1024.05	846.05	-3.5	14	178.00		926.90
P-15			1008.82	879.58	-7.0	0	129.24		917.80
P-17	613926	3577466	1016.74	842.85	-6.0	0	173.89	915.20	909.30
WIPP-12	613710	3583524	1058.05	807.35	-7.0	0	250.70	935.30	933.60
WIPP-13	612644	3584247	1037.96	820.79	-4.1	0	217.17	935.17	933.70
WIPP-18	613735	3583179	1053.51	810.43	-6.5	0	243.08	936.08	930.50
WIPP-19	613739	3582782	1046.40	812.47	-6.2	0	233.93	932.66	NU
WIPP-21	613743	3582319	1041.53	815.68	-6.6	0	225.85	927.00	NU
WIPP-22	613739	3582653	1044.18	814.67	-6.4	0	229.51	930.96	NU
WIPP-25	606385	3584028	979.16	839.10	-3.5	48	140.06	932.70	928.70
WIPP-26	604014	3581162	960.65	900.45	-2.9	52	60.20	921.06	918.50
WIPP-27			968.40	875.07	-3.3	70	92.97	941.04	938.10
WIPP-28			1020.05	888.14	-3.6	45	131.98		937.50

Well	UTMX Coord	UTMY Coord	Eleva-tion m asml	Elev. to Culebra Middle m	Log T m/s	Salado Disso-lution m	Culebra Depth m	2000 Freshwater Head, m asml	CCA Freshwater Head, m asml
WIPP-29			9070.37	899.14	-3.0	115	8.23	905.36	NU
WIPP-30	613721	3589701	1044.70	849.01	-6.7	0	195.69	936.88	934.10
WQSP-1	612561	3583427	1041.40	825.61	-4.5	0	215.79	935.64	NU
WQSP-2	613776	3583973	1055.00	805.28	-4.7	0	249.72	938.82	NU
WQSP-3	614686	3583518	1059.90	799.52	-6.8	0	260.38	935.89	NU
WQSP-4	614728	3580766	1045.60	809.18	-4.9	0	236.42	917.49	NU
WQSP-5	613668	3580353	1030.70	830.03	-5.9	0	200.67	917.22	NU
WQSP-6	612605	3580736	1024.70	844.39	-6.6	0	180.31	920.02	NU
USGS-1	606462	3569459	1044.10	881.66	-3.3	37	162.44		909.80

NA: Not Available
NU: Not Used
NE: Not equilibrated

APPENDIX I: FMT DATABASE

Used in geochemical calculations (solubilities) of radionuclides.

```
fmt_021120.chemdat
----------------------------------------------------------------------------
'FMT_021120.chemdat'
'ERG update of FMT_970407.chemdat (PAVT db)'

27 214 'nNEW T' 'nACTCOEF' 'nECHO' 'nABCD'
200 1.d-6 1.d-18
'NONE' 298.15 1.d0 1.d0

'Hydrogen' 'Oxygen' 'Sodium' 'Potassium' 'Magnesium' 'Calcium' 'Chlorine' 'Sulfur'
'Carbon' 'PosIon:EL'
  'NegIon:EL' 'Oxalate:EL' 'Boron' 'Bromine' 'Acetate:EL' 'Th(IV)' 'Am(III)' 'Pu(III)'
'Np(V)'
  'ClO4:EL' 'Phosphorus' 'U(IV)' 'Lactate:EL' 'EDTA:EL' 'Citrate:EL' 'Electron:EL'
'Charge:EL'
1.0079 15.9994 22.98977 39.0983 24.305 40.08 35.453 32.06 12.011 0.0 0.0 28.84 10.81
79.904 59.044
   232.0381 243.0 238.029 237.0482 99.4506 30.974 242.0 89.07 888.888 189.1 0.0 0.0

'H2O                          WATER'  2  1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1 -95.6635     HMW84
'Na+                            Na+'  0  0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  1   1 -105.651     HMW84
'K+                              K+'  0  0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  1   1 -113.957     HMW84
'Ca++                          Ca++'  0  0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  2   1 -223.30      HMW84
'Mg++                          Mg++'  0  0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  2   1 -183.468     HMW84
'MgOH+                        MgOH+'  1  1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  1   1 -251.94      HMW84
'H+                              H+'  1  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  1   1  0.          HMW84

'Cl-                            Cl-'  0  0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1 -52.955      HMW84
'SO4=                          SO4='  0  4 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -2   1 -300.386     HMW84
'HSO4-                        HSO4-'  1  4 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1 -304.942     HMW84
'OH-                            OH-'  1  1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1 -63.435      HMW84
'HCO3-                        HCO3-'  1  3 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1 -236.751     HMW84
'CO3=                          CO3='  0  3 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -2   1 -212.944     HMW84

'CO2(aq)                    CO2(aq)'  0  2 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1 -155.68      HMW84
'CaCO3(aq)                CaCO3(aq)'  0  3 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1 -443.5       HMW84
'MgCO3(aq)                MgCO3(aq)'  0  3 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1 -403.155     HMW84

'B(OH)3(aq)              B(OH)3(aq)'  3  3 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0  0   1 -390.81      FW86
'B(OH)4-                   B(OH)4-'  4  4 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1 -465.20      FW86
'B3O3(OH)4-              B3O3(OH)4-'  4  7 0 0 0 0 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1 -963.77      FW86
'B4O5(OH)4=              B4O5(OH)4='  4  9 0 0 0 0 0 0 0 0 0 0 0 4 0 0 0 0 0 0 0 0 0 0 0
0 0 -2   1 -1239.10     FW86
'CaB(OH)4+                CaB(OH)4+'  4  4 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0
0 0  1   1 -692.30      FW86
'MgB(OH)4+                MgB(OH)4+'  4  4 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0
0 0  1   1 -651.89      FW86
'Br-                            Br-'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0
0 0 -1   1 -999.99      arbitrary
'ClO4-                  perchlorate'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0
0 0 -1   1 -73.81       CFN950705

'NaOH(aq)      to.titrate.base.only'  1  1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1  500.        arbitrary
'HCl(aq)       to.titrate.acid.only'  1  0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1  500.        arbitrary
'HClO4(aq)     to.titrate.acid.only'  1  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0
0 0  0   1  500.        arbitrary
'PosIon                POSITIVE.ION'  0  0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  1   1  0.          arbitrary
'NegIon                NEGATIVE.ION'  0  0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1  0.          arbitrary
'PosIon(OH)(aq)     to.titrate.base'  1  1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1  500.        arbitrary
'HNegIon(aq)        to.titrate.acid'  1  0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1  500.        arbitrary

'H3PO4(aq)                H3PO4(aq)'  3  4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0
0 0  0   1 -460.90      RFF92
'H2PO4-                      H2PO4-'  2  4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0
0 0 -1   1 -455.96      RFF92
'HPO4=                        HPO4='  1  4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0
0 0 -2   1 -439.367     CFN95a
'PO4=-                        PO4=-'  0  4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0
0 0 -3   1 -410.947     RFF92

'Am+++                        Am+++'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0  3   1 -241.694     FO76
'AmCO3+                      AmCO3+'  0  3 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0  1   1 -473.29      FK98/Fanghanel et al 1999
'Am(CO3)2-                Am(CO3)2-'  0  6 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0 -1   1 -697.52      FK98/Fanghanel et al 1999
'Am(CO3)3=-              Am(CO3)3=-'  0  9 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0 -3   1 -915.53      FK98/Fanghanel et al 1999
'AmOH++                      AmOH++'  1  1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0  2   1 -319.96      FK98/Fanghanel et al 1994
'Am(OH)2+                  Am(OH)2+'  2  2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0  1   1 -396.89      FK98/Fanghanel et al 1994
'Am(OH)3(aq)            Am(OH)3(aq)'  3  3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0  0   1 -469.53      FK98/Fanghanel et al 1994
'AmCl++                      AmCl++'  0  0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0  2   1 -295.20      FK98/Konnecke et al 1997
'AmCl2+                      AmCl2+'  0  0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0  1   1 -345.90      FK98/Konnecke et al 1997
'Am(CO3)4==-            Am(CO3)4==-'  0 12 0 0 0 0 0 0 4 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0 -5   1 -1123.40     FK98/Fanghanel et al 1999
'Am(SO4)2-                Am(SO4)2-'  0  8 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0 -1   1 -850.99      FK98
'AmSO4+                      AmSO4+'  0  4 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
```

```
0 0  1   1 -549.56      FK98

'Pu(OH)2+               deactivated'  2  2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
0 0  1   1  999.999
'Pu(OH)3(aq)            deactivated'  3  3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
0 0  0   1  999.999

'Th++++                      Th++++'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0  4   1 -284.227     FO76
'Th(CO3)5===            Th(CO3)5==='  0 15 0 0 0 0 0 0 5 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0 -6   1 -1411.378    CFN960119/FRSMHC97
'Th(OH)3(CO3)-        Th(OH)3(CO3)-'  3  6 0 0 0 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0 -1   1 -775.627     CFN960119/FRSMHC97
'Th(OH)4(aq)            Th(OH)4(aq)'  4  4 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0  0   1 -622.47      ERG_Th_memo/RR87
'Th(SO4)2(aq)          Th(SO4)2(aq)'  0  8 0 0 0 0 0 2 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0  0   1 -911.69      FR92
'Th(SO4)3=                Th(SO4)3='  0 12 0 0 0 0 0 3 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0 -2   1 -1214.0      FR92

'U++++                        U++++'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0  4   1 -214.19      RFSMMN
'UOH+++                      UOH+++'  1  1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0  3   1 -308.7       RFSMMN
'U(CO3)5===              U(CO3)5==='  0 15 0 0 0 0 0 0 5 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0 -6   1 -1345.393    Rai96
'U(OH)2(CO3)2=        U(OH)2(CO3)2='  2  8 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0 -2   1 -863.383     Rai96
'U(OH)4(CO3)2==      U(OH)4(CO3)2=='  4 10 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0 -4   1 -998.662     Rai96
'U(OH)4(aq)             deactivated'  4  4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0  0   1  999.999
'U(SO4)2(aq)            deactivated'  0  8 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0  0   1  999.999
'U(SO4)3=               deactivated'  0 12 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0 -2   1  999.999

'NpO2+                        NpO2+'  0  2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
0 0  1   1 -369.105     FO76
'NpO2CO3-                  NpO2CO3-'  0  5 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
0 0 -1   1 -593.601     FNK95
'NpO2(CO3)2=-          NpO2(CO3)2=-'  0  8 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
0 0 -3   1 -809.832     FNK95
'NpO2(CO3)3==-        NpO2(CO3)3==-'  0 11 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
0 0 -5   1 -1020.214    FNK95
'NpO2OH(aq)              NpO2OH(aq)'  1  3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
0 0  0   1 -438.730     FNK95
'NpO2(OH)2-              NpO2(OH)2-'  2  4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
0 0 -1   1 -506.238     FNK95

'HAc(aq)                 AceticAcid'  1  0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0
0 0  0   1 -158.300     SAND99/NBC96
'Ac-                       Acetate-'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0
0 0 -1   1 -147.347     SAND99/NBC96

'H3Citrate(aq)           CitricAcid'  3  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1 0  0   1  000.000     SAND99/Mizera
'H2Citrate-             H2Citrate-'   2  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1 0 -1   1    7.476     SAND99/Mizera
'HCitrate=                HCitrate='  1  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1 0 -2   1   18.620     SAND99/Mizera
'Citrate=-                Citrate=-'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1 0 -3   1   33.410     SAND99/Mizera
```

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'H4EDTA(aq)            H4EDTA(aq)'  4  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
0 0  0   1  000.000     SAND99/Mizera
'H3EDTA-                  H3EDTA-'  3  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
0 0 -1   1    5.761     SAND99/Mizera
'H2EDTA=                  H2EDTA='  2  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
0 0 -2   1   12.870     SAND99/Mizera
'HEDTA=-                  HEDTA=-'  1  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
0 0 -3   1   28.710     SAND99/Mizera
'EDTA==                    EDTA=='  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
0 0 -4   1   53.050     SAND99/Mizera

'H2Ox(aq)              OxalicAcid'  2  0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1   0.000      SAND99/Mizera
'HOx-                  Bioxalate-'  1  0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1   3.209      SAND99/Mizera
'Ox=                     Oxalate='  0  0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -2   1  13.017      SAND99/Mizera

'HLactate(aq)          LacticAcid'  1  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0
0 0  0   1  000.000     SAND99
'Lactate-                Lactate-'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0
0 0 -1   1    8.798     SAND99

'AmAc++                AmAcetate++'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0
0 0  2   1 -395.356     ERG_org_memo
'AmCit(aq)           AmCitrate(aq)'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
1 0  0   1 -228.543     SAND99
'AmEDTA-                  AmEDTA-'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1
0 0 -1   1 -232.324     SAND99
'AmOx+                 AmOxalate+'  0  0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0
0 0  1   1 -242.853     SAND99/Borkowski et al 01
'AmLac++               AmLactate++'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0
0 0  2   1 -241.436     SAND99/Moore et al 99 deemed data insufficient

'ThAc2++             ThAcetate2++'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 2 1 0 0 0 0 0 0 0 0
0 0  2   1 -604.800     Moore et al 1999
'PuCit(aq)             deactivated'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
1 0  0   1  999.999
'NpO2H2EDTA-           NpO2H2EDTA-'  2  2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1
0 0 -1   1 -364.098     SAND99/PBMC98
'PuOx+                 deactivated'  0  0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0
0 0  1   1  999.999
'ThLac2++            ThLactate2++'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 2 0
0 0  2   1 -292.400     Moore et al 1999

'ThAc+++                  ThAc+++'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0
0 0  3   1 -448.525     SAND99
'ThCit+                    ThCit+'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
1 0  1   1 -285.898     SAND99/data of CEX96
'ThEDTA(aq)            ThEDTA(aq)'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1
0 0  0   1 -285.419     ERG_org_memo
'ThOx++                Th(C2O4)++'  0  0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0
0 0  2   1 -297.428     SAND99/Borkowski et al 01
'ThLac+++                ThLac+++'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1 0
0 0  3   1 -291.152     SAND99/Moore et al 99

'UAc+++                deactivated'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1 0 0
0 0  3   1  999.999
'UCit+                 deactivated'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
1 0  1   1  999.999
'UEDTA(aq)             deactivated'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1
0 0  0   1  999.999
```

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'ULac+++              deactivated'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0
0 0  3   1  999.999
'UOx++                deactivated'  0  0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0
0 0  2   1  999.999

'NpO2Ac(aq)            NpO2Ac(aq)'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0
0 0  0   1 -519.615     ERG_release_memo
'NpO2Cit=            NpO2Citrate='  0  2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
1 0 -2   1 -343.747     SAND99/data of BPBC99
'NpO2EDTA=-            NpO2EDTA=-'  0  2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1
0 0 -3   1 -335.708     SAND99/PBMC98
'NpO2Ox-             NpO2Oxalate-'  0  2 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0
0 0 -1   1 -365.851     SAND99/Borkowski et al 01
'NpO2Lac(aq)       NpO2Lactate(aq)'  0  2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0
0 0  0   1 -364.837     SAND99/Moore et al 99

'MgAc+                      MgAc+'  0  0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0
0 0  1   1 -333.378     ERG_org_memo
'MgCit-                    MgCit-'  0  0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1 0 -1   1 -162.261     ERG_org_memo
'MgEDTA=                  MgEDTA='  0  0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
0 0 -2   1 -153.734     ERG_org_memo
'MgOx(aq)                MgOx(aq)'  0  0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1 -179.185     ERG_org_memo
'MgLac+                    MgLac+'  0  0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0
0 0  1   1  999.999     No MgLac data

'CaAc+                (Mg-analog)'  0  0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0
0 0  1   1 -373.210     analogy w/Mg++ (ERG_org_memo)
'CaCit-               (Mg-analog)'  0  0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1 0 -1   1 -202.093     analogy w/Mg++ (ERG_org_memo)
'CaEDTA=              (Mg-analog)'  0  0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
0 0 -2   1 -193.566     analogy w/Mg++ (ERG_org_memo)
'CaOx(aq)             (Mg-analog)'  0  0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1 -219.017     analogy w/Mg++ (ERG_org_memo)
'CaLac+               (Mg-analog)'  0  0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0
0 0  1   1  999.999     No MgLac data

'UnuCat#1+                  UC#1+'  0  0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  1   1  999.999
'NpO2HEDTA=            NpO2HEDTA='  1  2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1
0 0 -2   1 -351.852     SAND99/PBMC98
'UnuAn#2-                   UA#2-'  0  0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1  999.999
'UnuAn#3-                   UA#3-'  0  0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1  999.999
'UnuAn#4-                   UA#4-'  0  0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1  999.999
'UnuNeu#1(aq)            UN#1(aq)'  0  0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1  999.999

'AmOHCO3(c)______________AmOHCO3(c)'  1  4 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0  0   2  -570.34     Fanghanel et al. 1999
'Am(OH)3(s)______________Am(OH)3(s)'  3  3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0  0   2  -495.32     Konnecke et al. 1997
'NaAm(CO3)2.6H2O(c)________________' 12 12 1 0 0 0 0 0 2 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0  0   2 -1396.47     RRFFN96
'AmPO4(c)__________________AmPO4(c)'  0  4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0
0 0  0   2  -709.75     RFF92

'PuOHCO3(c)_____________deactivated'  1  4 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
0 0  0   2   999.999
'Pu(OH)3(s)_____________deactivated'  3  3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
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0 0  0   2   999.999
'NaPu(CO3)2.6H2O(c)_____deactivated' 12 12 1 0 0 0 0 0 2 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
0 0  0   2   999.999
'PuPO4(c)________________deactivated'  0  4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0
0 0  0   2   999.999

'ThO2(am)_____Hydrous_Thorium_Oxide'  0  2 0  0 0 0 0  0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0 0  0   2 -451.408     FRM91
'Th(SO4)2.9H2O(s)__________________' 18 17 0  0 0 0 0  2 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0 0  0   2 -1775.90     FR92
'Th(SO4)2.8H2O(s)__________________' 16 16 0  0 0 0 0  2 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0 0  0   2 -1680.00     FR92
'Th(SO4)2.Na2SO4.6H2O(16C,s)_______' 12 18 2  0 0 0 0  3 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0 0  0   2 -2011.29     FR92
'Th(SO4)2.K2SO4.4H2O(16C,s)________'  8 16 0  2 0 0 0  3 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0 0  0   2 -1837.57     FR92
'Th(SO4)2.2K2SO4.2H2O(16C,s)_______'  4 18 0  4 0 0 0  4 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0 0  0   2 -2181.81     FR92
'2[Th(SO4)2.7/2K2SO4(16C,s)]_______'  0 44 0 14 0 0 0 11 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0
0 0 0  0   2 -5581.66 =2[-2790.83] FR92

'UO2(am)________Hydrous_U(IV)_Oxide'  0  2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0  0   2 -399.67      RFSMMN

'NpO2OH(aged)___________NpO2OH(aged)'  1  3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
0 0  0   2  -454.369    FNK95/NFRK95
'NpO2OH(amor)___________NpO2OH(amor)'  1  3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
0 0  0   2  -452.757    FNK95/NFRK95
'2[NaNpO2CO3.7/2H2O(s)]_____________' 14 17 2 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0
0 0  0   2 -2096.116    =2*(-1048.058)  FNK95/NFRK95
'Na3NpO2(CO3)2(s)__Na3NpO2(CO3)2(s)'  0  8 3 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
0 0  0   2 -1144.597    FNK95/NFRK95
'KNpO2CO3(s)_____________KNpO2CO3(s)'  0  5 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
0 0  0   2  -727.330    Novak et al. 1997
'K3NpO2(CO3)2(s)____K3NpO2(CO3)2(s)'  0  8 0 3 0 0 0 0 2 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
0 0  0   2 -1173.546    Novak et al. 1997

'H2Ox.2H2O(s)________H2C2O4.2H2O(s)'  6  2 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -191.346     ERG_ox_memo
'NaHOx.H2O(s)________NaHC2O4.H2O(s)'  3  1 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -202.253     ERG_ox_memo
'Na2Ox(s)_________________Na2C2O4(s)'  0  0 2 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -203.823     ERG_ox_memo
'CO2("solid",DISABLED)_____________'  0  2 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2    0.0

'CaSO4_____________________Anhydrite'  0  4 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -533.73      HMW84
'NaK3(SO4)2__Aphthitalite/Glaserite'  0  8 1 3 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1057.05     HMW84
'CaCl2.6H2O_____________Antarcticite' 12  6 0 0 0 1 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -893.65      HMW84
'CaCO3______________________Aragonite'  0  3 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -455.17      HMW84
'K2SO4________________________Arcanite'  0  4 0 2 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -532.39      HMW84
'MgCl2.6H2O_______________Bischofite' 12  6 0 0 1 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -853.1       HMW84
'Na2Mg(SO4)2.4H2O___________Bloedite'  8 12 2 0 1 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1383.6      HMW84
'Mg(OH)2_______________________Brucite'  2  2 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -335.4       HMW84
'Na6CO3(SO4)2_______________Burkeite'  0 11 6 0 0 0 0 2 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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0 0  0   2 -1449.4      HMW84
'CaCO3______________________Calcite'  0  3 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -455.6       HMW84
'CaCl2.4H2O______CaCl2_Tetrahydrite'  8  4 0 0 0 1 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -698.7       HMW84
'Ca4Cl2(OH)6.13H2O__CaOxychloride_A' 32 19 0 0 0 4 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -2658.45     HMW84
'Ca2Cl2(OH)2.H2O____CaOxychloride_B'  4  3 0 0 0 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -778.41      HMW84
'KMgCl3.6H2O_____________Carnallite' 12  6 0 1 1 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1020.3      HMW84
'MgSO4.7H2O________________Epsomite' 14 11 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1157.83     HMW84
'CaNa2(CO3)2.5H2O________Gaylussite' 10 11 2 0 0 1 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1360.5      HMW84
'Na2Ca(SO4)2_____________Glauberite'  0  8 2 0 0 1 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1047.45     HMW84
'CaSO4.2H2O__________________Gypsum'  4  6 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -725.56      HMW84
'NaCl________________________Halite'  0  0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -154.99      HMW84
'MgSO4.6H2O_____________Hexahydrite' 12 10 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1061.60     HMW84
'KMgClSO4.3H2O______________Kainite'  6  7 0 1 1 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -938.2       HMW84
'KHCO3___________________Kalicinite'  1  3 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -350.06      HMW84
'MgSO4.H2O________________Kieserite'  2  5 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -579.80      HMW84
'K2Mg(SO4)2.4H2O____________Leonite'  8 12 0 2 1 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1403.97     HMW84
'Na4Ca(SO4)3.2H2O_______Labile_Salt'  4 14 4 0 0 1 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1751.45     HMW84
'MgCO3____________________Magnesite'  0  3 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -414.45      HMW84
'Mg2Cl(OH)3.4H2O______MgOxychloride' 11  7 0 0 2 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1029.6      HMW84
'KHSO4___________________Mercallite'  1  4 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -417.57      HMW84
'Na2SO4.10H2O____________Mirabilite' 20 14 2 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1471.15     HMW84
'K8H6(SO4)7________________Misenite'  6 28 0 8 0 0 0 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -3039.24     HMW84
'NaHCO3___________________Nahcolite'  1  3 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -343.33      HMW84
'Na2CO3.10H2O________________Natron' 20 13 2 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1382.78     HMW84
'MgCO3.3H2O____________Nesquehonite'  6  6 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -695.3       HMW84
'K2Mg(SO4)2.6H2O_Picromerite/Schoen' 12 14 0 2 1 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1596.1      HMW84
'Na2Ca(CO3)2.2H2O________Pirssonite'  4  8 2 0 0 1 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1073.1      HMW84
'K2MgCa2(SO4)4.2H2O______Polyhalite'  4 18 0 2 1 2 0 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -2282.5      HMW84
'Ca(OH)2________________Portlandite'  2  2 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -362.12      HMW84
'K2CO3.3/2H2O___Potassium_Carbonate' 3 4.5 0 2 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -577.37      HMW84
'K8H4(CO3)6.3H2O___K-Sequicarbonate' 10 21 0 8 0 0 0 0 6 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -2555.4      HMW84
'KNaCO3.6H2O__________K-Na-Carbonate' 12  9 1 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1006.8      HMW84
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'K2NaH(CO3)2.2H2O___Potassium_Trona'  5  8 1 2 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -971.74      HMW84
'K3H(SO4)2__Sesquipotassium_Sulfate'  1  8 0 3 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -950.8       HMW84
'Na3H(SO4)2____Sesquisodium_Sulfate'  1  8 3 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -919.6       HMW84
'Na2CO3.7H2O____Na2CO3-Heptahydrate' 14 10 2 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1094.95     HMW84
'KCl__________________________Sylvite'  0  0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -164.84      HMW84
'K2Ca(SO4)2.H2O___________Syngenite'  2  9 0 2 0 1 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1164.8      HMW84
'Mg2CaCl6.12H2O________Tachyhydrite' 24 12 0 0 2 1 6 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -2015.9      HMW84
'Na2SO4__________________Thenardite'  0  4 2 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -512.35      HMW84
'Na2CO3.H2O___________Thermonatrite'  2  4 2 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -518.8       HMW84
'Na3H(CO3)2.2H2O______________Trona'  5  8 3 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -960.38      HMW84
'Na2B4O7.10H2O________________Borax' 20 17 2 0 0 0 0 0 0 0 0 0 4 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -2224.16     FW86
'B(OH)3____________Borix_Acid_Solid'  3  3 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -390.88      FW86
'KB5O8.4H2O____K-Pentaborate_(30_C)'  8 12 0 1 0 0 0 0 0 0 0 0 5 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1770.26     FW86
'K2B4O7.4H2O___K-Tetraborate_(30_C)'  8 11 0 2 0 0 0 0 0 0 0 0 4 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1663.47     FW86
'NaBO2.4H2O_______Sodium_Metaborate'  8  6 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -761.42      FW86
'NaB5O8.5H2O_____Sodium_Pentaborate' 10 13 1 0 0 0 0 0 0 0 0 0 5 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1854.80     FW86
'NaBO2.NaCl.2H2O___Teepleite_(20_C)'  4  4 2 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -725.77      FW86
'CaMg(CO3)2________________Dolomite'  0  6 0 0 1 1 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -871.99      HMW84
'Mg5(CO3)4(OH)2.4H2O_HydroMagne5424' 10 18 0 0 5 0 0 0 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -2364.06     R&H73
'Mg4(CO3)3(OH)2.3H2O_HydroMagne4323'  8 14 0 0 4 0 0 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1856.104    Lang65
'H+(solid)________________to.set.aH+'  1  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  1   2  0.0
'OH-/H2O(solid)___________to.set.aH+' -1  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   2  0.0

'nDG_BYPASS' 0
'PITZACT'
39 #Cations
53 #Anions
26 #Neutrals

 1  .0765     .2644    .0     .00127   Na+ Cl-           HMW84 (beta0, beta1, beta2,
cphi) NOTE: HMW gives .2644; P91 gives .2664
 1  .01958   1.113     .0     .00497   Na+ SO4=          HMW84
 1  .0454     .398     .0     .0       Na+ HSO4-         HMW84
 1  .0864     .253     .0     .0044    Na+ OH-           HMW84
 1  .0277     .0411    .0     .0       Na+ HCO3-         HMW84
 1  .0399    1.389     .0     .0044    Na+ CO3=          HM284
 1 -.0427     .089     .0     .0114    Na+ B(OH)4-       FW86
 1 -.056     -.910     .0     .0       Na+ B3O3(OH)4-    FW86
 1 -.11      -.40      .0     .0       Na+ B4O5(OH)4=    FW86
 1  .0        .0       .0     .0       Na+ Br-
 1 -.240      .224     .0     .0284    Na+ Am(CO3)2-     FK98/Fanghanel et al. 1999
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 1  .125     4.73      .0      .0007    Na+ Am(CO3)3=-    FK98/Fanghanel et al. 1999
 1  .0554     .2755    .0    -.00118    Na+ ClO4-         P91
 1  .0        .0       .0      .0       Na+ NpO2(OH)2-    FNK95
 1  .10       .34      .0      .0       Na+ NpO2CO3-      FNK95
 1  .48      4.4       .0      .0       Na+ NpO2(CO3)2=-  FNK95
 1  1.80     22.7      .0      .0       Na+ NpO2(CO3)3==- FNK95
 1 -.0533     .0396    .0      .00795   Na+ H2PO4-        P91
 1 -.0583    1.466     .0      .0294    Na+ HPO4=         P91
 1  .1781    3.851     .0    -.05154    Na+ PO4=-         P91
 1  .12       .0       .0      .0       Na+ Th(SO4)3=     FR92
 1  .0        .0       .0      .0       Na+ Th(OH)3(CO3)-
 1  1.31    30.        .0      .0       Na+ Th(CO3)5===   FRSMHC97
 1 -0.2448    .29      .0      .068     Na+ HOx-          SAND99/Mizera
 1 -0.2176   1.74      .0      .122     Na+ Ox=           SAND99/Mizera
 1  0.1426    .22      .0    -.00629    Na+ Ac-           SAND99/NBC96
 1 -0.0563    .29      .0      .047     Na+ Lac-          SAND99/Moore et al 99
 1 -0.1296    .29      .0      .013     Na+ H2Cit-        SAND99/Mizera
 1 -0.0989   1.74      .0      .027     Na+ HCit=         SAND99/Mizera
 1  0.0887   5.22      .0      .047     Na+ Cit=-         SAND99/Mizera
 1 -0.2345    .29      .0      .059     Na+ H3EDTA-       SAND99/Mizera
 1 -0.1262   1.74      .0      .054     Na+ H2EDTA=       SAND99/Mizera
 1  0.5458   5.22      .0    -0.048     Na+ HEDTA=-       SAND99/Mizera
 1  1.016   11.6       .0      .001     Na+ EDTA==        SAND99/Mizera
 1 -.2239     .29      .0      .002     Na+ AmEDTA-       SAND99
 1 -.4226    1.75      .0      .142     Na+ NpO2Cit=      SAND99
 1  .683     5.911     .0      .0       Na+ NpO2EDTA=-    SAND99/PBMC98
 1 -.5418     .29      .0      .095     Na+ NpO2Ox-       SAND99/Borkowski et al 01
 1  .41     17.25      .0      .0       Na+ U(OH)4(CO3)2==  Rai96
 1 1.31     30.0       .0      .0       Na+ U(CO3)5===      Rai96
 1  .0        .0       .0      .0       Na+ U(SO4)3=
 1 2.022    19.22      .0     -.305     Na+ Am(CO3)4==-   FK98/Fanghanel et al. 1999
 1 -.354     0.40      .0      .051     Na+ Am(SO4)2-     FK98
 1 -.8285    .2575     .0      .256     Na+ NpO2H2EDTA-   PBMC98
 1  .1742     .29      .0    -.06923    Na+ CaCit-        analogy w/Mg  (ERG_org_memo)
 1  .2134    1.74      .0      .00869   Na+ CaEDTA=       analogy w/Mg  (ERG_org_memo)
 1  .0        .0       .0      .0       Na+ UnuAn#2-
 1  .0        .0       .0      .0       Na+ UnuAn#3-
 1  .0        .0       .0      .0       Na+ UnuAn#4-
 1  .0        .0       .0      .0       Na+ U(OH)2(CO3)2=
 1  .1742     .29      .0    -.06923    Na+ MgCit-          ERG_org_memo
 1  .2134    1.74      .0      .00869   Na+ MgEDTA=         ERG_org_memo
 1  .4733   -1.504     .0      .0       Na+ NpO2HEDTA=      PBMC98

 1  .04835    .2122    .0    -.00084    K+ Cl-            HMW84
 1  .04995    .7793    .0      .0       K+ SO4=           HMW84
 1 -.0003     .1735    .0      .0       K+ HSO4-          HMW84
 1  .1298     .320     .0      .0041    K+ OH-            HMW84
 1  .0296    -.013     .0     -.008     K+ HCO3-          HMW84
 1  .1488    1.43      .0     -.0015    K+ CO3=           HMW84
 1  .035      .14      .0      .0       K+ B(OH)4-        FW86
 1 -.13       .0       .0      .0       K+ B3O3(OH)4-     FW86
 1 -.022      .0       .0      .0       K+ B4O5(OH)4=     FW86
 1  .0        .0       .0      .0       K+ Br-
 1 -.240      .224     .0      .0284    K+ Am(CO3)2-      analogy w/ Na (FK98)
 1  .125     4.73      .0      .0007    K+ Am(CO3)3=-     analogy w/ Na (FK98)
 1  .0        .0       .0      .0       K+ ClO4-
 1  .0        .0       .0      .0       K+ NpO2(OH)2-     Novak et al. 1997 (made
analogy w/Na+)
 1  .10       .34      .0      .0       K+ NpO2CO3-       Novak et al. 1997 (made
analogy w/Na+)
 1  .48      4.4       .0      .0       K+ NpO2(CO3)2=-   Novak et al. 1997 (made
analogy w/Na+)
 1 2.34     22.7     -96.     -.22      K+ NpO2(CO3)3==-  Novak et al. 1997 (calculated
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from K+ data)
 1 -.0678    -.1042    .0     .0       K+ H2PO4-         P91
 1  .0248    1.274     .0     .0164    K+ HPO4=          P91
 1  .3729    3.972     .0    -.08680   K+ PO4=-          P91
 1  .90       .0       .0     .0       K+ Th(SO4)3=      FR92
 1  .0        .0       .0     .0       K+ Th(OH)3(CO3)-
 1 1.31     30.        .0     .0       K+ Th(CO3)5===    analogy w/ Na (FRSMHC97)
 1 -0.2448    .29      .0     .068     K+ HOx-           analogy w/ Na (SAND99/Mizera)
 1 -0.2176   1.74      .0     .122     K+ Ox=            analogy w/ Na (SAND99/Mizera)
 1  .1587     .3251    .0    -.0066    K+ Ac-            P91
 1 -0.0563    .29      .0     .047     K+ Lac-           analogy w/ Na (SAND99/Moore
et al 99)
 1 -0.1296    .29      .0     .013     K+ H2Cit-         analogy w/ Na (SAND99/Mizera)
 1 -0.0989   1.74      .0     .027     K+ HCit=          analogy w/ Na (SAND99/Mizera)
 1  0.0887   5.22      .0     .047     K+ Cit=-          analogy w/ Na (SAND99/Mizera)
 1 -0.2345    .29      .0     .059     K+ H3EDTA-        analogy w/ Na (SAND99/Mizera)
 1 -0.1262   1.74      .0     .054     K+ H2EDTA=        analogy w/ Na (SAND99/Mizera)
 1  0.5458   5.22      .0   -0.048     K+ HEDTA=-        analogy w/ Na (SAND99/Mizera)
 1  1.016   11.6       .0     .001     K+ EDTA==         analogy w/ Na (SAND99/Mizera)
 1 -.2239     .29      .0     .002     K+ AmEDTA-        analogy w/ Na (SAND99)
 1 -.4226    1.75      .0     .142     K+ NpO2Cit=       analogy w/ Na (SAND99)
 1  .683    5.911      .0     .0       K+ NpO2EDTA=-     analogy w/ Na (SAND99/PBMC98)
 1 -.5418     .29      .0     .095     K+ NpO2Ox-        analogy w/ Na
(SAND99/Borkowski et al 01)
 1  .41     17.25      .0     .0       K+ U(OH)4(CO3)2== analogy w/ Na (Rai96)
 1 1.31     30.0       .0     .0       K+ U(CO3)5===     analogy w/ Na, analogy w/Th
(FRSMHC97)
 1  .0        .0       .0     .0       K+ U(SO4)3=
 1 2.022    19.22      .0    -.305     K+ Am(CO3)4==-    analogy w/ Na (FK98)
 1 -.354     0.40      .0     .051     K+ Am(SO4)2-      analogy w/ Na (FK98)
 1 -.8285    .2575     .0     .256     K+ NpO2H2EDTA-    analogy w/ Na (PBMC98)
 1  .1742     .29      .0    -.06923   K+ CaCit-         analogy w/ Na, analogy w/ Mg
(ERG_org_memo)
 1  .2134    1.74      .0     .00869   K+ CaEDTA=        analogy w/ Na, analogy w/ Mg
(ERG_org_memo)
 1  .0        .0       .0     .0       K+ UnuAn#2-
 1  .0        .0       .0     .0       K+ UnuAn#3-
 1  .0        .0       .0     .0       K+ UnuAn#4-
 1  .0        .0       .0     .0       K+ U(OH)2(CO3)2=
 1  .1742     .29      .0    -.06923   K+ MgCit-          analogy w/ Na (ERG_org_memo)
 1  .2134    1.74      .0     .00869   K+ MgEDTA=         analogy w/ Na (ERG_org_memo)
 1  .4733   -1.504     .0     .0       K+ NpO2HEDTA=      analogy w/ Na (PBMC98)

 1  .3159     1.614    .0    -.00034   Ca++ Cl-          HMW84
 2  .20       3.1973 -54.24   .0       Ca++ SO4=         HMW84
 1  .2145     2.53     .0     .0       Ca++ HSO4-        HMW84
 1 -.1747     -.2303  -5.72   .0       Ca++ OH-          HMW84
 1  .4        2.977    .0     .0       Ca++ HCO3-        HMW84
 2  .0         .0      .0     .0       Ca++ CO3=         HMW84
 1  .0         .0      .0     .0       Ca++ B(OH)4-      FW86
 1  .0         .0      .0     .0       Ca++ B3O3(OH)4-   FW86
 2  .0         .0      .0     .0       Ca++ B4O5(OH)4=   FW86
 1  .0         .0      .0     .0       Ca++ Br-
 1  .0         .0      .0     .0       Ca++ Am(CO3)2-
 3  .0         .0      .0     .0       Ca++ Am(CO3)3=-
 1  .4511     1.756    .0    -.00500   Ca++ ClO4-        P91
 1  .0         .0      .0     .0       Ca++ NpO2(OH)2-
 1  .10        .34     .0     .0       Ca++ NpO2CO3-      by analogy w/ Mg++ (Al
Mahamid et al. 1998)
 3  .48       4.4      .0     .0       Ca++ NpO2(CO3)2=-  by analogy w/ Mg++ (Al
Mahamid et al. 1998)
 3  2.07     22.7    -48.    -.11      Ca++ NpO2(CO3)3==- by analogy w/ Mg++ (Al
Mahamid et al. 1998)
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```
 1  .0         .0        .0      .0       Ca++ H2PO4-
 2  .0         .0        .0      .0       Ca++ HPO4=
 3  .0         .0        .0      .0       Ca++ PO4=-
 2  .0         .0        .0      .0       Ca++ Th(SO4)3=
 1  .0         .0        .0      .0       Ca++ Th(OH)3(CO3)-
 3  .0         .0        .0      .0       Ca++ Th(CO3)5===
 1  .0         .0        .0      .0       Ca++ HOx-
 2  .0         .0        .0      .0       Ca++ Ox=
 1  .0         .0        .0      .0       Ca++ Ac-
 1  .0         .0        .0      .0       Ca++ Lac-
 1  .0         .0        .0      .0       Ca++ H2Cit-
 2  .0         .0        .0      .0       Ca++ HCit=
 3  .0         .0        .0      .0       Ca++ Cit=-
 3  .0         .0        .0      .0       Ca++ H3EDTA-
 3  .0         .0        .0      .0       Ca++ H2EDTA=
 3  .0         .0        .0      .0       Ca++ HEDTA=-
 3  .0         .0        .0      .0       Ca++ EDTA==
 3  .0         .0        .0      .0       Ca++ AmEDTA-
 2  .0         .0        .0      .0       Ca++ NpO2Cit=
 3  .0         .0        .0      .0       Ca++ NpO2EDTA==-
 1  .0         .0        .0      .0       Ca++ NpO2Ox-
 3  .0         .0        .0      .0       Ca++ U(OH)4(CO3)2==
 3  .0         .0        .0      .0       Ca++ U(CO3)5===
 2  .0         .0        .0      .0       Ca++ U(SO4)3=
 3  .0         .0        .0      .0       Ca++ Am(CO3)4==-
 1  .0         .0        .0      .0       Ca++ Am(SO4)2-
 1  .0         .0        .0      .0       Ca++ NpO2H2EDTA-
 1  .0         .0        .0      .0       Ca++ CaCit-
 3  .0         .0        .0      .0       Ca++ CaEDTA=
 3  .0         .0        .0      .0       Ca++ UnuAn#2-
 1  .0         .0        .0      .0       Ca++ UnuAn#3-
 3  .0         .0        .0      .0       Ca++ UnuAn#4-
 2  .0         .0        .0      .0       Ca++ U(OH)2(CO3)2=
 1  .0         .0        .0      .0       Ca++ MgCit-
 2  .0         .0        .0      .0       Ca++ MgEDTA=
 2  .0         .0        .0      .0       Ca++ NpO2HEDTA=

 1  .35235   1.6815    .0      .00519   Mg++ Cl-           HMW84
 2  .2210    3.343   -37.23    .025     Mg++ SO4=          HMW84
 1  .4746    1.729     .0      .0       Mg++ HSO4-         HMW84
 1  .0        .0       .0      .0       Mg++ OH-           HMW84
 1  .329      .6072    .0      .0       Mg++ HCO3-         HMW84
 2  .0        .0       .0      .0       Mg++ CO3=          HMW84
 1  .0        .0       .0      .0       Mg++ B(OH)4-       FW86
 1  .0        .0       .0      .0       Mg++ B3O3(OH)4-    FW86
 2  .0        .0       .0      .0       Mg++ B4O5(OH)4=    FW86
 1  .0        .0       .0      .0       Mg++ Br-
 1  .0        .0       .0      .0       Mg++ Am(CO3)2-
 3  .0        .0       .0      .0       Mg++ Am(CO3)3=-
 1  .4961    2.008     .0      .009578  Mg++ ClO4-          P91
 1  .0        .0       .0      .0       Mg++ NpO2(OH)2-
 1  .10       .34      .0      .0       Mg++ NpO2CO3-       Al Mahamid et al. 1998 (made
analogy w/ Na)
 3  .48      4.4       .0      .0       Mg++ NpO2(CO3)2=-   Al Mahamid et al. 1998 (made
analogy w/ Na)
 3  2.07     22.7     -48.    -.11      Mg++ NpO2(CO3)3==- Al Mahamid et al. 1998
(averaged Na and K values)
 1  .0        .0       .0      .0       Mg++ H2PO4-
 2  .0        .0       .0      .0       Mg++ HPO4=
 3  .0        .0       .0      .0       Mg++ PO4=-
 2  .0        .0       .0      .0       Mg++ Th(SO4)3=
 1  .0        .0       .0      .0       Mg++ Th(OH)3(CO3)-
 3  .0        .0       .0      .0       Mg++ Th(CO3)5===
```

1	.0	.0	.0	.0	Mg++ HOx-	
2	.0	.0	.0	.0	Mg++ Ox=	
1	.0	.0	.0	.0	Mg++ Ac-	
1	.0	.0	.0	.0	Mg++ Lac-	
1	.0	.0	.0	.0	Mg++ H2Cit-	
2	.0	.0	.0	.0	Mg++ HCit=	
3	.0	.0	.0	.0	Mg++ Cit=-	
3	.0	.0	.0	.0	Mg++ H3EDTA-	
3	.0	.0	.0	.0	Mg++ H2EDTA=	
3	.0	.0	.0	.0	Mg++ HEDTA=-	
3	.0	.0	.0	.0	Mg++ EDTA==	
3	.0	.0	.0	.0	Mg++ AmEDTA-	
2	.0	.0	.0	.0	Mg++ NpO2Cit=	
3	.0	.0	.0	.0	Mg++ NpO2EDTA==-	
1	.0	.0	.0	.0	Mg++ NpO2Ox-	
3	.0	.0	.0	.0	Mg++ U(OH)4(CO3)2==	
3	.0	.0	.0	.0	Mg++ U(CO3)5===	
2	.0	.0	.0	.0	Mg++ U(SO4)3=	
3	.0	.0	.0	.0	Mg++ Am(CO3)4==-	
1	.0	.0	.0	.0	Mg++ Am(SO4)2-	
1	.0	.0	.0	.0	Mg++ NpO2H2EDTA-	
1	.0	.0	.0	.0	Mg++ CaCit-	
3	.0	.0	.0	.0	Mg++ CaEDTA=	
3	.0	.0	.0	.0	Mg++ UnuAn#2-	
1	.0	.0	.0	.0	Mg++ UnuAn#3-	
2	.0	.0	.0	.0	Mg++ UnuAn#4-	
2	.0	.0	.0	.0	Mg++ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	Mg++ MgCit-	
2	.0	.0	.0	.0	Mg++ MgEDTA=	
2	.0	.0	.0	.0	Mg++ NpO2HEDTA=	
1	-.10	1.658	.0	.0	MgOH+ Cl-	HMW84
1	.0	.0	.0	.0	MgOH+ SO4=	HMW84
1	.0	.0	.0	.0	MgOH+ HSO4-	HMW84
1	.0	.0	.0	.0	MgOH+ OH-	HMW84
1	.0	.0	.0	.0	MgOH+ HCO3-	HMW84
1	.0	.0	.0	.0	MgOH+ CO3=	HMW84
1	.0	.0	.0	.0	MgOH+ B(OH)4-	
1	.0	.0	.0	.0	MgOH+ B3O3(OH)4-	
1	.0	.0	.0	.0	MgOH+ B4O5(OH)4=	
1	.0	.0	.0	.0	MgOH+ Br-	
1	.0	.0	.0	.0	MgOH+ Am(CO3)2-	
1	.0	.0	.0	.0	MgOH+ Am(CO3)3=-	
1	.0	.0	.0	.0	MgOH+ ClO4-	
1	.0	.0	.0	.0	MgOH+ NpO2(OH)2-	
1	.0	.0	.0	.0	MgOH+ NpO2CO3-	
1	.0	.0	.0	.0	MgOH+ NpO2(CO3)2=-	
1	.0	.0	.0	.0	MgOH+ NpO2(CO3)3==-	
1	.0	.0	.0	.0	MgOH+ H2PO4-	
1	.0	.0	.0	.0	MgOH+ HPO4=	
1	.0	.0	.0	.0	MgOH+ PO4=-	
1	.0	.0	.0	.0	MgOH+ Th(SO4)3=	
1	.0	.0	.0	.0	MgOH+ Th(OH)3(CO3)-	
1	.0	.0	.0	.0	MgOH+ Th(CO3)5===	
1	.0	.0	.0	.0	MgOH+ HOx-	
1	.0	.0	.0	.0	MgOH+ Ox=	
1	.0	.0	.0	.0	MgOH+ Ac-	
1	.0	.0	.0	.0	MgOH+ Lac-	
1	.0	.0	.0	.0	MgOH+ H2Cit-	
1	.0	.0	.0	.0	MgOH+ HCit=	
1	.0	.0	.0	.0	MgOH+ Cit=-	
1	.0	.0	.0	.0	MgOH+ H3EDTA-	
1	.0	.0	.0	.0	MgOH+ H2EDTA=	

1	.0	.0	.0	.0	MgOH+ HEDTA=-	
1	.0	.0	.0	.0	MgOH+ EDTA==	
1	.0	.0	.0	.0	MgOH+ AmEDTA-	
1	.0	.0	.0	.0	MgOH+ NpO2Cit=	
1	.0	.0	.0	.0	MgOH+ NpO2EDTA==-	
1	.0	.0	.0	.0	MgOH+ NpO2Ox-	
1	.0	.0	.0	.0	MgOH+ U(OH)4(CO3)2==	
1	.0	.0	.0	.0	MgOH+ U(CO3)5===	
1	.0	.0	.0	.0	MgOH+ U(SO4)3=	
1	.0	.0	.0	.0	MgOH+ Am(CO3)4==-	
1	.0	.0	.0	.0	MgOH+ Am(SO4)2-	
1	.0	.0	.0	.0	MgOH+ NpO2H2EDTA-	
1	.0	.0	.0	.0	MgOH+ CaCit-	
1	.0	.0	.0	.0	MgOH+ CaEDTA=	
1	.0	.0	.0	.0	MgOH+ UnuAn#2-	
1	.0	.0	.0	.0	MgOH+ UnuAn#3-	
1	.0	.0	.0	.0	MgOH+ UnuAn#4-	
1	.0	.0	.0	.0	MgOH+ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	MgOH+ MgCit-	
1	.0	.0	.0	.0	MgOH+ MgEDTA=	
1	.0	.0	.0	.0	MgOH+ NpO2HEDTA=	
1	.1775	.2945	.0	.0008	H+ Cl-	HMW84
1	.0298	.0	.0	.0438	H+ SO4=	HMW84
1	.2065	.5556	.0	.0	H+ HSO4-	HMW84
1	.0	.0	.0	.0	H+ OH-	HMW84
1	.0	.0	.0	.0	H+ HCO3-	HMW84
1	.0	.0	.0	.0	H+ CO3=	HMW84
1	.0	.0	.0	.0	H+ B(OH)4-	FW86
1	.0	.0	.0	.0	H+ B3O3(OH)4-	FW86
1	.0	.0	.0	.0	H+ B4O5(OH)4=	FW86
1	.0	.0	.0	.0	H+ Br-	
1	.0	.0	.0	.0	H+ Am(CO3)2-	
1	.0	.0	.0	.0	H+ Am(CO3)3=-	
1	.1747	.2931	.0	.00819	H+ ClO4-	P91
1	.0	.0	.0	.0	H+ NpO2(OH)2-	
1	.0	.0	.0	.0	H+ NpO2CO3-	
1	.0	.0	.0	.0	H+ NpO2(CO3)2=-	
1	.0	.0	.0	.0	H+ NpO2(CO3)3==-	
1	.0	.0	.0	.0	H+ H2PO4-	
1	.0	.0	.0	.0	H+ HPO4=	
1	.0	.0	.0	.0	H+ PO4=-	
1	.84	.0	.0	.0	H+ Th(SO4)3=	FR92
1	.0	.0	.0	.0	H+ Th(OH)3(CO3)-	
1	.0	.0	.0	.0	H+ Th(CO3)5===	
1	.0	.0	.0	.0	H+ HOx-	
1	.0	.0	.0	.0	H+ Ox=	
1	.0	.0	.0	.0	H+ Ac-	NBC96/Mesmer et al. 89
1	.0	.0	.0	.0	H+ Lac-	
1	.0	.0	.0	.0	H+ H2Cit-	
1	.0	.0	.0	.0	H+ HCit=	
1	.0	.0	.0	.0	H+ Cit=-	
1	.0	.0	.0	.0	H+ H3EDTA-	
1	.0	.0	.0	.0	H+ H2EDTA=	
1	.0	.0	.0	.0	H+ HEDTA=-	
1	.0	.0	.0	.0	H+ EDTA==	
1	.0	.0	.0	.0	H+ AmEDTA-	
1	.0	.0	.0	.0	H+ NpO2Cit=	
1	.0	.0	.0	.0	H+ NpO2EDTA==-	
1	.0	.0	.0	.0	H+ NpO2Ox-	
1	.0	.0	.0	.0	H+ U(OH)4(CO3)2==	
1	.0	.0	.0	.0	H+ U(CO3)5===	
1	.0	.0	.0	.0	H+ U(SO4)3=	

1	.0	.0	.0	.0	H+ Am(CO3)4==-
1	.0	.0	.0	.0	H+ Am(SO4)2-
1	.0	.0	.0	.0	H+ NpO2H2EDTA-
1	.0	.0	.0	.0	H+ CaCit-
1	.0	.0	.0	.0	H+ CaEDTA=
1	.0	.0	.0	.0	H+ UnuAn#2-
1	.0	.0	.0	.0	H+ UnuAn#3-
1	.0	.0	.0	.0	H+ UnuAn#4-
1	.0	.0	.0	.0	H+ U(OH)2(CO3)2=
1	.0	.0	.0	.0	H+ MgCit-
1	.0	.0	.0	.0	H+ MgEDTA=
1	.0	.0	.0	.0	H+ NpO2HEDTA=

1	.16	.0	.0	.0	MgB(OH)4+ Cl- FW86
1	.0	.0	.0	.0	MgB(OH)4+ SO4=
1	.0	.0	.0	.0	MgB(OH)4+ HSO4-
1	.0	.0	.0	.0	MgB(OH)4+ OH-
1	.0	.0	.0	.0	MgB(OH)4+ HCO3-
1	.0	.0	.0	.0	MgB(OH)4+ CO3=
1	.0	.0	.0	.0	MgB(OH)4+ B(OH)4-
1	.0	.0	.0	.0	MgB(OH)4+ B3O3(OH)4-
1	.0	.0	.0	.0	MgB(OH)4+ B4O5(OH)4=
1	.0	.0	.0	.0	MgB(OH)4+ Br-
1	.0	.0	.0	.0	MgB(OH)4+ Am(CO3)2-
1	.0	.0	.0	.0	MgB(OH)4+ Am(CO3)3=-
1	.0	.0	.0	.0	MgB(OH)4+ ClO4-
1	.0	.0	.0	.0	MgB(OH)4+ NpO2(OH)2-
1	.0	.0	.0	.0	MgB(OH)4+ NpO2CO3-
1	.0	.0	.0	.0	MgB(OH)4+ NpO2(CO3)2=-
1	.0	.0	.0	.0	MgB(OH)4+ NpO2(CO3)3==-
1	.0	.0	.0	.0	MgB(OH)4+ H2PO4-
1	.0	.0	.0	.0	MgB(OH)4+ HPO4=
1	.0	.0	.0	.0	MgB(OH)4+ PO4=-
1	.0	.0	.0	.0	MgB(OH)4+ Th(SO4)3=
1	.0	.0	.0	.0	MgB(OH)4+ Th(OH)3(CO3)-
1	.0	.0	.0	.0	MgB(OH)4+ Th(CO3)5===
1	.0	.0	.0	.0	MgB(OH)4+ HOx-
1	.0	.0	.0	.0	MgB(OH)4+ Ox=
1	.0	.0	.0	.0	MgB(OH)4+ Ac-
1	.0	.0	.0	.0	MgB(OH)4+ Lac-
1	.0	.0	.0	.0	MgB(OH)4+ H2Cit-
1	.0	.0	.0	.0	MgB(OH)4+ HCit=
1	.0	.0	.0	.0	MgB(OH)4+ Cit=-
1	.0	.0	.0	.0	MgB(OH)4+ H3EDTA-
1	.0	.0	.0	.0	MgB(OH)4+ H2EDTA=
1	.0	.0	.0	.0	MgB(OH)4+ HEDTA=-
1	.0	.0	.0	.0	MgB(OH)4+ EDTA==
1	.0	.0	.0	.0	MgB(OH)4+ AmEDTA-
1	.0	.0	.0	.0	MgB(OH)4+ NpO2Cit=
1	.0	.0	.0	.0	MgB(OH)4+ NpO2EDTA==-
1	.0	.0	.0	.0	MgB(OH)4+ NpO2Ox-
1	.0	.0	.0	.0	MgB(OH)4+ U(OH)4(CO3)2==
1	.0	.0	.0	.0	MgB(OH)4+ U(CO3)5===
1	.0	.0	.0	.0	MgB(OH)4+ U(SO4)3=
1	.0	.0	.0	.0	MgB(OH)4+ Am(CO3)4==-
1	.0	.0	.0	.0	MgB(OH)4+ Am(SO4)2-
1	.0	.0	.0	.0	MgB(OH)4+ NpO2H2EDTA-
1	.0	.0	.0	.0	MgB(OH)4+ CaCit-
1	.0	.0	.0	.0	MgB(OH)4+ CaEDTA=
1	.0	.0	.0	.0	MgB(OH)4+ UnuAn#2-
1	.0	.0	.0	.0	MgB(OH)4+ UnuAn#3-
1	.0	.0	.0	.0	MgB(OH)4+ UnuAn#4-
1	.0	.0	.0	.0	MgB(OH)4+ U(OH)2(CO3)2=

```
1  .0         .0       .0     .0      MgB(OH)4+ MgCit-
1  .0         .0       .0     .0      MgB(OH)4+ MgEDTA=
1  .0         .0       .0     .0      MgB(OH)4+ NpO2HEDTA=

1  .12        .0       .0     .0      CaB(OH)4+ Cl-      FW86
1  .0         .0       .0     .0      CaB(OH)4+ SO4=
1  .0         .0       .0     .0      CaB(OH)4+ HSO4-
1  .0         .0       .0     .0      CaB(OH)4+ OH-
1  .0         .0       .0     .0      CaB(OH)4+ HCO3-
1  .0         .0       .0     .0      CaB(OH)4+ CO3=
1  .0         .0       .0     .0      CaB(OH)4+ B(OH)4-
1  .0         .0       .0     .0      CaB(OH)4+ B3O3(OH)4-
1  .0         .0       .0     .0      CaB(OH)4+ B4O5(OH)4=
1  .0         .0       .0     .0      CaB(OH)4+ Br-
1  .0         .0       .0     .0      CaB(OH)4+ Am(CO3)2-
1  .0         .0       .0     .0      CaB(OH)4+ Am(CO3)3=-
1  .0         .0       .0     .0      CaB(OH)4+ ClO4-
1  .0         .0       .0     .0      CaB(OH)4+ NpO2(OH)2-
1  .0         .0       .0     .0      CaB(OH)4+ NpO2CO3-
1  .0         .0       .0     .0      CaB(OH)4+ NpO2(CO3)2=-
1  .0         .0       .0     .0      CaB(OH)4+ NpO2(CO3)3==-
1  .0         .0       .0     .0      CaB(OH)4+ H2PO4-
1  .0         .0       .0     .0      CaB(OH)4+ HPO4=
1  .0         .0       .0     .0      CaB(OH)4+ PO4=-
1  .0         .0       .0     .0      CaB(OH)4+ Th(SO4)3=
1  .0         .0       .0     .0      CaB(OH)4+ Th(OH)3(CO3)-
1  .0         .0       .0     .0      CaB(OH)4+ Th(CO3)5===
1  .0         .0       .0     .0      CaB(OH)4+ HOx-
1  .0         .0       .0     .0      CaB(OH)4+ Ox=
1  .0         .0       .0     .0      CaB(OH)4+ Ac-
1  .0         .0       .0     .0      CaB(OH)4+ Lac-
1  .0         .0       .0     .0      CaB(OH)4+ H2Cit-
1  .0         .0       .0     .0      CaB(OH)4+ HCit=
1  .0         .0       .0     .0      CaB(OH)4+ Cit=-
1  .0         .0       .0     .0      CaB(OH)4+ H3EDTA-
1  .0         .0       .0     .0      CaB(OH)4+ H2EDTA=
1  .0         .0       .0     .0      CaB(OH)4+ HEDTA=-
1  .0         .0       .0     .0      CaB(OH)4+ EDTA==
1  .0         .0       .0     .0      CaB(OH)4+ AmEDTA-
1  .0         .0       .0     .0      CaB(OH)4+ NpO2Cit=
1  .0         .0       .0     .0      CaB(OH)4+ NpO2EDTA==-
1  .0         .0       .0     .0      CaB(OH)4+ NpO2Ox-
1  .0         .0       .0     .0      CaB(OH)4+ U(OH)4(CO3)2==
1  .0         .0       .0     .0      CaB(OH)4+ U(CO3)5===
1  .0         .0       .0     .0      CaB(OH)4+ U(SO4)3=
1  .0         .0       .0     .0      CaB(OH)4+ Am(CO3)4==-
1  .0         .0       .0     .0      CaB(OH)4+ Am(SO4)2-
1  .0         .0       .0     .0      CaB(OH)4+ NpO2H2EDTA-
1  .0         .0       .0     .0      CaB(OH)4+ CaCit-
1  .0         .0       .0     .0      CaB(OH)4+ CaEDTA=
1  .0         .0       .0     .0      CaB(OH)4+ UnuAn#2-
1  .0         .0       .0     .0      CaB(OH)4+ UnuAn#3-
1  .0         .0       .0     .0      CaB(OH)4+ UnuAn#4-
1  .0         .0       .0     .0      CaB(OH)4+ U(OH)2(CO3)2=
1  .0         .0       .0     .0      CaB(OH)4+ MgCit-
1  .0         .0       .0     .0      CaB(OH)4+ MgEDTA=
1  .0         .0       .0     .0      CaB(OH)4+ NpO2HEDTA=

1  .5856    5.6        .0  -0.0166    Am+++ Cl-          FK98/Konnecke et al. 1997
3 1.792    15.04       .0     .600    Am+++ SO4=         FK98
1  .0         .0       .0     .0      Am+++ HSO4-
1  .0         .0       .0     .0      Am+++ OH-
1  .0         .0       .0     .0      Am+++ HCO3-
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```
3  .0        .0       .0      .0       Am+++ CO3=
1  .0        .0       .0      .0       Am+++ B(OH)4-
1  .0        .0       .0      .0       Am+++ B3O3(OH)4-
3  .0        .0       .0      .0       Am+++ B4O5(OH)4=
1  .0        .0       .0      .0       Am+++ Br-
1  .0        .0       .0      .0       Am+++ Am(CO3)2-
3  .0        .0       .0      .0       Am+++ Am(CO3)3=-
1  .80      5.35      .0   -0.0048     Am+++ ClO4-          FRF90
1  .0        .0       .0      .0       Am+++ NpO2(OH)2-
1  .0        .0       .0      .0       Am+++ NpO2CO3-
3  .0        .0       .0      .0       Am+++ NpO2(CO3)2=-
3  .0        .0       .0      .0       Am+++ NpO2(CO3)3==-
1  .0        .0    -92.9      .0       Am+++ H2PO4-         RFF95 (from Nd-H2PO4 value)
3  .0        .0       .0      .0       Am+++ HPO4=
3  .0        .0       .0      .0       Am+++ PO4=-
3  .0        .0       .0      .0       Am+++ Th(SO4)3=
1  .0        .0       .0      .0       Am+++ Th(OH)3(CO3)-
3  .0        .0       .0      .0       Am+++ Th(CO3)5===
1  .0        .0       .0      .0       Am+++ HOx-
3  .0        .0       .0      .0       Am+++ Ox=
1  .0        .0       .0      .0       Am+++ Ac-
1  .0        .0       .0      .0       Am+++ Lac-
1  .0        .0       .0      .0       Am+++ H2Cit-
3  .0        .0       .0      .0       Am+++ HCit=
3  .0        .0       .0      .0       Am+++ Cit=-
3  .0        .0       .0      .0       Am+++ H3EDTA-
3  .0        .0       .0      .0       Am+++ H2EDTA=
3  .0        .0       .0      .0       Am+++ HEDTA=-
3  .0        .0       .0      .0       Am+++ EDTA==
3  .0        .0       .0      .0       Am+++ AmEDTA-
3  .0        .0       .0      .0       Am+++ NpO2Cit=
3  .0        .0       .0      .0       Am+++ NpO2EDTA==-
1  .0        .0       .0      .0       Am+++ NpO2Ox-
3  .0        .0       .0      .0       Am+++ U(OH)4(CO3)2==
3  .0        .0       .0      .0       Am+++ U(CO3)5===
3  .0        .0       .0      .0       Am+++ U(SO4)3=
3  .0        .0       .0      .0       Am+++ Am(CO3)4==-
1  .0        .0       .0      .0       Am+++ Am(SO4)2-
1  .0        .0       .0      .0       Am+++ NpO2H2EDTA-
1  .0        .0       .0      .0       Am+++ CaCit-
3  .0        .0       .0      .0       Am+++ CaEDTA=
3  .0        .0       .0      .0       Am+++ UnuAn#2-
1  .0        .0       .0      .0       Am+++ UnuAn#3-
3  .0        .0       .0      .0       Am+++ UnuAn#4-
3  .0        .0       .0      .0       Am+++ U(OH)2(CO3)2=
1  .0        .0       .0      .0       Am+++ MgCit-
3  .0        .0       .0      .0       Am+++ MgEDTA=
3  .0        .0       .0      .0       Am+++ NpO2HEDTA=

1 -.072      .403     .0      .0388    AmCO3+ Cl-      FK98/Fanghanel et al. 1999
1  .0        .0       .0      .0       AmCO3+ SO4=
1  .0        .0       .0      .0       AmCO3+ HSO4-
1  .0        .0       .0      .0       AmCO3+ OH-
1  .0        .0       .0      .0       AmCO3+ HCO3-
1  .0        .0       .0      .0       AmCO3+ CO3=
1  .0        .0       .0      .0       AmCO3+ B(OH)4-
1  .0        .0       .0      .0       AmCO3+ B3O3(OH)4-
1  .0        .0       .0      .0       AmCO3+ B4O5(OH)4=
1  .0        .0       .0      .0       AmCO3+ Br-
1  .0        .0       .0      .0       AmCO3+ Am(CO3)2-
1  .0        .0       .0      .0       AmCO3+ Am(CO3)3=-
1  .0        .0       .0      .0       AmCO3+ ClO4-
1  .0        .0       .0      .0       AmCO3+ NpO2(OH)2-
```

1	.0	.0	.0	.0	AmCO3+	NpO2CO3-	
1	.0	.0	.0	.0	AmCO3+	NpO2(CO3)2=-	
1	.0	.0	.0	.0	AmCO3+	NpO2(CO3)3==-	
1	.0	.0	.0	.0	AmCO3+	H2PO4-	
1	.0	.0	.0	.0	AmCO3+	HPO4=	
1	.0	.0	.0	.0	AmCO3+	PO4=-	
1	.0	.0	.0	.0	AmCO3+	Th(SO4)3=	
1	.0	.0	.0	.0	AmCO3+	Th(OH)3(CO3)-	
1	.0	.0	.0	.0	AmCO3+	Th(CO3)5===	
1	.0	.0	.0	.0	AmCO3+	HOx-	
1	.0	.0	.0	.0	AmCO3+	Ox=	
1	.0	.0	.0	.0	AmCO3+	Ac-	
1	.0	.0	.0	.0	AmCO3+	Lac-	
1	.0	.0	.0	.0	AmCO3+	H2Cit-	
1	.0	.0	.0	.0	AmCO3+	HCit=	
1	.0	.0	.0	.0	AmCO3+	Cit=-	
1	.0	.0	.0	.0	AmCO3+	H3EDTA-	
1	.0	.0	.0	.0	AmCO3+	H2EDTA=	
1	.0	.0	.0	.0	AmCO3+	HEDTA=-	
1	.0	.0	.0	.0	AmCO3+	EDTA==	
1	.0	.0	.0	.0	AmCO3+	AmEDTA-	
1	.0	.0	.0	.0	AmCO3+	NpO2Cit=	
1	.0	.0	.0	.0	AmCO3+	NpO2EDTA==-	
1	.0	.0	.0	.0	AmCO3+	NpO2Ox-	
1	.0	.0	.0	.0	AmCO3+	U(OH)4(CO3)2==	
1	.0	.0	.0	.0	AmCO3+	U(CO3)5===	
1	.0	.0	.0	.0	AmCO3+	U(SO4)3=	
1	.0	.0	.0	.0	AmCO3+	Am(CO3)4==-	
1	.0	.0	.0	.0	AmCO3+	Am(SO4)2-	
1	.0	.0	.0	.0	AmCO3+	NpO2H2EDTA-	
1	.0	.0	.0	.0	AmCO3+	CaCit-	
1	.0	.0	.0	.0	AmCO3+	CaEDTA=	
1	.0	.0	.0	.0	AmCO3+	UnuAn#2-	
1	.0	.0	.0	.0	AmCO3+	UnuAn#3-	
1	.0	.0	.0	.0	AmCO3+	UnuAn#4-	
1	.0	.0	.0	.0	AmCO3+	U(OH)2(CO3)2=	
1	.0	.0	.0	.0	AmCO3+	MgCit-	
1	.0	.0	.0	.0	AmCO3+	MgEDTA=	
1	.0	.0	.0	.0	AmCO3+	NpO2HEDTA=	

1	1.092	13.7	-160.	-.112	Th++++	Cl-	Roy92
3	1.56	.0	.0	.0	Th++++	SO4=	FR92
1	1.44	.0	.0	.0	Th++++	HSO4-	FR92
1	.0	.0	.0	.0	Th++++	OH-	
1	.0	.0	.0	.0	Th++++	HCO3-	
3	.0	.0	.0	.0	Th++++	CO3=	
1	.0	.0	.0	.0	Th++++	B(OH)4-	
1	.0	.0	.0	.0	Th++++	B3O3(OH)4-	
3	.0	.0	.0	.0	Th++++	B4O5(OH)4=	
1	.0	.0	.0	.0	Th++++	Br-	
1	.0	.0	.0	.0	Th++++	Am(CO3)2-	
3	.0	.0	.0	.0	Th++++	Am(CO3)3=-	
1	1.19	27.3	.0	-.057	Th++++	ClO4-	CFN960119
1	.0	.0	.0	.0	Th++++	NpO2(OH)2-	
1	.0	.0	.0	.0	Th++++	NpO2CO3-	
3	.0	.0	.0	.0	Th++++	NpO2(CO3)2=-	
3	.0	.0	.0	.0	Th++++	NpO2(CO3)3==-	
1	.0	.0	.0	.0	Th++++	H2PO4-	
3	.0	.0	.0	.0	Th++++	HPO4=	
3	.0	.0	.0	.0	Th++++	PO4=-	
3	.0	.0	.0	.0	Th++++	Th(SO4)3=	
1	.0	.0	.0	.0	Th++++	Th(OH)3(CO3)-	
3	.0	.0	.0	.0	Th++++	Th(CO3)5===	

1	.0	.0	.0	.0	Th++++ HOx-	
3	.0	.0	.0	.0	Th++++ Ox=	
1	.0	.0	.0	.0	Th++++ Ac-	
1	.0	.0	.0	.0	Th++++ Lac-	
1	.0	.0	.0	.0	Th++++ H2Cit-	
3	.0	.0	.0	.0	Th++++ HCit=	
3	.0	.0	.0	.0	Th++++ Cit=-	
3	.0	.0	.0	.0	Th++++ H3EDTA-	
3	.0	.0	.0	.0	Th++++ H2EDTA=	
3	.0	.0	.0	.0	Th++++ HEDTA=-	
3	.0	.0	.0	.0	Th++++ EDTA==	
3	.0	.0	.0	.0	Th++++ AmEDTA-	
3	.0	.0	.0	.0	Th++++ NpO2Cit=	
3	.0	.0	.0	.0	Th++++ NpO2EDTA==-	
1	.0	.0	.0	.0	Th++++ NpO2Ox-	
3	.0	.0	.0	.0	Th++++ U(OH)4(CO3)2==	
3	.0	.0	.0	.0	Th++++ U(CO3)5===	
3	.0	.0	.0	.0	Th++++ U(SO4)3=	
3	.0	.0	.0	.0	Th++++ Am(CO3)4==-	
1	.0	.0	.0	.0	Th++++ Am(SO4)2-	
1	.0	.0	.0	.0	Th++++ NpO2H2EDTA-	
1	.0	.0	.0	.0	Th++++ CaCit-	
3	.0	.0	.0	.0	Th++++ CaEDTA=	
3	.0	.0	.0	.0	Th++++ UnuAn#2-	
1	.0	.0	.0	.0	Th++++ UnuAn#3-	
3	.0	.0	.0	.0	Th++++ UnuAn#4-	
3	.0	.0	.0	.0	Th++++ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	Th++++ MgCit-	
3	.0	.0	.0	.0	Th++++ MgEDTA=	
3	.0	.0	.0	.0	Th++++ NpO2HEDTA=	

1	.593	3.15	.0	-0.006	AmCl++ Cl-	FK98/Konnecke et al. 1997
2	.0	.0	.0	.0	AmCl++ SO4=	
1	.0	.0	.0	.0	AmCl++ HSO4-	
1	.0	.0	.0	.0	AmCl++ OH-	
1	.0	.0	.0	.0	AmCl++ HCO3-	
2	.0	.0	.0	.0	AmCl++ CO3=	
1	.0	.0	.0	.0	AmCl++ B(OH)4-	
1	.0	.0	.0	.0	AmCl++ B3O3(OH)4-	
2	.0	.0	.0	.0	AmCl++ B4O5(OH)4=	
1	.0	.0	.0	.0	AmCl++ Br-	
1	.0	.0	.0	.0	AmCl++ Am(CO3)2-	
3	.0	.0	.0	.0	AmCl++ Am(CO3)3=-	
1	.0	.0	.0	.0	AmCl++ ClO4-	
1	.0	.0	.0	.0	AmCl++ NpO2(OH)2-	
1	.0	.0	.0	.0	AmCl++ NpO2CO3-	
3	.0	.0	.0	.0	AmCl++ NpO2(CO3)2=-	
3	.0	.0	.0	.0	AmCl++ NpO2(CO3)3==-	
1	.0	.0	.0	.0	AmCl++ H2PO4-	
2	.0	.0	.0	.0	AmCl++ HPO4=	
3	.0	.0	.0	.0	AmCl++ PO4=-	
2	.0	.0	.0	.0	AmCl++ Th(SO4)3=	
1	.0	.0	.0	.0	AmCl++ Th(OH)3(CO3)-	
3	.0	.0	.0	.0	AmCl++ Th(CO3)5===	
1	.0	.0	.0	.0	AmCl++ HOx-	
2	.0	.0	.0	.0	AmCl++ Ox=	
1	.0	.0	.0	.0	AmCl++ Ac-	
1	.0	.0	.0	.0	AmCl++ Lac-	
1	.0	.0	.0	.0	AmCl++ H2Cit-	
2	.0	.0	.0	.0	AmCl++ HCit=	
3	.0	.0	.0	.0	AmCl++ Cit=-	
1	.0	.0	.0	.0	AmCl++ H3EDTA-	
2	.0	.0	.0	.0	AmCl++ H2EDTA=	

3	.0	.0	.0	.0	AmCl++	HEDTA=-	
3	.0	.0	.0	.0	AmCl++	EDTA==	
1	.0	.0	.0	.0	AmCl++	NpO2H2EDTA-	
2	.0	.0	.0	.0	AmCl++	NpO2Cit=	
3	.0	.0	.0	.0	AmCl++	NpO2EDTA==-	
1	.0	.0	.0	.0	AmCl++	NpO2Ox-	
3	.0	.0	.0	.0	AmCl++	U(OH)4(CO3)2==	
3	.0	.0	.0	.0	AmCl++	U(CO3)5===	
2	.0	.0	.0	.0	AmCl++	U(SO4)3=	
3	.0	.0	.0	.0	AmCl++	Am(CO3)4==-	
1	.0	.0	.0	.0	AmCl++	Am(SO4)2-	
1	.0	.0	.0	.0	AmCl++	NpO2H2EDTA-	
1	.0	.0	.0	.0	AmCl++	CaCit-	
2	.0	.0	.0	.0	AmCl++	CaEDTA=	
1	.0	.0	.0	.0	AmCl++	UnuAn#2-	
1	.0	.0	.0	.0	AmCl++	UnuAn#3-	
1	.0	.0	.0	.0	AmCl++	UnuAn#4-	
2	.0	.0	.0	.0	AmCl++	U(OH)2(CO3)2=	
1	.0	.0	.0	.0	AmCl++	MgCit-	
2	.0	.0	.0	.0	AmCl++	MgEDTA=	
2	.0	.0	.0	.0	AmCl++	NpO2HEDTA=	

1	.1415	.281	.0	.0	NpO2+	Cl-	NFRK95
1	.0	.0	.0	.0	NpO2+	SO4=	
1	.0	.0	.0	.0	NpO2+	HSO4-	
1	.0	.0	.0	.0	NpO2+	OH-	
1	.0	.0	.0	.0	NpO2+	HCO3-	
1	.0	.0	.0	.0	NpO2+	CO3=	
1	.0	.0	.0	.0	NpO2+	B(OH)4-	
1	.0	.0	.0	.0	NpO2+	B3O3(OH)4-	
1	.0	.0	.0	.0	NpO2+	B4O5(OH)4=	
1	.0	.0	.0	.0	NpO2+	Br-	
1	.0	.0	.0	.0	NpO2+	Am(CO3)2-	
1	.0	.0	.0	.0	NpO2+	Am(CO3)3=-	
1	.257	.180	.0	.0081	NpO2+	ClO4-	NFRK95
1	.0	.0	.0	.0	NpO2+	NpO2(OH)2-	
1	.0	.0	.0	.0	NpO2+	NpO2CO3-	
1	.0	.0	.0	.0	NpO2+	NpO2(CO3)2=-	
1	.0	.0	.0	.0	NpO2+	NpO2(CO3)3==-	
1	.0	.0	.0	.0	NpO2+	H2PO4-	
1	.0	.0	.0	.0	NpO2+	HPO4=	
1	.0	.0	.0	.0	NpO2+	PO4=-	
1	.0	.0	.0	.0	NpO2+	Th(SO4)3=	
1	.0	.0	.0	.0	NpO2+	Th(OH)3(CO3)-	
1	.0	.0	.0	.0	NpO2+	Th(CO3)5===	
1	.0	.0	.0	.0	NpO2+	HOx-	
1	.0	.0	.0	.0	NpO2+	Ox=	
1	.0	.0	.0	.0	NpO2+	Ac-	
1	.0	.0	.0	.0	NpO2+	Lac-	
1	.0	.0	.0	.0	NpO2+	H2Cit-	
1	.0	.0	.0	.0	NpO2+	HCit=	
1	.0	.0	.0	.0	NpO2+	Cit=-	
1	.0	.0	.0	.0	NpO2+	H3EDTA-	
1	.0	.0	.0	.0	NpO2+	H2EDTA=	
1	.0	.0	.0	.0	NpO2+	HEDTA=-	
1	.0	.0	.0	.0	NpO2+	EDTA==	
1	.0	.0	.0	.0	NpO2+	AmEDTA-	
1	.0	.0	.0	.0	NpO2+	NpO2Cit=	
1	.0	.0	.0	.0	NpO2+	NpO2EDTA==-	
1	.0	.0	.0	.0	NpO2+	NpO2Ox-	
1	.0	.0	.0	.0	NpO2+	U(OH)4(CO3)2==	
1	.0	.0	.0	.0	NpO2+	U(CO3)5===	
1	.0	.0	.0	.0	NpO2+	U(SO4)3=	

```
 1  .0         .0        .0      .0       NpO2+ Am(CO3)4==-
 1  .0         .0        .0      .0       NpO2+ Am(SO4)2-
 1  .0         .0        .0      .0       NpO2+ NpO2H2EDTA-
 1  .0         .0        .0      .0       NpO2+ CaCit-
 1  .0         .0        .0      .0       NpO2+ CaEDTA=
 1  .0         .0        .0      .0       NpO2+ UnuAn#2-
 1  .0         .0        .0      .0       NpO2+ UnuAn#3-
 1  .0         .0        .0      .0       NpO2+ UnuAn#4-
 1  .0         .0        .0      .0       NpO2+ U(OH)2(CO3)2=
 1  .0         .0        .0      .0       NpO2+ MgCit-
 1  .0         .0        .0      .0       NpO2+ MgEDTA=
 1  .0         .0        .0      .0       NpO2+ NpO2HEDTA=

 1 1.644    15.5       .0      .1       U++++ Cl-         RFSMMN  (values really are
different from Th++++ values)
 3  .0         .0        .0      .0       U++++ SO4=
 1  .0         .0        .0      .0       U++++ HSO4-
 1  .0         .0        .0      .0       U++++ OH-
 1  .0         .0        .0      .0       U++++ HCO3-
 3  .0         .0        .0      .0       U++++ CO3=
 1  .0         .0        .0      .0       U++++ B(OH)4-
 1  .0         .0        .0      .0       U++++ B3O3(OH)4-
 3  .0         .0        .0      .0       U++++ B4O5(OH)4=
 1  .0         .0        .0      .0       U++++ Br-
 1  .0         .0        .0      .0       U++++ Am(CO3)2-
 3  .0         .0        .0      .0       U++++ Am(CO3)3=-
 1  .0         .0        .0      .0       U++++ ClO4-
 1  .0         .0        .0      .0       U++++ NpO2(OH)2-
 1  .0         .0        .0      .0       U++++ NpO2CO3-
 3  .0         .0        .0      .0       U++++ NpO2(CO3)2=-
 3  .0         .0        .0      .0       U++++ NpO2(CO3)3==-
 1  .0         .0        .0      .0       U++++ H2PO4-
 3  .0         .0        .0      .0       U++++ HPO4=
 3  .0         .0        .0      .0       U++++ PO4=-
 3  .0         .0        .0      .0       U++++ Th(SO4)3=
 1  .0         .0        .0      .0       U++++ Th(OH)3(CO3)-
 3  .0         .0        .0      .0       U++++ Th(CO3)5===
 1  .0         .0        .0      .0       U++++ HOx-
 3  .0         .0        .0      .0       U++++ Ox=
 1  .0         .0        .0      .0       U++++ Ac-
 1  .0         .0        .0      .0       U++++ Lac-
 1  .0         .0        .0      .0       U++++ H2Cit-
 3  .0         .0        .0      .0       U++++ HCit=
 3  .0         .0        .0      .0       U++++ Cit=-
 3  .0         .0        .0      .0       U++++ H3EDTA-
 3  .0         .0        .0      .0       U++++ H2EDTA=
 3  .0         .0        .0      .0       U++++ HEDTA=-
 3  .0         .0        .0      .0       U++++ EDTA==
 3  .0         .0        .0      .0       U++++ AmEDTA-
 3  .0         .0        .0      .0       U++++ NpO2Cit=
 3  .0         .0        .0      .0       U++++ NpO2EDTA==-
 1  .0         .0        .0      .0       U++++ NpO2Ox-
 3  .0         .0        .0      .0       U++++ U(OH)4(CO3)2==
 3  .0         .0        .0      .0       U++++ U(CO3)5===
 3  .0         .0        .0      .0       U++++ U(SO4)3=
 3  .0         .0        .0      .0       U++++ Am(CO3)4==-
 1  .0         .0        .0      .0       U++++ Am(SO4)2-
 1  .0         .0        .0      .0       U++++ NpO2H2EDTA-
 1  .0         .0        .0      .0       U++++ CaCit-
 3  .0         .0        .0      .0       U++++ CaEDTA=
 3  .0         .0        .0      .0       U++++ UnuAn#2-
 1  .0         .0        .0      .0       U++++ UnuAn#3-
 3  .0         .0        .0      .0       U++++ UnuAn#4-
```

3	.0	.0	.0	.0	U++++ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	U++++ MgCit-	
3	.0	.0	.0	.0	U++++ MgEDTA=	
3	.0	.0	.0	.0	U++++ NpO2HEDTA=	
1	1.0	7.856	.0	.0	UOH+++ Cl-	RFSMMN
3	.0	.0	.0	.0	UOH+++ SO4=	
1	.0	.0	.0	.0	UOH+++ HSO4-	
1	.0	.0	.0	.0	UOH+++ OH-	
1	.0	.0	.0	.0	UOH+++ HCO3-	
3	.0	.0	.0	.0	UOH+++ CO3=	
1	.0	.0	.0	.0	UOH+++ B(OH)4-	
1	.0	.0	.0	.0	UOH+++ B3O3(OH)4-	
3	.0	.0	.0	.0	UOH+++ B4O5(OH)4=	
1	.0	.0	.0	.0	UOH+++ Br-	
1	.0	.0	.0	.0	UOH+++ Am(CO3)2-	
3	.0	.0	.0	.0	UOH+++ Am(CO3)3=-	
1	.0	.0	.0	.0	UOH+++ ClO4-	
1	.0	.0	.0	.0	UOH+++ NpO2(OH)2-	
1	.0	.0	.0	.0	UOH+++ NpO2CO3-	
3	.0	.0	.0	.0	UOH+++ NpO2(CO3)2=-	
3	.0	.0	.0	.0	UOH+++ NpO2(CO3)3==-	
1	.0	.0	.0	.0	UOH+++ H2PO4-	
3	.0	.0	.0	.0	UOH+++ HPO4=	
3	.0	.0	.0	.0	UOH+++ PO4=-	
3	.0	.0	.0	.0	UOH+++ Th(SO4)3=	
1	.0	.0	.0	.0	UOH+++ Th(OH)3(CO3)-	
3	.0	.0	.0	.0	UOH+++ Th(CO3)5===	
1	.0	.0	.0	.0	UOH+++ HOx-	
3	.0	.0	.0	.0	UOH+++ Ox=	
1	.0	.0	.0	.0	UOH+++ Ac-	
1	.0	.0	.0	.0	UOH+++ Lac-	
1	.0	.0	.0	.0	UOH+++ H2Cit-	
3	.0	.0	.0	.0	UOH+++ HCit=	
3	.0	.0	.0	.0	UOH+++ Cit=-	
3	.0	.0	.0	.0	UOH+++ H3EDTA-	
3	.0	.0	.0	.0	UOH+++ H2EDTA=	
3	.0	.0	.0	.0	UOH+++ HEDTA=-	
3	.0	.0	.0	.0	UOH+++ EDTA==	
3	.0	.0	.0	.0	UOH+++ AmEDTA-	
3	.0	.0	.0	.0	UOH+++ NpO2Cit=	
3	.0	.0	.0	.0	UOH+++ NpO2EDTA==-	
1	.0	.0	.0	.0	UOH+++ NpO2Ox-	
3	.0	.0	.0	.0	UOH+++ U(OH)4(CO3)2==	
3	.0	.0	.0	.0	UOH+++ U(CO3)5===	
3	.0	.0	.0	.0	UOH+++ U(SO4)3=	
3	.0	.0	.0	.0	UOH+++ Am(CO3)4==-	
1	.0	.0	.0	.0	UOH+++ Am(SO4)2-	
1	.0	.0	.0	.0	UOH+++ NpO2H2EDTA-	
1	.0	.0	.0	.0	UOH+++ CaCit-	
3	.0	.0	.0	.0	UOH+++ CaEDTA=	
3	.0	.0	.0	.0	UOH+++ UnuAn#2-	
1	.0	.0	.0	.0	UOH+++ UnuAn#3-	
3	.0	.0	.0	.0	UOH+++ UnuAn#4-	
3	.0	.0	.0	.0	UOH+++ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	UOH+++ MgCit-	
3	.0	.0	.0	.0	UOH+++ MgEDTA=	
3	.0	.0	.0	.0	UOH+++ NpO2HEDTA=	
1	1.061	5.22	.0	.109	UAc+++ Cl-	analogy w/ Th (SAND99)
3	.0	.0	.0	.0	UAc+++ SO4=	
1	.0	.0	.0	.0	UAc+++ HSO4-	
1	.0	.0	.0	.0	UAc+++ OH-	

1	.0	.0	.0	.0	UAc+++ HCO3-	
3	.0	.0	.0	.0	UAc+++ CO3=	
1	.0	.0	.0	.0	UAc+++ B(OH)4-	
1	.0	.0	.0	.0	UAc+++ B3O3(OH)4-	
3	.0	.0	.0	.0	UAc+++ B4O5(OH)4=	
1	.0	.0	.0	.0	UAc+++ Br-	
1	.0	.0	.0	.0	UAc+++ Am(CO3)2-	
3	.0	.0	.0	.0	UAc+++ Am(CO3)3=-	
1	.0	.0	.0	.0	UAc+++ ClO4-	
1	.0	.0	.0	.0	UAc+++ NpO2(OH)2-	
1	.0	.0	.0	.0	UAc+++ NpO2CO3-	
3	.0	.0	.0	.0	UAc+++ NpO2(CO3)2=-	
3	.0	.0	.0	.0	UAc+++ NpO2(CO3)3==-	
1	.0	.0	.0	.0	UAc+++ H2PO4-	
3	.0	.0	.0	.0	UAc+++ HPO4=	
3	.0	.0	.0	.0	UAc+++ PO4=-	
3	.0	.0	.0	.0	UAc+++ Th(SO4)3=	
1	.0	.0	.0	.0	UAc+++ Th(OH)3(CO3)-	
3	.0	.0	.0	.0	UAc+++ Th(CO3)5===	
1	.0	.0	.0	.0	UAc+++ HOx-	
1	.0	.0	.0	.0	UAc+++ Ox=	
1	.0	.0	.0	.0	UAc+++ Ac-	
1	.0	.0	.0	.0	UAc+++ Lac-	
1	.0	.0	.0	.0	UAc+++ H2Cit-	
3	.0	.0	.0	.0	UAc+++ HCit=	
3	.0	.0	.0	.0	UAc+++ Cit=-	
3	.0	.0	.0	.0	UAc+++ H3EDTA-	
3	.0	.0	.0	.0	UAc+++ H2EDTA=	
3	.0	.0	.0	.0	UAc+++ HEDTA=-	
3	.0	.0	.0	.0	UAc+++ EDTA==	
3	.0	.0	.0	.0	UAc+++ AmEDTA-	
3	.0	.0	.0	.0	UAc+++ NpO2Cit=	
3	.0	.0	.0	.0	UAc+++ NpO2EDTA==-	
1	.0	.0	.0	.0	UAc+++ NpO2Ox-	
3	.0	.0	.0	.0	UAc+++ U(OH)4(CO3)2==	
3	.0	.0	.0	.0	UAc+++ U(CO3)5===	
3	.0	.0	.0	.0	UAc+++ U(SO4)3=	
3	.0	.0	.0	.0	UAc+++ Am(CO3)4==-	
1	.0	.0	.0	.0	UAc+++ Am(SO4)2-	
1	.0	.0	.0	.0	UAc+++ NpO2H2EDTA-	
1	.0	.0	.0	.0	UAc+++ CaCit-	
3	.0	.0	.0	.0	UAc+++ CaEDTA=	
3	.0	.0	.0	.0	UAc+++ UnuAn#2-	
1	.0	.0	.0	.0	UAc+++ UnuAn#3-	
3	.0	.0	.0	.0	UAc+++ UnuAn#4-	
3	.0	.0	.0	.0	UAc+++ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	UAc+++ MgCit-	
3	.0	.0	.0	.0	UAc+++ MgEDTA=	
3	.0	.0	.0	.0	UAc+++ NpO2HEDTA=	

1	-.343	1.74	.0	.5	ThOx++ Cl-	SAND99/Borkowski et al 01
2	.0	.0	.0	.0	ThOx++ SO4=	
1	.0	.0	.0	.0	ThOx++ HSO4-	
1	.0	.0	.0	.0	ThOx++ OH-	
1	.0	.0	.0	.0	ThOx++ HCO3-	
2	.0	.0	.0	.0	ThOx++ CO3=	
1	.0	.0	.0	.0	ThOx++ B(OH)4-	
1	.0	.0	.0	.0	ThOx++ B3O3(OH)4-	
2	.0	.0	.0	.0	ThOx++ B4O5(OH)4=	
1	.0	.0	.0	.0	ThOx++ Br-	
1	.0	.0	.0	.0	ThOx++ Am(CO3)2-	
3	.0	.0	.0	.0	ThOx++ Am(CO3)3=-	
1	.0	.0	.0	.0	ThOx++ ClO4-	

1	.0	.0	.0	.0	ThOx++	NpO2(OH)2-	
1	.0	.0	.0	.0	ThOx++	NpO2CO3-	
3	.0	.0	.0	.0	ThOx++	NpO2(CO3)2=-	
3	.0	.0	.0	.0	ThOx++	NpO2(CO3)3==-	
1	.0	.0	.0	.0	ThOx++	H2PO4-	
2	.0	.0	.0	.0	ThOx++	HPO4=	
3	.0	.0	.0	.0	ThOx++	PO4=-	
2	.0	.0	.0	.0	ThOx++	Th(SO4)3=	
1	.0	.0	.0	.0	ThOx++	Th(OH)3(CO3)-	
3	.0	.0	.0	.0	ThOx++	Th(CO3)5===	
1	.0	.0	.0	.0	ThOx++	HOx-	
2	.0	.0	.0	.0	ThOx++	Ox=	
1	.0	.0	.0	.0	ThOx++	Ac-	
1	.0	.0	.0	.0	ThOx++	Lac-	
1	.0	.0	.0	.0	ThOx++	H2Cit-	
2	.0	.0	.0	.0	ThOx++	HCit=	
3	.0	.0	.0	.0	ThOx++	Cit=-	
3	.0	.0	.0	.0	ThOx++	H3EDTA-	
3	.0	.0	.0	.0	ThOx++	H2EDTA=	
3	.0	.0	.0	.0	ThOx++	HEDTA=-	
3	.0	.0	.0	.0	ThOx++	EDTA==	
3	.0	.0	.0	.0	ThOx++	AmEDTA-	
2	.0	.0	.0	.0	ThOx++	NpO2Cit=	
3	.0	.0	.0	.0	ThOx++	NpO2EDTA==-	
1	.0	.0	.0	.0	ThOx++	NpO2Ox-	
3	.0	.0	.0	.0	ThOx++	U(OH)4(CO3)2==	
3	.0	.0	.0	.0	ThOx++	U(CO3)5===	
2	.0	.0	.0	.0	ThOx++	U(SO4)3=	
3	.0	.0	.0	.0	ThOx++	Am(CO3)4==-	
1	.0	.0	.0	.0	ThOx++	Am(SO4)2-	
1	.0	.0	.0	.0	ThOx++	NpO2H2EDTA-	
1	.0	.0	.0	.0	ThOx++	CaCit-	
2	.0	.0	.0	.0	ThOx++	CaEDTA=	
1	.0	.0	.0	.0	ThOx++	UnuAn#2-	
1	.0	.0	.0	.0	ThOx++	UnuAn#3-	
1	.0	.0	.0	.0	ThOx++	UnuAn#4-	
2	.0	.0	.0	.0	ThOx++	U(OH)2(CO3)2=	
1	.0	.0	.0	.0	ThOx++	MgCit-	
2	.0	.0	.0	.0	ThOx++	MgEDTA=	
2	.0	.0	.0	.0	ThOx++	NpO2HEDTA=	
1	.3088	1.74	.0	-.132	AmAc++	Cl-	ERG_org_memo
2	.0	.0	.0	.0	AmAc++	SO4=	
1	.0	.0	.0	.0	AmAc++	HSO4-	
1	.0	.0	.0	.0	AmAc++	OH-	
1	.0	.0	.0	.0	AmAc++	HCO3-	
2	.0	.0	.0	.0	AmAc++	CO3=	
1	.0	.0	.0	.0	AmAc++	B(OH)4-	
1	.0	.0	.0	.0	AmAc++	B3O3(OH)4-	
2	.0	.0	.0	.0	AmAc++	B4O5(OH)4=	
1	.0	.0	.0	.0	AmAc++	Br-	
1	.0	.0	.0	.0	AmAc++	Am(CO3)2-	
3	.0	.0	.0	.0	AmAc++	Am(CO3)3=-	
1	.0	.0	.0	.0	AmAc++	ClO4-	
1	.0	.0	.0	.0	AmAc++	NpO2(OH)2-	
1	.0	.0	.0	.0	AmAc++	NpO2CO3-	
3	.0	.0	.0	.0	AmAc++	NpO2(CO3)2=-	
3	.0	.0	.0	.0	AmAc++	NpO2(CO3)3==-	
1	.0	.0	.0	.0	AmAc++	H2PO4-	
2	.0	.0	.0	.0	AmAc++	HPO4=	
3	.0	.0	.0	.0	AmAc++	PO4=-	
2	.0	.0	.0	.0	AmAc++	Th(SO4)3=	
1	.0	.0	.0	.0	AmAc++	Th(OH)3(CO3)-	

3	.0	.0	.0	.0	AmAc++ Th(CO3)5===	
1	.0	.0	.0	.0	AmAc++ HOx-	
2	.0	.0	.0	.0	AmAc++ Ox=	
1	.0	.0	.0	.0	AmAc++ Ac-	
1	.0	.0	.0	.0	AmAc++ Lac-	
1	.0	.0	.0	.0	AmAc++ H2Cit-	
2	.0	.0	.0	.0	AmAc++ HCit=	
3	.0	.0	.0	.0	AmAc++ Cit=-	
3	.0	.0	.0	.0	AmAc++ H3EDTA-	
3	.0	.0	.0	.0	AmAc++ H2EDTA=	
3	.0	.0	.0	.0	AmAc++ HEDTA=-	
3	.0	.0	.0	.0	AmAc++ EDTA==	
3	.0	.0	.0	.0	AmAc++ AmEDTA-	
2	.0	.0	.0	.0	AmAc++ NpO2Cit=	
3	.0	.0	.0	.0	AmAc++ NpO2EDTA==-	
1	.0	.0	.0	.0	AmAc++ NpO2Ox-	
3	.0	.0	.0	.0	AmAc++ U(OH)4(CO3)2==	
3	.0	.0	.0	.0	AmAc++ U(CO3)5===	
2	.0	.0	.0	.0	AmAc++ U(SO4)3=	
3	.0	.0	.0	.0	AmAc++ Am(CO3)4==-	
1	.0	.0	.0	.0	AmAc++ Am(SO4)2-	
1	.0	.0	.0	.0	AmAc++ NpO2H2EDTA-	
1	.0	.0	.0	.0	AmAc++ CaCit-	
2	.0	.0	.0	.0	AmAc++ CaEDTA=	
1	.0	.0	.0	.0	AmAc++ UnuAn#2-	
1	.0	.0	.0	.0	AmAc++ UnuAn#3-	
1	.0	.0	.0	.0	AmAc++ UnuAn#4-	
2	.0	.0	.0	.0	AmAc++ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	AmAc++ MgCit-	
2	.0	.0	.0	.0	AmAc++ MgEDTA=	
2	.0	.0	.0	.0	AmAc++ NpO2HEDTA=	

1	0.8397	1.74	.0	-0.332	AmLac++ Cl-	SAND99/Moore et al 1999
2	.0	.0	.0	.0	AmLac++ SO4=	
1	.0	.0	.0	.0	AmLac++ HSO4-	
1	.0	.0	.0	.0	AmLac++ OH-	
1	.0	.0	.0	.0	AmLac++ HCO3-	
2	.0	.0	.0	.0	AmLac++ CO3=	
1	.0	.0	.0	.0	AmLac++ B(OH)4-	
1	.0	.0	.0	.0	AmLac++ B3O3(OH)4-	
2	.0	.0	.0	.0	AmLac++ B4O5(OH)4=	
1	.0	.0	.0	.0	AmLac++ Br-	
1	.0	.0	.0	.0	AmLac++ Am(CO3)2-	
3	.0	.0	.0	.0	AmLac++ Am(CO3)3=-	
1	.0	.0	.0	.0	AmLac++ ClO4-	
1	.0	.0	.0	.0	AmLac++ NpO2(OH)2-	
1	.0	.0	.0	.0	AmLac++ NpO2CO3-	
3	.0	.0	.0	.0	AmLac++ NpO2(CO3)2=-	
3	.0	.0	.0	.0	AmLac++ NpO2(CO3)3==-	
1	.0	.0	.0	.0	AmLac++ H2PO4-	
2	.0	.0	.0	.0	AmLac++ HPO4=	
3	.0	.0	.0	.0	AmLac++ PO4=-	
2	.0	.0	.0	.0	AmLac++ Th(SO4)3=	
1	.0	.0	.0	.0	AmLac++ Th(OH)3(CO3)-	
3	.0	.0	.0	.0	AmLac++ Th(CO3)5===	
1	.0	.0	.0	.0	AmLac++ HOx-	
2	.0	.0	.0	.0	AmLac++ Ox=	
1	.0	.0	.0	.0	AmLac++ Ac-	
1	.0	.0	.0	.0	AmLac++ Lac-	
1	.0	.0	.0	.0	AmLac++ H2Cit-	
2	.0	.0	.0	.0	AmLac++ HCit=	
3	.0	.0	.0	.0	AmLac++ Cit=-	
3	.0	.0	.0	.0	AmLac++ H3EDTA-	

```
3   .0         .0        .0     .0       AmLac++ H2EDTA=
3   .0         .0        .0     .0       AmLac++ HEDTA=-
3   .0         .0        .0     .0       AmLac++ EDTA==
3   .0         .0        .0     .0       AmLac++ AmEDTA-
2   .0         .0        .0     .0       AmLac++ NpO2Cit=
3   .0         .0        .0     .0       AmLac++ NpO2EDTA==-
1   .0         .0        .0     .0       AmLac++ NpO2Ox-
3   .0         .0        .0     .0       AmLac++ U(OH)4(CO3)2==
3   .0         .0        .0     .0       AmLac++ U(CO3)5===
2   .0         .0        .0     .0       AmLac++ U(SO4)3=
3   .0         .0        .0     .0       AmLac++ Am(CO3)4==-
1   .0         .0        .0     .0       AmLac++ Am(SO4)2-
1   .0         .0        .0     .0       AmLac++ NpO2H2EDTA-
1   .0         .0        .0     .0       AmLac++ CaCit-
2   .0         .0        .0     .0       AmLac++ CaEDTA=
1   .0         .0        .0     .0       AmLac++ UnuAn#2-
1   .0         .0        .0     .0       AmLac++ UnuAn#3-
1   .0         .0        .0     .0       AmLac++ UnuAn#4-
2   .0         .0        .0     .0       AmLac++ U(OH)2(CO3)2=
1   .0         .0        .0     .0       AmLac++ MgCit-
2   .0         .0        .0     .0       AmLac++ MgEDTA=
2   .0         .0        .0     .0       AmLac++ NpO2HEDTA=

1 -.9374      .29        .0     .248     AmOx+ Cl-             SAND99/Borkowski et al 01
1   .0         .0        .0     .0       AmOx+ SO4=
1   .0         .0        .0     .0       AmOx+ HSO4-
1   .0         .0        .0     .0       AmOx+ OH-
1   .0         .0        .0     .0       AmOx+ HCO3-
1   .0         .0        .0     .0       AmOx+ CO3=
1   .0         .0        .0     .0       AmOx+ B(OH)4-
1   .0         .0        .0     .0       AmOx+ B3O3(OH)4-
2   .0         .0        .0     .0       AmOx+ B4O5(OH)4=
1   .0         .0        .0     .0       AmOx+ Br-
1   .0         .0        .0     .0       AmOx+ Am(CO3)2-
1   .0         .0        .0     .0       AmOx+ Am(CO3)3=-
1   .0         .0        .0     .0       AmOx+ ClO4-
1   .0         .0        .0     .0       AmOx+ NpO2(OH)2-
1   .0         .0        .0     .0       AmOx+ NpO2CO3-
1   .0         .0        .0     .0       AmOx+ NpO2(CO3)2=-
1   .0         .0        .0     .0       AmOx+ NpO2(CO3)3==-
1   .0         .0        .0     .0       AmOx+ H2PO4-
1   .0         .0        .0     .0       AmOx+ HPO4=
1   .0         .0        .0     .0       AmOx+ PO4=-
1   .0         .0        .0     .0       AmOx+ Th(SO4)3=
1   .0         .0        .0     .0       AmOx+ Th(OH)3(CO3)-
1   .0         .0        .0     .0       AmOx+ Th(CO3)5===
1   .0         .0        .0     .0       AmOx+ HOx-
1   .0         .0        .0     .0       AmOx+ Ox=
1   .0         .0        .0     .0       AmOx+ Ac-
1   .0         .0        .0     .0       AmOx+ Lac-
1   .0         .0        .0     .0       AmOx+ H2Cit-
1   .0         .0        .0     .0       AmOx+ HCit=
1   .0         .0        .0     .0       AmOx+ Cit=-
1   .0         .0        .0     .0       AmOx+ H3EDTA-
1   .0         .0        .0     .0       AmOx+ H2EDTA=
1   .0         .0        .0     .0       AmOx+ HEDTA=-
1   .0         .0        .0     .0       AmOx+ EDTA==
1   .0         .0        .0     .0       AmOx+ AmEDTA-
1   .0         .0        .0     .0       AmOx+ NpO2Cit=
1   .0         .0        .0     .0       AmOx+ NpO2EDTA==-
1   .0         .0        .0     .0       AmOx+ NpO2Ox-
1   .0         .0        .0     .0       AmOx+ U(OH)4(CO3)2==
1   .0         .0        .0     .0       AmOx+ U(CO3)5===
```

1	.0	.0	.0	.0	AmOx+ U(SO4)3=	
1	.0	.0	.0	.0	AmOx+ Am(CO3)4==-	
1	.0	.0	.0	.0	AmOx+ Am(SO4)2-	
1	.0	.0	.0	.0	AmOx+ NpO2H2EDTA-	
1	.0	.0	.0	.0	AmOx+ CaCit-	
1	.0	.0	.0	.0	AmOx+ CaEDTA=	
1	.0	.0	.0	.0	AmOx+ UnuAn#2-	
1	.0	.0	.0	.0	AmOx+ UnuAn#3-	
1	.0	.0	.0	.0	AmOx+ UnuAn#4-	
1	.0	.0	.0	.0	AmOx+ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	AmOx+ MgCit-	
1	.0	.0	.0	.0	AmOx+ MgEDTA=	
1	.0	.0	.0	.0	AmOx+ NpO2HEDTA=	

1	-.7467	.29	.0	.319	UCit+ Cl-	analogy w/ Th (SAND99)
1	.0	.0	.0	.0	UCit+ SO4=	
1	.0	.0	.0	.0	UCit+ HSO4-	
1	.0	.0	.0	.0	UCit+ OH-	
1	.0	.0	.0	.0	UCit+ HCO3-	
1	.0	.0	.0	.0	UCit+ CO3=	
1	.0	.0	.0	.0	UCit+ B(OH)4-	
1	.0	.0	.0	.0	UCit+ B3O3(OH)4-	
1	.0	.0	.0	.0	UCit+ B4O5(OH)4=	
1	.0	.0	.0	.0	UCit+ Br-	
1	.0	.0	.0	.0	UCit+ Am(CO3)2-	
1	.0	.0	.0	.0	UCit+ Am(CO3)3=-	
1	.0	.0	.0	.0	UCit+ ClO4-	
1	.0	.0	.0	.0	UCit+ NpO2(OH)2-	
1	.0	.0	.0	.0	UCit+ NpO2CO3-	
1	.0	.0	.0	.0	UCit+ NpO2(CO3)2=-	
1	.0	.0	.0	.0	UCit+ NpO2(CO3)3==-	
1	.0	.0	.0	.0	UCit+ H2PO4-	
1	.0	.0	.0	.0	UCit+ HPO4=	
1	.0	.0	.0	.0	UCit+ PO4=-	
1	.0	.0	.0	.0	UCit+ Th(SO4)3=	
1	.0	.0	.0	.0	UCit+ Th(OH)3(CO3)-	
1	.0	.0	.0	.0	UCit+ Th(CO3)5===	
1	.0	.0	.0	.0	UCit+ HOx-	
1	.0	.0	.0	.0	UCit+ Ox=	
1	.0	.0	.0	.0	UCit+ Ac-	
1	.0	.0	.0	.0	UCit+ Lac-	
1	.0	.0	.0	.0	UCit+ H2Cit-	
1	.0	.0	.0	.0	UCit+ HCit=	
1	.0	.0	.0	.0	UCit+ Cit=-	
1	.0	.0	.0	.0	UCit+ H3EDTA-	
1	.0	.0	.0	.0	UCit+ H2EDTA=	
1	.0	.0	.0	.0	UCit+ HEDTA=-	
1	.0	.0	.0	.0	UCit+ EDTA==	
1	.0	.0	.0	.0	UCit+ AmEDTA-	
1	.0	.0	.0	.0	UCit+ NpO2Cit=	
1	.0	.0	.0	.0	UCit+ NpO2EDTA==-	
1	.0	.0	.0	.0	UCit+ NpO2Ox-	
1	.0	.0	.0	.0	UCit+ U(OH)4(CO3)2==	
1	.0	.0	.0	.0	UCit+ U(CO3)5===	
1	.0	.0	.0	.0	UCit+ U(SO4)3=	
1	.0	.0	.0	.0	UCit+ Am(CO3)4==-	
1	.0	.0	.0	.0	UCit+ Am(SO4)2-	
1	.0	.0	.0	.0	UCit+ NpO2H2EDTA-	
1	.0	.0	.0	.0	UCit+ CaCit-	
1	.0	.0	.0	.0	UCit+ CaEDTA=	
1	.0	.0	.0	.0	UCit+ UnuAn#2-	
1	.0	.0	.0	.0	UCit+ UnuAn#3-	
1	.0	.0	.0	.0	UCit+ UnuAn#4-	

```
 1  .0         .0       .0     .0       UCit+ U(OH)2(CO3)2=
 1  .0         .0       .0     .0       UCit+ MgCit-
 1  .0         .0       .0     .0       UCit+ MgEDTA=
 1  .0         .0       .0     .0       UCit+ NpO2HEDTA=

 1  .6677    5.22       .0     .341     ULac+++ Cl-        analogy w/ Th (SAND99/Moore
et al 1999)
 3  .0         .0       .0     .0       ULac+++ SO4=
 1  .0         .0       .0     .0       ULac+++ HSO4-
 1  .0         .0       .0     .0       ULac+++ OH-
 1  .0         .0       .0     .0       ULac+++ HCO3-
 3  .0         .0       .0     .0       ULac+++ CO3=
 1  .0         .0       .0     .0       ULac+++ B(OH)4-
 1  .0         .0       .0     .0       ULac+++ B3O3(OH)4-
 3  .0         .0       .0     .0       ULac+++ B4O5(OH)4=
 1  .0         .0       .0     .0       ULac+++ Br-
 1  .0         .0       .0     .0       ULac+++ Am(CO3)2-
 3  .0         .0       .0     .0       ULac+++ Am(CO3)3=-
 1  .0         .0       .0     .0       ULac+++ ClO4-
 1  .0         .0       .0     .0       ULac+++ NpO2(OH)2-
 1  .0         .0       .0     .0       ULac+++ NpO2CO3-
 3  .0         .0       .0     .0       ULac+++ NpO2(CO3)2=-
 3  .0         .0       .0     .0       ULac+++ NpO2(CO3)3==-
 1  .0         .0       .0     .0       ULac+++ H2PO4-
 3  .0         .0       .0     .0       ULac+++ HPO4=
 3  .0         .0       .0     .0       ULac+++ PO4=-
 3  .0         .0       .0     .0       ULac+++ Th(SO4)3=
 1  .0         .0       .0     .0       ULac+++ Th(OH)3(CO3)-
 3  .0         .0       .0     .0       ULac+++ Th(CO3)5===
 1  .0         .0       .0     .0       ULac+++ HOx-
 3  .0         .0       .0     .0       ULac+++ Ox=
 1  .0         .0       .0     .0       ULac+++ Ac-
 1  .0         .0       .0     .0       ULac+++ Lac-
 1  .0         .0       .0     .0       ULac+++ H2Cit-
 3  .0         .0       .0     .0       ULac+++ HCit=
 3  .0         .0       .0     .0       ULac+++ Cit=-
 3  .0         .0       .0     .0       ULac+++ H3EDTA-
 3  .0         .0       .0     .0       ULac+++ H2EDTA=
 3  .0         .0       .0     .0       ULac+++ HEDTA=-
 3  .0         .0       .0     .0       ULac+++ EDTA==
 3  .0         .0       .0     .0       ULac+++ AmEDTA-
 3  .0         .0       .0     .0       ULac+++ NpO2Cit=
 3  .0         .0       .0     .0       ULac+++ NpO2EDTA==-
 1  .0         .0       .0     .0       ULac+++ NpO2Ox-
 3  .0         .0       .0     .0       ULac+++ U(OH)4(CO3)2==
 3  .0         .0       .0     .0       ULac+++ U(CO3)5===
 3  .0         .0       .0     .0       ULac+++ U(SO4)3=
 3  .0         .0       .0     .0       ULac+++ Am(CO3)4==-
 1  .0         .0       .0     .0       ULac+++ Am(SO4)2-
 1  .0         .0       .0     .0       ULac+++ NpO2H2EDTA-
 1  .0         .0       .0     .0       ULac+++ CaCit-
 3  .0         .0       .0     .0       ULac+++ CaEDTA=
 1  .0         .0       .0     .0       ULac+++ UnuAn#2-
 1  .0         .0       .0     .0       ULac+++ UnuAn#3-
 1  .0         .0       .0     .0       ULac+++ UnuAn#4-
 3  .0         .0       .0     .0       ULac+++ U(OH)2(CO3)2=
 1  .0         .0       .0     .0       ULac+++ MgCit-
 3  .0         .0       .0     .0       ULac+++ MgEDTA=
 3  .0         .0       .0     .0       ULac+++ NpO2HEDTA=

 1 -.343     1.74       .0     .5       UOx++ Cl-         analogy w/Th
(SAND99/Borkowski et al 01)
 2  .0         .0       .0     .0       UOx++ SO4=
```

1	.0	.0	.0	.0	UOx++ HSO4-	
1	.0	.0	.0	.0	UOx++ OH-	
1	.0	.0	.0	.0	UOx++ HCO3-	
2	.0	.0	.0	.0	UOx++ CO3=	
1	.0	.0	.0	.0	UOx++ B(OH)4-	
1	.0	.0	.0	.0	UOx++ B3O3(OH)4-	
2	.0	.0	.0	.0	UOx++ B4O5(OH)4=	
1	.0	.0	.0	.0	UOx++ Br-	
1	.0	.0	.0	.0	UOx++ Am(CO3)2-	
3	.0	.0	.0	.0	UOx++ Am(CO3)3=-	
1	.0	.0	.0	.0	UOx++ ClO4-	
1	.0	.0	.0	.0	UOx++ NpO2(OH)2-	
1	.0	.0	.0	.0	UOx++ NpO2CO3-	
3	.0	.0	.0	.0	UOx++ NpO2(CO3)2=-	
3	.0	.0	.0	.0	UOx++ NpO2(CO3)3==-	
1	.0	.0	.0	.0	UOx++ H2PO4-	
2	.0	.0	.0	.0	UOx++ HPO4=	
3	.0	.0	.0	.0	UOx++ PO4=-	
2	.0	.0	.0	.0	UOx++ Th(SO4)3=	
1	.0	.0	.0	.0	UOx++ Th(OH)3(CO3)-	
3	.0	.0	.0	.0	UOx++ Th(CO3)5===	
1	.0	.0	.0	.0	UOx++ HOx-	
2	.0	.0	.0	.0	UOx++ Ox=	
1	.0	.0	.0	.0	UOx++ Ac-	
1	.0	.0	.0	.0	UOx++ Lac-	
1	.0	.0	.0	.0	UOx++ H2Cit-	
2	.0	.0	.0	.0	UOx++ HCit=	
3	.0	.0	.0	.0	UOx++ Cit=-	
3	.0	.0	.0	.0	UOx++ H3EDTA-	
3	.0	.0	.0	.0	UOx++ H2EDTA=	
3	.0	.0	.0	.0	UOx++ HEDTA=-	
3	.0	.0	.0	.0	UOx++ EDTA==	
3	.0	.0	.0	.0	UOx++ AmEDTA-	
3	.0	.0	.0	.0	UOx++ NpO2Cit=	
3	.0	.0	.0	.0	UOx++ NpO2EDTA==-	
1	.0	.0	.0	.0	UOx++ NpO2Ox-	
3	.0	.0	.0	.0	UOx++ U(OH)4(CO3)2==	
3	.0	.0	.0	.0	UOx++ U(CO3)5===	
2	.0	.0	.0	.0	UOx++ U(SO4)3=	
3	.0	.0	.0	.0	UOx++ Am(CO3)4==-	
1	.0	.0	.0	.0	UOx++ Am(SO4)2-	
1	.0	.0	.0	.0	UOx++ NpO2H2EDTA-	
1	.0	.0	.0	.0	UOx++ CaCit-	
2	.0	.0	.0	.0	UOx++ CaEDTA=	
1	.0	.0	.0	.0	UOx++ UnuAn#2-	
1	.0	.0	.0	.0	UOx++ UnuAn#3-	
1	.0	.0	.0	.0	UOx++ UnuAn#4-	
2	.0	.0	.0	.0	UOx++ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	UOx++ MgCit-	
2	.0	.0	.0	.0	UOx++ MgEDTA=	
2	.0	.0	.0	.0	UOx++ NpO2HEDTA=	
1	1.061	5.22	.0	.109	ThAc+++ Cl-	SAND99
3	.0	.0	.0	.0	ThAc+++ SO4=	
1	.0	.0	.0	.0	ThAc+++ HSO4-	
1	.0	.0	.0	.0	ThAc+++ OH-	
1	.0	.0	.0	.0	ThAc+++ HCO3-	
3	.0	.0	.0	.0	ThAc+++ CO3=	
1	.0	.0	.0	.0	ThAc+++ B(OH)4-	
1	.0	.0	.0	.0	ThAc+++ B3O3(OH)4-	
3	.0	.0	.0	.0	ThAc+++ B4O5(OH)4=	
1	.0	.0	.0	.0	ThAc+++ Br-	
1	.0	.0	.0	.0	ThAc+++ Am(CO3)2-	

```
3  .0        .0       .0      .0       ThAc+++ Am(CO3)3=-
1  .0        .0       .0      .0       ThAc+++ ClO4-
1  .0        .0       .0      .0       ThAc+++ NpO2(OH)2-
1  .0        .0       .0      .0       ThAc+++ NpO2CO3-
3  .0        .0       .0      .0       ThAc+++ NpO2(CO3)2=-
3  .0        .0       .0      .0       ThAc+++ NpO2(CO3)3==-
1  .0        .0       .0      .0       ThAc+++ H2PO4-
3  .0        .0       .0      .0       ThAc+++ HPO4=
3  .0        .0       .0      .0       ThAc+++ PO4=-
3  .0        .0       .0      .0       ThAc+++ Th(SO4)3=
1  .0        .0       .0      .0       ThAc+++ Th(OH)3(CO3)-
3  .0        .0       .0      .0       ThAc+++ Th(CO3)5===
1  .0        .0       .0      .0       ThAc+++ HOx-
3  .0        .0       .0      .0       ThAc+++ Ox=
1  .0        .0       .0      .0       ThAc+++ Ac-
1  .0        .0       .0      .0       ThAc+++ Lac-
1  .0        .0       .0      .0       ThAc+++ H2Cit-
3  .0        .0       .0      .0       ThAc+++ HCit=
3  .0        .0       .0      .0       ThAc+++ Cit=-
3  .0        .0       .0      .0       ThAc+++ H3EDTA-
3  .0        .0       .0      .0       ThAc+++ H2EDTA=
3  .0        .0       .0      .0       ThAc+++ HEDTA=-
3  .0        .0       .0      .0       ThAc+++ EDTA==
3  .0        .0       .0      .0       ThAc+++ AmEDTA-
3  .0        .0       .0      .0       ThAc+++ NpO2Cit=
3  .0        .0       .0      .0       ThAc+++ NpO2EDTA==-
1  .0        .0       .0      .0       ThAc+++ NpO2Ox-
3  .0        .0       .0      .0       ThAc+++ U(OH)4(CO3)2==
3  .0        .0       .0      .0       ThAc+++ U(CO3)5===
3  .0        .0       .0      .0       ThAc+++ U(SO4)3=
3  .0        .0       .0      .0       ThAc+++ Am(CO3)4==-
1  .0        .0       .0      .0       ThAc+++ Am(SO4)2-
1  .0        .0       .0      .0       ThAc+++ NpO2H2EDTA-
1  .0        .0       .0      .0       ThAc+++ CaCit-
3  .0        .0       .0      .0       ThAc+++ CaEDTA=
1  .0        .0       .0      .0       ThAc+++ UnuAn#2-
1  .0        .0       .0      .0       ThAc+++ UnuAn#3-
1  .0        .0       .0      .0       ThAc+++ UnuAn#4-
3  .0        .0       .0      .0       ThAc+++ U(OH)2(CO3)2=
1  .0        .0       .0      .0       ThAc+++ MgCit-
3  .0        .0       .0      .0       ThAc+++ MgEDTA=
3  .0        .0       .0      .0       ThAc+++ NpO2HEDTA=

1 -.7467     .29      .0      .319     ThCit+ Cl-           SAND99
1  .0        .0       .0      .0       ThCit+ SO4=
1  .0        .0       .0      .0       ThCit+ HSO4-
1  .0        .0       .0      .0       ThCit+ OH-
1  .0        .0       .0      .0       ThCit+ HCO3-
1  .0        .0       .0      .0       ThCit+ CO3=
1  .0        .0       .0      .0       ThCit+ B(OH)4-
1  .0        .0       .0      .0       ThCit+ B3O3(OH)4-
1  .0        .0       .0      .0       ThCit+ B4O5(OH)4=
1  .0        .0       .0      .0       ThCit+ Br-
1  .0        .0       .0      .0       ThCit+ Am(CO3)2-
1  .0        .0       .0      .0       ThCit+ Am(CO3)3=-
1  .0        .0       .0      .0       ThCit+ ClO4-
1  .0        .0       .0      .0       ThCit+ NpO2(OH)2-
1  .0        .0       .0      .0       ThCit+ NpO2CO3-
1  .0        .0       .0      .0       ThCit+ NpO2(CO3)2=-
1  .0        .0       .0      .0       ThCit+ NpO2(CO3)3==-
1  .0        .0       .0      .0       ThCit+ H2PO4-
1  .0        .0       .0      .0       ThCit+ HPO4=
1  .0        .0       .0      .0       ThCit+ PO4=-
```

1	.0	.0	.0	.0	ThCit+	Th(SO4)3=	
1	.0	.0	.0	.0	ThCit+	Th(OH)3(CO3)-	
1	.0	.0	.0	.0	ThCit+	Th(CO3)5===	
1	.0	.0	.0	.0	ThCit+	HOx-	
1	.0	.0	.0	.0	ThCit+	Ox=	
1	.0	.0	.0	.0	ThCit+	Ac-	
1	.0	.0	.0	.0	ThCit+	Lac-	
1	.0	.0	.0	.0	ThCit+	H2Cit-	
1	.0	.0	.0	.0	ThCit+	HCit=	
1	.0	.0	.0	.0	ThCit+	Cit=-	
1	.0	.0	.0	.0	ThCit+	H3EDTA-	
1	.0	.0	.0	.0	ThCit+	H2EDTA=	
1	.0	.0	.0	.0	ThCit+	HEDTA=-	
1	.0	.0	.0	.0	ThCit+	EDTA==	
1	.0	.0	.0	.0	ThCit+	AmEDTA-	
1	.0	.0	.0	.0	ThCit+	NpO2Cit=	
1	.0	.0	.0	.0	ThCit+	NpO2EDTA==-	
1	.0	.0	.0	.0	ThCit+	NpO2Ox-	
1	.0	.0	.0	.0	ThCit+	U(OH)4(CO3)2==	
1	.0	.0	.0	.0	ThCit+	U(CO3)5===	
1	.0	.0	.0	.0	ThCit+	U(SO4)3=	
1	.0	.0	.0	.0	ThCit+	Am(CO3)4==-	
1	.0	.0	.0	.0	ThCit+	Am(SO4)2-	
1	.0	.0	.0	.0	ThCit+	NpO2H2EDTA-	
1	.0	.0	.0	.0	ThCit+	CaCit-	
1	.0	.0	.0	.0	ThCit+	CaEDTA=	
1	.0	.0	.0	.0	ThCit+	UnuAn#2-	
1	.0	.0	.0	.0	ThCit+	UnuAn#3-	
1	.0	.0	.0	.0	ThCit+	UnuAn#4-	
1	.0	.0	.0	.0	ThCit+	U(OH)2(CO3)2=	
1	.0	.0	.0	.0	ThCit+	MgCit-	
1	.0	.0	.0	.0	ThCit+	MgEDTA=	
1	.0	.0	.0	.0	ThCit+	NpO2HEDTA=	
1	.6677	5.22	.0	.341	ThLac+++	Cl-	SAND99/Moore et al 99
3	.0	.0	.0	.0	ThLac+++	SO4=	
1	.0	.0	.0	.0	ThLac+++	HSO4-	
1	.0	.0	.0	.0	ThLac+++	OH-	
1	.0	.0	.0	.0	ThLac+++	HCO3-	
3	.0	.0	.0	.0	ThLac+++	CO3=	
1	.0	.0	.0	.0	ThLac+++	B(OH)4-	
1	.0	.0	.0	.0	ThLac+++	B3O3(OH)4-	
3	.0	.0	.0	.0	ThLac+++	B4O5(OH)4=	
1	.0	.0	.0	.0	ThLac+++	Br-	
1	.0	.0	.0	.0	ThLac+++	Am(CO3)2-	
3	.0	.0	.0	.0	ThLac+++	Am(CO3)3=-	
1	.0	.0	.0	.0	ThLac+++	ClO4-	
1	.0	.0	.0	.0	ThLac+++	NpO2(OH)2-	
1	.0	.0	.0	.0	ThLac+++	NpO2CO3-	
3	.0	.0	.0	.0	ThLac+++	NpO2(CO3)2=-	
3	.0	.0	.0	.0	ThLac+++	NpO2(CO3)3==-	
1	.0	.0	.0	.0	ThLac+++	H2PO4-	
3	.0	.0	.0	.0	ThLac+++	HPO4=	
3	.0	.0	.0	.0	ThLac+++	PO4=-	
3	.0	.0	.0	.0	ThLac+++	Th(SO4)3=	
1	.0	.0	.0	.0	ThLac+++	Th(OH)3(CO3)-	
3	.0	.0	.0	.0	ThLac+++	Th(CO3)5===	
1	.0	.0	.0	.0	ThLac+++	HOx-	
3	.0	.0	.0	.0	ThLac+++	Ox=	
1	.0	.0	.0	.0	ThLac+++	Ac-	
1	.0	.0	.0	.0	ThLac+++	Lac-	
1	.0	.0	.0	.0	ThLac+++	H2Cit-	
3	.0	.0	.0	.0	ThLac+++	HCit=	

```
3  .0         .0       .0      .0       ThLac+++ Cit=-
3  .0         .0       .0      .0       ThLac+++ H3EDTA-
3  .0         .0       .0      .0       ThLac+++ H2EDTA=
3  .0         .0       .0      .0       ThLac+++ HEDTA=-
3  .0         .0       .0      .0       ThLac+++ EDTA==
3  .0         .0       .0      .0       ThLac+++ AmEDTA-
3  .0         .0       .0      .0       ThLac+++ NpO2Cit=
3  .0         .0       .0      .0       ThLac+++ NpO2EDTA==-
1  .0         .0       .0      .0       ThLac+++ NpO2Ox-
3  .0         .0       .0      .0       ThLac+++ U(OH)4(CO3)2==
3  .0         .0       .0      .0       ThLac+++ U(CO3)5===
3  .0         .0       .0      .0       ThLac+++ U(SO4)3=
3  .0         .0       .0      .0       ThLac+++ Am(CO3)4==-
1  .0         .0       .0      .0       ThLac+++ Am(SO4)2-
1  .0         .0       .0      .0       ThLac+++ NpO2H2EDTA-
1  .0         .0       .0      .0       ThLac+++ CaCit-
3  .0         .0       .0      .0       ThLac+++ CaEDTA=
1  .0         .0       .0      .0       ThLac+++ UnuAn#2-
1  .0         .0       .0      .0       ThLac+++ UnuAn#3-
1  .0         .0       .0      .0       ThLac+++ UnuAn#4-
3  .0         .0       .0      .0       ThLac+++ U(OH)2(CO3)2=
1  .0         .0       .0      .0       ThLac+++ MgCit-
3  .0         .0       .0      .0       ThLac+++ MgEDTA=
3  .0         .0       .0      .0       ThLac+++ NpO2HEDTA=

1 -0.055     1.6       .0      0.050    AmOH++ Cl-   FK98/Konnecke et al. 1997
2  .0         .0       .0      .0       AmOH++ SO4=
1  .0         .0       .0      .0       AmOH++ HSO4-
1  .0         .0       .0      .0       AmOH++ OH-
1  .0         .0       .0      .0       AmOH++ HCO3-
2  .0         .0       .0      .0       AmOH++ CO3=
1  .0         .0       .0      .0       AmOH++ B(OH)4-
1  .0         .0       .0      .0       AmOH++ B3O3(OH)4-
2  .0         .0       .0      .0       AmOH++ B4O5(OH)4=
1  .0         .0       .0      .0       AmOH++ Br-
1  .0         .0       .0      .0       AmOH++ Am(CO3)2-
3  .0         .0       .0      .0       AmOH++ Am(CO3)3=-
1  .0         .0       .0      .0       AmOH++ ClO4-
1  .0         .0       .0      .0       AmOH++ NpO2(OH)2-
1  .0         .0       .0      .0       AmOH++ NpO2CO3-
3  .0         .0       .0      .0       AmOH++ NpO2(CO3)2=-
3  .0         .0       .0      .0       AmOH++ NpO2(CO3)3==-
1  .0         .0       .0      .0       AmOH++ H2PO4-
2  .0         .0       .0      .0       AmOH++ HPO4=
3  .0         .0       .0      .0       AmOH++ PO4=-
2  .0         .0       .0      .0       AmOH++ Th(SO4)3=
1  .0         .0       .0      .0       AmOH++ Th(OH)3(CO3)-
3  .0         .0       .0      .0       AmOH++ Th(CO3)5===
1  .0         .0       .0      .0       AmOH++ HOx-
2  .0         .0       .0      .0       AmOH++ Ox=
1  .0         .0       .0      .0       AmOH++ Ac-
1  .0         .0       .0      .0       AmOH++ Lac-
1  .0         .0       .0      .0       AmOH++ H2Cit-
2  .0         .0       .0      .0       AmOH++ HCit=
3  .0         .0       .0      .0       AmOH++ Cit=-
3  .0         .0       .0      .0       AmOH++ H3EDTA-
3  .0         .0       .0      .0       AmOH++ H2EDTA=
3  .0         .0       .0      .0       AmOH++ HEDTA=-
3  .0         .0       .0      .0       AmOH++ EDTA==
3  .0         .0       .0      .0       AmOH++ AmEDTA-
3  .0         .0       .0      .0       AmOH++ NpO2Cit=
3  .0         .0       .0      .0       AmOH++ NpO2EDTA==-
1  .0         .0       .0      .0       AmOH++ NpO2Ox-
```

```
3  .0         .0        .0      .0       AmOH++ U(OH)4(CO3)2==
3  .0         .0        .0      .0       AmOH++ U(CO3)5===
2  .0         .0        .0      .0       AmOH++ U(SO4)3=
3  .0         .0        .0      .0       AmOH++ Am(CO3)4==-
1  .0         .0        .0      .0       AmOH++ Am(SO4)2-
1  .0         .0        .0      .0       AmOH++ NpO2H2EDTA-
1  .0         .0        .0      .0       AmOH++ CaCit-
2  .0         .0        .0      .0       AmOH++ CaEDTA=
1  .0         .0        .0      .0       AmOH++ UnuAn#2-
1  .0         .0        .0      .0       AmOH++ UnuAn#3-
1  .0         .0        .0      .0       AmOH++ UnuAn#4-
2  .0         .0        .0      .0       AmOH++ U(OH)2(CO3)2=
1  .0         .0        .0      .0       AmOH++ MgCit-
2  .0         .0        .0      .0       AmOH++ MgEDTA=
2  .0         .0        .0      .0       AmOH++ NpO2HEDTA=

1 -0.616     -0.45      .0     .050      Am(OH)2+ Cl-   FK98/Konnecke et al. 1997
1  .0         .0        .0      .0       Am(OH)2+ SO4=
1  .0         .0        .0      .0       Am(OH)2+ HSO4-
1  .0         .0        .0      .0       Am(OH)2+ OH-
1  .0         .0        .0      .0       Am(OH)2+ HCO3-
1  .0         .0        .0      .0       Am(OH)2+ CO3=
1  .0         .0        .0      .0       Am(OH)2+ B(OH)4-
1  .0         .0        .0      .0       Am(OH)2+ B3O3(OH)4-
1  .0         .0        .0      .0       Am(OH)2+ B4O5(OH)4=
1  .0         .0        .0      .0       Am(OH)2+ Br-
1  .0         .0        .0      .0       Am(OH)2+ Am(CO3)2-
1  .0         .0        .0      .0       Am(OH)2+ Am(CO3)3=-
1  .0         .0        .0      .0       Am(OH)2+ ClO4-
1  .0         .0        .0      .0       Am(OH)2+ NpO2(OH)2-
1  .0         .0        .0      .0       Am(OH)2+ NpO2CO3-
1  .0         .0        .0      .0       Am(OH)2+ NpO2(CO3)2=-
1  .0         .0        .0      .0       Am(OH)2+ NpO2(CO3)3==-
1  .0         .0        .0      .0       Am(OH)2+ H2PO4-
1  .0         .0        .0      .0       Am(OH)2+ HPO4=
1  .0         .0        .0      .0       Am(OH)2+ PO4=-
1  .0         .0        .0      .0       Am(OH)2+ Th(SO4)3=
1  .0         .0        .0      .0       Am(OH)2+ Th(OH)3(CO3)-
1  .0         .0        .0      .0       Am(OH)2+ Th(CO3)5===
1  .0         .0        .0      .0       Am(OH)2+ HOx-
1  .0         .0        .0      .0       Am(OH)2+ Ox=
1  .0         .0        .0      .0       Am(OH)2+ Ac-
1  .0         .0        .0      .0       Am(OH)2+ Lac-
1  .0         .0        .0      .0       Am(OH)2+ H2Cit-
1  .0         .0        .0      .0       Am(OH)2+ HCit=
1  .0         .0        .0      .0       Am(OH)2+ Cit=-
1  .0         .0        .0      .0       Am(OH)2+ H3EDTA-
1  .0         .0        .0      .0       Am(OH)2+ H2EDTA=
1  .0         .0        .0      .0       Am(OH)2+ HEDTA=-
1  .0         .0        .0      .0       Am(OH)2+ EDTA==
1  .0         .0        .0      .0       Am(OH)2+ AmEDTA-
1  .0         .0        .0      .0       Am(OH)2+ NpO2Cit=
1  .0         .0        .0      .0       Am(OH)2+ NpO2EDTA==-
1  .0         .0        .0      .0       Am(OH)2+ NpO2Ox-
1  .0         .0        .0      .0       Am(OH)2+ U(OH)4(CO3)2==
1  .0         .0        .0      .0       Am(OH)2+ U(CO3)5===
1  .0         .0        .0      .0       Am(OH)2+ U(SO4)3=
1  .0         .0        .0      .0       Am(OH)2+ Am(CO3)4==-
1  .0         .0        .0      .0       Am(OH)2+ Am(SO4)2-
1  .0         .0        .0      .0       Am(OH)2+ NpO2H2EDTA-
1  .0         .0        .0      .0       Am(OH)2+ CaCit-
1  .0         .0        .0      .0       Am(OH)2+ CaEDTA=
1  .0         .0        .0      .0       Am(OH)2+ UnuAn#2-
```

```
1  .0         .0        .0      .0       Am(OH)2+ UnuAn#3-
1  .0         .0        .0      .0       Am(OH)2+ UnuAn#4-
1  .0         .0        .0      .0       Am(OH)2+ U(OH)2(CO3)2=
1  .0         .0        .0      .0       Am(OH)2+ MgCit-
1  .0         .0        .0      .0       Am(OH)2+ MgEDTA=
1  .0         .0        .0      .0       Am(OH)2+ NpO2HEDTA=

1  .516     1.75        .0      .010     AmCl2+ Cl-      FK98/Konnecke et al. 1997
1  .0         .0        .0      .0       AmCl2+ SO4=
1  .0         .0        .0      .0       AmCl2+ HSO4-
1  .0         .0        .0      .0       AmCl2+ OH-
1  .0         .0        .0      .0       AmCl2+ HCO3-
1  .0         .0        .0      .0       AmCl2+ CO3=
1  .0         .0        .0      .0       AmCl2+ B(OH)4-
1  .0         .0        .0      .0       AmCl2+ B3O3(OH)4-
1  .0         .0        .0      .0       AmCl2+ B4O5(OH)4=
1  .0         .0        .0      .0       AmCl2+ Br-
1  .0         .0        .0      .0       AmCl2+ Am(CO3)2-
1  .0         .0        .0      .0       AmCl2+ Am(CO3)3=-
1  .0         .0        .0      .0       AmCl2+ ClO4-
1  .0         .0        .0      .0       AmCl2+ NpO2(OH)2-
1  .0         .0        .0      .0       AmCl2+ NpO2CO3-
1  .0         .0        .0      .0       AmCl2+ NpO2(CO3)2=-
1  .0         .0        .0      .0       AmCl2+ NpO2(CO3)3==-
1  .0         .0        .0      .0       AmCl2+ H2PO4-
1  .0         .0        .0      .0       AmCl2+ HPO4=
1  .0         .0        .0      .0       AmCl2+ PO4=-
1  .0         .0        .0      .0       AmCl2+ Th(SO4)3=
1  .0         .0        .0      .0       AmCl2+ Th(OH)3(CO3)-
1  .0         .0        .0      .0       AmCl2+ Th(CO3)5===
1  .0         .0        .0      .0       AmCl2+ HOx-
1  .0         .0        .0      .0       AmCl2+ Ox=
1  .0         .0        .0      .0       AmCl2+ Ac-
1  .0         .0        .0      .0       AmCl2+ Lac-
1  .0         .0        .0      .0       AmCl2+ H2Cit-
1  .0         .0        .0      .0       AmCl2+ HCit=
1  .0         .0        .0      .0       AmCl2+ Cit=-
1  .0         .0        .0      .0       AmCl2+ H3EDTA-
1  .0         .0        .0      .0       AmCl2+ H2EDTA=
1  .0         .0        .0      .0       AmCl2+ HEDTA=-
1  .0         .0        .0      .0       AmCl2+ EDTA==
1  .0         .0        .0      .0       AmCl2+ AmEDTA-
1  .0         .0        .0      .0       AmCl2+ NpO2Cit=
1  .0         .0        .0      .0       AmCl2+ NpO2EDTA==-
1  .0         .0        .0      .0       AmCl2+ NpO2Ox-
1  .0         .0        .0      .0       AmCl2+ U(OH)4(CO3)2==
1  .0         .0        .0      .0       AmCl2+ U(CO3)5===
1  .0         .0        .0      .0       AmCl2+ U(SO4)3=
1  .0         .0        .0      .0       AmCl2+ Am(CO3)4==-
1  .0         .0        .0      .0       AmCl2+ Am(SO4)2-
1  .0         .0        .0      .0       AmCl2+ NpO2H2EDTA-
1  .0         .0        .0      .0       AmCl2+ CaCit-
1  .0         .0        .0      .0       AmCl2+ CaEDTA=
1  .0         .0        .0      .0       AmCl2+ UnuAn#2-
1  .0         .0        .0      .0       AmCl2+ UnuAn#3-
1  .0         .0        .0      .0       AmCl2+ UnuAn#4-
1  .0         .0        .0      .0       AmCl2+ U(OH)2(CO3)2=
1  .0         .0        .0      .0       AmCl2+ MgCit-
1  .0         .0        .0      .0       AmCl2+ MgEDTA=
1  .0         .0        .0      .0       AmCl2+ NpO2HEDTA=

1 -0.091     -.39       .0      0.048    AmSO4+ Cl-   FK98
1  .0         .0        .0      .0       AmSO4+ SO4=
```

```
1  .0         .0       .0      .0       AmSO4+ HSO4-
1  .0         .0       .0      .0       AmSO4+ OH-
1  .0         .0       .0      .0       AmSO4+ HCO3-
1  .0         .0       .0      .0       AmSO4+ CO3=
1  .0         .0       .0      .0       AmSO4+ B(OH)4-
1  .0         .0       .0      .0       AmSO4+ B3O3(OH)4-
1  .0         .0       .0      .0       AmSO4+ B4O5(OH)4=
1  .0         .0       .0      .0       AmSO4+ Br-
1  .0         .0       .0      .0       AmSO4+ Am(CO3)2-
1  .0         .0       .0      .0       AmSO4+ Am(CO3)3=-
1  .0         .0       .0      .0       AmSO4+ ClO4-
1  .0         .0       .0      .0       AmSO4+ NpO2(OH)2-
1  .0         .0       .0      .0       AmSO4+ NpO2CO3-
1  .0         .0       .0      .0       AmSO4+ NpO2(CO3)2=-
1  .0         .0       .0      .0       AmSO4+ NpO2(CO3)3==-
1  .0         .0       .0      .0       AmSO4+ H2PO4-
1  .0         .0       .0      .0       AmSO4+ HPO4=
1  .0         .0       .0      .0       AmSO4+ PO4=-
1  .0         .0       .0      .0       AmSO4+ Th(SO4)3=
1  .0         .0       .0      .0       AmSO4+ Th(OH)3(CO3)-
1  .0         .0       .0      .0       AmSO4+ Th(CO3)5===
1  .0         .0       .0      .0       AmSO4+ HOx-
1  .0         .0       .0      .0       AmSO4+ Ox=
1  .0         .0       .0      .0       AmSO4+ Ac-
1  .0         .0       .0      .0       AmSO4+ Lac-
1  .0         .0       .0      .0       AmSO4+ H2Cit-
1  .0         .0       .0      .0       AmSO4+ HCit=
1  .0         .0       .0      .0       AmSO4+ Cit=-
1  .0         .0       .0      .0       AmSO4+ H3EDTA-
1  .0         .0       .0      .0       AmSO4+ H2EDTA=
1  .0         .0       .0      .0       AmSO4+ HEDTA=-
1  .0         .0       .0      .0       AmSO4+ EDTA==
1  .0         .0       .0      .0       AmSO4+ AmEDTA-
1  .0         .0       .0      .0       AmSO4+ NpO2Cit=
1  .0         .0       .0      .0       AmSO4+ NpO2EDTA==-
1  .0         .0       .0      .0       AmSO4+ NpO2Ox-
1  .0         .0       .0      .0       AmSO4+ U(OH)4(CO3)2==
1  .0         .0       .0      .0       AmSO4+ U(CO3)5===
1  .0         .0       .0      .0       AmSO4+ U(SO4)3=
1  .0         .0       .0      .0       AmSO4+ Am(CO3)4==-
1  .0         .0       .0      .0       AmSO4+ Am(SO4)2-
1  .0         .0       .0      .0       AmSO4+ NpO2H2EDTA-
1  .0         .0       .0      .0       AmSO4+ CaCit-
1  .0         .0       .0      .0       AmSO4+ CaEDTA=
1  .0         .0       .0      .0       AmSO4+ UnuAn#2-
1  .0         .0       .0      .0       AmSO4+ UnuAn#3-
1  .0         .0       .0      .0       AmSO4+ UnuAn#4-
1  .0         .0       .0      .0       AmSO4+ U(OH)2(CO3)2=
1  .0         .0       .0      .0       AmSO4+ MgCit-
1  .0         .0       .0      .0       AmSO4+ MgEDTA=
1  .0         .0       .0      .0       AmSO4+ NpO2HEDTA=

1 -0.616     -0.45     .0     .050      Pu(OH)2+ Cl-   analogy w/ Am (FK98)
1  .0         .0       .0      .0       Pu(OH)2+ SO4=
1  .0         .0       .0      .0       Pu(OH)2+ HSO4-
1  .0         .0       .0      .0       Pu(OH)2+ OH-
1  .0         .0       .0      .0       Pu(OH)2+ HCO3-
1  .0         .0       .0      .0       Pu(OH)2+ CO3=
1  .0         .0       .0      .0       Pu(OH)2+ B(OH)4-
1  .0         .0       .0      .0       Pu(OH)2+ B3O3(OH)4-
1  .0         .0       .0      .0       Pu(OH)2+ B4O5(OH)4=
1  .0         .0       .0      .0       Pu(OH)2+ Br-
1  .0         .0       .0      .0       Pu(OH)2+ Am(CO3)2-
```

1	.0	.0	.0	.0	Pu(OH)2+ Am(CO3)3=-
1	.0	.0	.0	.0	Pu(OH)2+ ClO4-
1	.0	.0	.0	.0	Pu(OH)2+ NpO2(OH)2-
1	.0	.0	.0	.0	Pu(OH)2+ NpO2CO3-
1	.0	.0	.0	.0	Pu(OH)2+ NpO2(CO3)2=-
1	.0	.0	.0	.0	Pu(OH)2+ NpO2(CO3)3==-
1	.0	.0	.0	.0	Pu(OH)2+ H2PO4-
1	.0	.0	.0	.0	Pu(OH)2+ HPO4=
1	.0	.0	.0	.0	Pu(OH)2+ PO4=-
1	.0	.0	.0	.0	Pu(OH)2+ Th(SO4)3=
1	.0	.0	.0	.0	Pu(OH)2+ Th(OH)3(CO3)-
1	.0	.0	.0	.0	Pu(OH)2+ Th(CO3)5===
1	.0	.0	.0	.0	Pu(OH)2+ HOx-
1	.0	.0	.0	.0	Pu(OH)2+ Ox=
1	.0	.0	.0	.0	Pu(OH)2+ Ac-
1	.0	.0	.0	.0	Pu(OH)2+ Lac-
1	.0	.0	.0	.0	Pu(OH)2+ H2Cit-
1	.0	.0	.0	.0	Pu(OH)2+ HCit=
1	.0	.0	.0	.0	Pu(OH)2+ Cit=-
1	.0	.0	.0	.0	Pu(OH)2+ H3EDTA-
1	.0	.0	.0	.0	Pu(OH)2+ H2EDTA=
1	.0	.0	.0	.0	Pu(OH)2+ HEDTA=-
1	.0	.0	.0	.0	Pu(OH)2+ EDTA==
1	.0	.0	.0	.0	Pu(OH)2+ AmEDTA-
1	.0	.0	.0	.0	Pu(OH)2+ NpO2Cit=
1	.0	.0	.0	.0	Pu(OH)2+ NpO2EDTA==-
1	.0	.0	.0	.0	Pu(OH)2+ NpO2Ox-
1	.0	.0	.0	.0	Pu(OH)2+ U(OH)4(CO3)2==
1	.0	.0	.0	.0	Pu(OH)2+ U(CO3)5===
1	.0	.0	.0	.0	Pu(OH)2+ U(SO4)3=
1	.0	.0	.0	.0	Pu(OH)2+ Am(CO3)4==-
1	.0	.0	.0	.0	Pu(OH)2+ Am(SO4)2-
1	.0	.0	.0	.0	Pu(OH)2+ NpO2H2EDTA-
1	.0	.0	.0	.0	Pu(OH)2+ CaCit-
1	.0	.0	.0	.0	Pu(OH)2+ CaEDTA=
1	.0	.0	.0	.0	Pu(OH)2+ UnuAn#2-
1	.0	.0	.0	.0	Pu(OH)2+ UnuAn#3-
1	.0	.0	.0	.0	Pu(OH)2+ UnuAn#4-
1	.0	.0	.0	.0	Pu(OH)2+ U(OH)2(CO3)2=
1	.0	.0	.0	.0	Pu(OH)2+ MgCit-
1	.0	.0	.0	.0	Pu(OH)2+ MgEDTA=
1	.0	.0	.0	.0	Pu(OH)2+ NpO2HEDTA=

1	.4671	1.74	.0	.143	ThAc2++ Cl- Moore et al 1999
2	.0	.0	.0	.0	ThAc2++ SO4=
1	.0	.0	.0	.0	ThAc2++ HSO4-
1	.0	.0	.0	.0	ThAc2++ OH-
1	.0	.0	.0	.0	ThAc2++ HCO3-
2	.0	.0	.0	.0	ThAc2++ CO3=
1	.0	.0	.0	.0	ThAc2++ B(OH)4-
1	.0	.0	.0	.0	ThAc2++ B3O3(OH)4-
2	.0	.0	.0	.0	ThAc2++ B4O5(OH)4=
1	.0	.0	.0	.0	ThAc2++ Br-
1	.0	.0	.0	.0	ThAc2++ Am(CO3)2-
3	.0	.0	.0	.0	ThAc2++ Am(CO3)3=-
1	.0	.0	.0	.0	ThAc2++ ClO4-
1	.0	.0	.0	.0	ThAc2++ NpO2(OH)2-
1	.0	.0	.0	.0	ThAc2++ NpO2CO3-
3	.0	.0	.0	.0	ThAc2++ NpO2(CO3)2=-
3	.0	.0	.0	.0	ThAc2++ NpO2(CO3)3==-
1	.0	.0	.0	.0	ThAc2++ H2PO4-
2	.0	.0	.0	.0	ThAc2++ HPO4=
3	.0	.0	.0	.0	ThAc2++ PO4=-

```
 2  .0         .0        .0      .0        ThAc2++ Th(SO4)3=
 1  .0         .0        .0      .0        ThAc2++ Th(OH)3(CO3)-
 3  .0         .0        .0      .0        ThAc2++ Th(CO3)5===
 1  .0         .0        .0      .0        ThAc2++ HOx-
 2  .0         .0        .0      .0        ThAc2++ Ox=
 1  .0         .0        .0      .0        ThAc2++ Ac-
 1  .0         .0        .0      .0        ThAc2++ Lac-
 1  .0         .0        .0      .0        ThAc2++ H2Cit-
 2  .0         .0        .0      .0        ThAc2++ HCit=
 3  .0         .0        .0      .0        ThAc2++ Cit=-
 3  .0         .0        .0      .0        ThAc2++ H3EDTA-
 3  .0         .0        .0      .0        ThAc2++ H2EDTA=
 3  .0         .0        .0      .0        ThAc2++ HEDTA=-
 3  .0         .0        .0      .0        ThAc2++ EDTA==
 3  .0         .0        .0      .0        ThAc2++ AmEDTA-
 3  .0         .0        .0      .0        ThAc2++ NpO2Cit=
 3  .0         .0        .0      .0        ThAc2++ NpO2EDTA==-
 1  .0         .0        .0      .0        ThAc2++ NpO2Ox-
 3  .0         .0        .0      .0        ThAc2++ U(OH)4(CO3)2==
 3  .0         .0        .0      .0        ThAc2++ U(CO3)5===
 2  .0         .0        .0      .0        ThAc2++ U(SO4)3=
 3  .0         .0        .0      .0        ThAc2++ Am(CO3)4==-
 1  .0         .0        .0      .0        ThAc2++ Am(SO4)2-
 1  .0         .0        .0      .0        ThAc2++ NpO2H2EDTA-
 1  .0         .0        .0      .0        ThAc2++ CaCit-
 3  .0         .0        .0      .0        ThAc2++ CaEDTA=
 1  .0         .0        .0      .0        ThAc2++ UnuAn#2-
 1  .0         .0        .0      .0        ThAc2++ UnuAn#3-
 1  .0         .0        .0      .0        ThAc2++ UnuAn#4-
 2  .0         .0        .0      .0        ThAc2++ U(OH)2(CO3)2=
 1  .0         .0        .0      .0        ThAc2++ MgCit-
 2  .0         .0        .0      .0        ThAc2++ MgEDTA=
 2  .0         .0        .0      .0        ThAc2++ NpO2HEDTA=

 1 -.9374     .29       .0      .248      PuOx+ Cl-        analogy w/ Am
(SAND99/Borkowski et al 01)
 1  .0         .0        .0      .0        PuOx+ SO4=
 1  .0         .0        .0      .0        PuOx+ HSO4-
 1  .0         .0        .0      .0        PuOx+ OH-
 1  .0         .0        .0      .0        PuOx+ HCO3-
 1  .0         .0        .0      .0        PuOx+ CO3=
 1  .0         .0        .0      .0        PuOx+ B(OH)4-
 1  .0         .0        .0      .0        PuOx+ B3O3(OH)4-
 1  .0         .0        .0      .0        PuOx+ B4O5(OH)4=
 1  .0         .0        .0      .0        PuOx+ Br-
 1  .0         .0        .0      .0        PuOx+ Am(CO3)2-
 1  .0         .0        .0      .0        PuOx+ Am(CO3)3=-
 1  .0         .0        .0      .0        PuOx+ ClO4-
 1  .0         .0        .0      .0        PuOx+ NpO2(OH)2-
 1  .0         .0        .0      .0        PuOx+ NpO2CO3-
 1  .0         .0        .0      .0        PuOx+ NpO2(CO3)2=-
 1  .0         .0        .0      .0        PuOx+ NpO2(CO3)3==-
 1  .0         .0        .0      .0        PuOx+ H2PO4-
 1  .0         .0        .0      .0        PuOx+ HPO4=
 1  .0         .0        .0      .0        PuOx+ PO4=-
 1  .0         .0        .0      .0        PuOx+ Th(SO4)3=
 1  .0         .0        .0      .0        PuOx+ Th(OH)3(CO3)-
 1  .0         .0        .0      .0        PuOx+ Th(CO3)5===
 1  .0         .0        .0      .0        PuOx+ HOx-
 1  .0         .0        .0      .0        PuOx+ Ox=
 1  .0         .0        .0      .0        PuOx+ Ac-
 1  .0         .0        .0      .0        PuOx+ Lac-
 1  .0         .0        .0      .0        PuOx+ H2Cit-
```

1	.0	.0	.0	.0	PuOx+ HCit=	
1	.0	.0	.0	.0	PuOx+ Cit=-	
1	.0	.0	.0	.0	PuOx+ H3EDTA-	
1	.0	.0	.0	.0	PuOx+ H2EDTA=	
1	.0	.0	.0	.0	PuOx+ HEDTA=-	
1	.0	.0	.0	.0	PuOx+ EDTA==	
1	.0	.0	.0	.0	PuOx+ AmEDTA-	
1	.0	.0	.0	.0	PuOx+ NpO2Cit=	
1	.0	.0	.0	.0	PuOx+ NpO2EDTA==-	
1	.0	.0	.0	.0	PuOx+ NpO2Ox-	
1	.0	.0	.0	.0	PuOx+ U(OH)4(CO3)2==	
1	.0	.0	.0	.0	PuOx+ U(CO3)5===	
1	.0	.0	.0	.0	PuOx+ U(SO4)3=	
1	.0	.0	.0	.0	PuOx+ Am(CO3)4==-	
1	.0	.0	.0	.0	PuOx+ Am(SO4)2-	
1	.0	.0	.0	.0	PuOx+ NpO2H2EDTA-	
1	.0	.0	.0	.0	PuOx+ CaCit-	
1	.0	.0	.0	.0	PuOx+ CaEDTA=	
1	.0	.0	.0	.0	PuOx+ UnuAn#2-	
1	.0	.0	.0	.0	PuOx+ UnuAn#3-	
1	.0	.0	.0	.0	PuOx+ UnuAn#4-	
1	.0	.0	.0	.0	PuOx+ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	PuOx+ MgCit-	
1	.0	.0	.0	.0	PuOx+ MgEDTA=	
1	.0	.0	.0	.0	PuOx+ NpO2HEDTA=	

1	.5058	1.74	.0	0.225	ThLac2++ Cl-	Moore et al 1999
2	.0	.0	.0	.0	ThLac2++ SO4=	
1	.0	.0	.0	.0	ThLac2++ HSO4-	
1	.0	.0	.0	.0	ThLac2++ OH-	
1	.0	.0	.0	.0	ThLac2++ HCO3-	
2	.0	.0	.0	.0	ThLac2++ CO3=	
1	.0	.0	.0	.0	ThLac2++ B(OH)4-	
1	.0	.0	.0	.0	ThLac2++ B3O3(OH)4-	
2	.0	.0	.0	.0	ThLac2++ B4O5(OH)4=	
1	.0	.0	.0	.0	ThLac2++ Br-	
1	.0	.0	.0	.0	ThLac2++ Am(CO3)2-	
3	.0	.0	.0	.0	ThLac2++ Am(CO3)3=-	
1	.0	.0	.0	.0	ThLac2++ ClO4-	
1	.0	.0	.0	.0	ThLac2++ NpO2(OH)2-	
1	.0	.0	.0	.0	ThLac2++ NpO2CO3-	
3	.0	.0	.0	.0	ThLac2++ NpO2(CO3)2=-	
3	.0	.0	.0	.0	ThLac2++ NpO2(CO3)3==-	
1	.0	.0	.0	.0	ThLac2++ H2PO4-	
2	.0	.0	.0	.0	ThLac2++ HPO4=	
3	.0	.0	.0	.0	ThLac2++ PO4=-	
2	.0	.0	.0	.0	ThLac2++ Th(SO4)3=	
1	.0	.0	.0	.0	ThLac2++ Th(OH)3(CO3)-	
3	.0	.0	.0	.0	ThLac2++ Th(CO3)5===	
1	.0	.0	.0	.0	ThLac2++ HOx-	
2	.0	.0	.0	.0	ThLac2++ Ox=	
1	.0	.0	.0	.0	ThLac2++ Ac-	
1	.0	.0	.0	.0	ThLac2++ Lac-	
1	.0	.0	.0	.0	ThLac2++ H2Cit-	
2	.0	.0	.0	.0	ThLac2++ HCit=	
3	.0	.0	.0	.0	ThLac2++ Cit=-	
1	.0	.0	.0	.0	ThLac2++ H3EDTA-	
2	.0	.0	.0	.0	ThLac2++ H2EDTA=	
3	.0	.0	.0	.0	ThLac2++ HEDTA=-	
3	.0	.0	.0	.0	ThLac2++ EDTA==	
1	.0	.0	.0	.0	ThLac2++ AmEDTA-	
2	.0	.0	.0	.0	ThLac2++ NpO2Cit=	
3	.0	.0	.0	.0	ThLac2++ NpO2EDTA==-	

1	.0	.0	.0	.0	ThLac2++ NpO2Ox-	
3	.0	.0	.0	.0	ThLac2++ U(OH)4(CO3)2==	
3	.0	.0	.0	.0	ThLac2++ U(CO3)5===	
2	.0	.0	.0	.0	ThLac2++ U(SO4)3=	
3	.0	.0	.0	.0	ThLac2++ Am(CO3)4==-	
1	.0	.0	.0	.0	ThLac2++ Am(SO4)2-	
1	.0	.0	.0	.0	ThLac2++ NpO2H2EDTA-	
1	.0	.0	.0	.0	ThLac2++ CaCit-	
2	.0	.0	.0	.0	ThLac2++ CaEDTA=	
1	.0	.0	.0	.0	ThLac2++ UnuAn#2-	
1	.0	.0	.0	.0	ThLac2++ UnuAn#3-	
1	.0	.0	.0	.0	ThLac2++ UnuAn#4-	
2	.0	.0	.0	.0	ThLac2++ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	ThLac2++ MgCit-	
2	.0	.0	.0	.0	ThLac2++ MgEDTA=	
2	.0	.0	.0	.0	ThLac2++ NpO2HEDTA=	

1	-.0833	.29	.0	.0987	CaAc+ Cl-	analogy w/Mg (ERG_org_memo)
1	.0	.0	.0	.0	CaAc+ SO4=	
1	.0	.0	.0	.0	CaAc+ HSO4-	
1	.0	.0	.0	.0	CaAc+ OH-	
1	.0	.0	.0	.0	CaAc+ HCO3-	
1	.0	.0	.0	.0	CaAc+ CO3=	
1	.0	.0	.0	.0	CaAc+ B(OH)4-	
1	.0	.0	.0	.0	CaAc+ B3O3(OH)4-	
1	.0	.0	.0	.0	CaAc+ B4O5(OH)4=	
1	.0	.0	.0	.0	CaAc+ Br-	
1	.0	.0	.0	.0	CaAc+ Am(CO3)2-	
1	.0	.0	.0	.0	CaAc+ Am(CO3)3=-	
1	.0	.0	.0	.0	CaAc+ ClO4-	
1	.0	.0	.0	.0	CaAc+ NpO2(OH)2-	
1	.0	.0	.0	.0	CaAc+ NpO2CO3-	
1	.0	.0	.0	.0	CaAc+ NpO2(CO3)2=-	
1	.0	.0	.0	.0	CaAc+ NpO2(CO3)3==-	
1	.0	.0	.0	.0	CaAc+ H2PO4-	
1	.0	.0	.0	.0	CaAc+ HPO4=	
1	.0	.0	.0	.0	CaAc+ PO4=-	
1	.0	.0	.0	.0	CaAc+ Th(SO4)3=	
1	.0	.0	.0	.0	CaAc+ Th(OH)3(CO3)-	
1	.0	.0	.0	.0	CaAc+ Th(CO3)5===	
1	.0	.0	.0	.0	CaAc+ HOx-	
1	.0	.0	.0	.0	CaAc+ Ox=	
1	.0	.0	.0	.0	CaAc+ Ac-	
1	.0	.0	.0	.0	CaAc+ Lac-	
1	.0	.0	.0	.0	CaAc+ H2Cit-	
1	.0	.0	.0	.0	CaAc+ HCit=	
1	.0	.0	.0	.0	CaAc+ Cit=-	
1	.0	.0	.0	.0	CaAc+ H3EDTA-	
1	.0	.0	.0	.0	CaAc+ H2EDTA=	
1	.0	.0	.0	.0	CaAc+ HEDTA=-	
1	.0	.0	.0	.0	CaAc+ EDTA==	
1	.0	.0	.0	.0	CaAc+ AmEDTA-	
1	.0	.0	.0	.0	CaAc+ NpO2Cit=	
1	.0	.0	.0	.0	CaAc+ NpO2EDTA==-	
1	.0	.0	.0	.0	CaAc+ NpO2Ox-	
1	.0	.0	.0	.0	CaAc+ U(OH)4(CO3)2==	
1	.0	.0	.0	.0	CaAc+ U(CO3)5===	
1	.0	.0	.0	.0	CaAc+ U(SO4)3=	
1	.0	.0	.0	.0	CaAc+ Am(CO3)4==-	
1	.0	.0	.0	.0	CaAc+ Am(SO4)2-	
1	.0	.0	.0	.0	CaAc+ NpO2H2EDTA-	
1	.0	.0	.0	.0	CaAc+ CaCit-	
1	.0	.0	.0	.0	CaAc+ CaEDTA=	

1	.0	.0	.0	.0	CaAc+ UnuAn#2-	
1	.0	.0	.0	.0	CaAc+ UnuAn#3-	
1	.0	.0	.0	.0	CaAc+ UnuAn#4-	
1	.0	.0	.0	.0	CaAc+ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	CaAc+ MgCit-	
1	.0	.0	.0	.0	CaAc+ MgEDTA=	
1	.0	.0	.0	.0	CaAc+ NpO2HEDTA=	

1	.0	.0	.0	.0	CaLac+ Cl-	
1	.0	.0	.0	.0	CaLac+ SO4=	
1	.0	.0	.0	.0	CaLac+ HSO4-	
1	.0	.0	.0	.0	CaLac+ OH-	
1	.0	.0	.0	.0	CaLac+ HCO3-	
1	.0	.0	.0	.0	CaLac+ CO3=	
1	.0	.0	.0	.0	CaLac+ B(OH)4-	
1	.0	.0	.0	.0	CaLac+ B3O3(OH)4-	
1	.0	.0	.0	.0	CaLac+ B4O5(OH)4=	
1	.0	.0	.0	.0	CaLac+ Br-	
1	.0	.0	.0	.0	CaLac+ Am(CO3)2-	
1	.0	.0	.0	.0	CaLac+ Am(CO3)3=-	
1	.0	.0	.0	.0	CaLac+ ClO4-	
1	.0	.0	.0	.0	CaLac+ NpO2(OH)2-	
1	.0	.0	.0	.0	CaLac+ NpO2CO3-	
1	.0	.0	.0	.0	CaLac+ NpO2(CO3)2=-	
1	.0	.0	.0	.0	CaLac+ NpO2(CO3)3==-	
1	.0	.0	.0	.0	CaLac+ H2PO4-	
1	.0	.0	.0	.0	CaLac+ HPO4=	
1	.0	.0	.0	.0	CaLac+ PO4=-	
1	.0	.0	.0	.0	CaLac+ Th(SO4)3=	
1	.0	.0	.0	.0	CaLac+ Th(OH)3(CO3)-	
1	.0	.0	.0	.0	CaLac+ Th(CO3)5===	
1	.0	.0	.0	.0	CaLac+ HOx-	
1	.0	.0	.0	.0	CaLac+ Ox=	
1	.0	.0	.0	.0	CaLac+ Ac-	
1	.0	.0	.0	.0	CaLac+ Lac-	
1	.0	.0	.0	.0	CaLac+ H2Cit-	
1	.0	.0	.0	.0	CaLac+ HCit=	
1	.0	.0	.0	.0	CaLac+ Cit=-	
1	.0	.0	.0	.0	CaLac+ H3EDTA-	
1	.0	.0	.0	.0	CaLac+ H2EDTA=	
1	.0	.0	.0	.0	CaLac+ HEDTA=-	
1	.0	.0	.0	.0	CaLac+ EDTA==	
1	.0	.0	.0	.0	CaLac+ AmEDTA-	
1	.0	.0	.0	.0	CaLac+ NpO2Cit=	
1	.0	.0	.0	.0	CaLac+ NpO2EDTA==-	
1	.0	.0	.0	.0	CaLac+ NpO2Ox-	
1	.0	.0	.0	.0	CaLac+ U(OH)4(CO3)2==	
1	.0	.0	.0	.0	CaLac+ U(CO3)5===	
1	.0	.0	.0	.0	CaLac+ U(SO4)3=	
1	.0	.0	.0	.0	CaLac+ Am(CO3)4==-	
1	.0	.0	.0	.0	CaLac+ Am(SO4)2-	
1	.0	.0	.0	.0	CaLac+ NpO2H2EDTA-	
1	.0	.0	.0	.0	CaLac+ CaCit-	
1	.0	.0	.0	.0	CaLac+ CaEDTA=	
1	.0	.0	.0	.0	CaLac+ UnuAn#2-	
1	.0	.0	.0	.0	CaLac+ UnuAn#3-	
1	.0	.0	.0	.0	CaLac+ UnuAn#4-	
1	.0	.0	.0	.0	CaLac+ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	CaLac+ MgCit-	
1	.0	.0	.0	.0	CaLac+ MgEDTA=	
1	.0	.0	.0	.0	CaLac+ NpO2HEDTA=	

1	-.0833	.29	.0	.0987	MgAc+ Cl-	ERG_org_memo

1	.0	.0	.0	.0	MgAc+ SO4=
1	.0	.0	.0	.0	MgAc+ HSO4-
1	.0	.0	.0	.0	MgAc+ OH-
1	.0	.0	.0	.0	MgAc+ HCO3-
1	.0	.0	.0	.0	MgAc+ CO3=
1	.0	.0	.0	.0	MgAc+ B(OH)4-
1	.0	.0	.0	.0	MgAc+ B3O3(OH)4-
1	.0	.0	.0	.0	MgAc+ B4O5(OH)4=
1	.0	.0	.0	.0	MgAc+ Br-
1	.0	.0	.0	.0	MgAc+ Am(CO3)2-
1	.0	.0	.0	.0	MgAc+ Am(CO3)3=-
1	.0	.0	.0	.0	MgAc+ ClO4-
1	.0	.0	.0	.0	MgAc+ NpO2(OH)2-
1	.0	.0	.0	.0	MgAc+ NpO2CO3-
1	.0	.0	.0	.0	MgAc+ NpO2(CO3)2=-
1	.0	.0	.0	.0	MgAc+ NpO2(CO3)3==-
1	.0	.0	.0	.0	MgAc+ H2PO4-
1	.0	.0	.0	.0	MgAc+ HPO4=
1	.0	.0	.0	.0	MgAc+ PO4=-
1	.0	.0	.0	.0	MgAc+ Th(SO4)3=
1	.0	.0	.0	.0	MgAc+ Th(OH)3(CO3)-
1	.0	.0	.0	.0	MgAc+ Th(CO3)5===
1	.0	.0	.0	.0	MgAc+ HOx-
1	.0	.0	.0	.0	MgAc+ Ox=
1	.0	.0	.0	.0	MgAc+ Ac-
1	.0	.0	.0	.0	MgAc+ Lac-
1	.0	.0	.0	.0	MgAc+ H2Cit-
1	.0	.0	.0	.0	MgAc+ HCit=
1	.0	.0	.0	.0	MgAc+ Cit=-
1	.0	.0	.0	.0	MgAc+ H3EDTA-
1	.0	.0	.0	.0	MgAc+ H2EDTA=
1	.0	.0	.0	.0	MgAc+ HEDTA=-
1	.0	.0	.0	.0	MgAc+ EDTA==
1	.0	.0	.0	.0	MgAc+ AmEDTA-
1	.0	.0	.0	.0	MgAc+ NpO2Cit=
1	.0	.0	.0	.0	MgAc+ NpO2EDTA==-
1	.0	.0	.0	.0	MgAc+ NpO2Ox-
1	.0	.0	.0	.0	MgAc+ U(OH)4(CO3)2==
1	.0	.0	.0	.0	MgAc+ U(CO3)5===
1	.0	.0	.0	.0	MgAc+ U(SO4)3=
1	.0	.0	.0	.0	MgAc+ Am(CO3)4==-
1	.0	.0	.0	.0	MgAc+ Am(SO4)2-
1	.0	.0	.0	.0	MgAc+ NpO2H2EDTA-
1	.0	.0	.0	.0	MgAc+ CaCit-
1	.0	.0	.0	.0	MgAc+ CaEDTA=
1	.0	.0	.0	.0	MgAc+ UnuAn#2-
1	.0	.0	.0	.0	MgAc+ UnuAn#3-
1	.0	.0	.0	.0	MgAc+ UnuAn#4-
1	.0	.0	.0	.0	MgAc+ U(OH)2(CO3)2=
1	.0	.0	.0	.0	MgAc+ MgCit-
1	.0	.0	.0	.0	MgAc+ MgEDTA=
1	.0	.0	.0	.0	MgAc+ NpO2HEDTA=

1	.0	.0	.0	.0	MgLac+ Cl-
1	.0	.0	.0	.0	MgLac+ SO4=
1	.0	.0	.0	.0	MgLac+ HSO4-
1	.0	.0	.0	.0	MgLac+ OH-
1	.0	.0	.0	.0	MgLac+ HCO3-
1	.0	.0	.0	.0	MgLac+ CO3=
1	.0	.0	.0	.0	MgLac+ B(OH)4-
1	.0	.0	.0	.0	MgLac+ B3O3(OH)4-
1	.0	.0	.0	.0	MgLac+ B4O5(OH)4=
1	.0	.0	.0	.0	MgLac+ Br-

1	.0	.0	.0	.0	MgLac+ Am(CO3)2-
1	.0	.0	.0	.0	MgLac+ Am(CO3)3=-
1	.0	.0	.0	.0	MgLac+ ClO4-
1	.0	.0	.0	.0	MgLac+ NpO2(OH)2-
1	.0	.0	.0	.0	MgLac+ NpO2CO3-
1	.0	.0	.0	.0	MgLac+ NpO2(CO3)2=-
1	.0	.0	.0	.0	MgLac+ NpO2(CO3)3==-
1	.0	.0	.0	.0	MgLac+ H2PO4-
1	.0	.0	.0	.0	MgLac+ HPO4=
1	.0	.0	.0	.0	MgLac+ PO4=-
1	.0	.0	.0	.0	MgLac+ Th(SO4)3=
1	.0	.0	.0	.0	MgLac+ Th(OH)3(CO3)-
1	.0	.0	.0	.0	MgLac+ Th(CO3)5===
1	.0	.0	.0	.0	MgLac+ HOx-
1	.0	.0	.0	.0	MgLac+ Ox=
1	.0	.0	.0	.0	MgLac+ Ac-
1	.0	.0	.0	.0	MgLac+ Lac-
1	.0	.0	.0	.0	MgLac+ H2Cit-
1	.0	.0	.0	.0	MgLac+ HCit=
1	.0	.0	.0	.0	MgLac+ Cit=-
1	.0	.0	.0	.0	MgLac+ H3EDTA-
1	.0	.0	.0	.0	MgLac+ H2EDTA=
1	.0	.0	.0	.0	MgLac+ HEDTA=-
1	.0	.0	.0	.0	MgLac+ EDTA==
1	.0	.0	.0	.0	MgLac+ AmEDTA-
1	.0	.0	.0	.0	MgLac+ NpO2Cit=
1	.0	.0	.0	.0	MgLac+ NpO2EDTA==-
1	.0	.0	.0	.0	MgLac+ NpO2Ox-
1	.0	.0	.0	.0	MgLac+ U(OH)4(CO3)2==
1	.0	.0	.0	.0	MgLac+ U(CO3)5===
1	.0	.0	.0	.0	MgLac+ U(SO4)3=
1	.0	.0	.0	.0	MgLac+ Am(CO3)4==-
1	.0	.0	.0	.0	MgLac+ Am(SO4)2-
1	.0	.0	.0	.0	MgLac+ NpO2H2EDTA-
1	.0	.0	.0	.0	MgLac+ CaCit-
1	.0	.0	.0	.0	MgLac+ CaEDTA=
1	.0	.0	.0	.0	MgLac+ UnuAn#2-
1	.0	.0	.0	.0	MgLac+ UnuAn#3-
1	.0	.0	.0	.0	MgLac+ UnuAn#4-
1	.0	.0	.0	.0	MgLac+ U(OH)2(CO3)2=
1	.0	.0	.0	.0	MgLac+ MgCit-
1	.0	.0	.0	.0	MgLac+ MgEDTA=
1	.0	.0	.0	.0	MgLac+ NpO2HEDTA=

1	.0	.0	.0	.0	UnuCat#1+ Cl-
1	.0	.0	.0	.0	UnuCat#1+ SO4=
1	.0	.0	.0	.0	UnuCat#1+ HSO4-
1	.0	.0	.0	.0	UnuCat#1+ OH-
1	.0	.0	.0	.0	UnuCat#1+ HCO3-
1	.0	.0	.0	.0	UnuCat#1+ CO3=
1	.0	.0	.0	.0	UnuCat#1+ B(OH)4-
1	.0	.0	.0	.0	UnuCat#1+ B3O3(OH)4-
1	.0	.0	.0	.0	UnuCat#1+ B4O5(OH)4=
1	.0	.0	.0	.0	UnuCat#1+ Br-
1	.0	.0	.0	.0	UnuCat#1+ Am(CO3)2-
1	.0	.0	.0	.0	UnuCat#1+ Am(CO3)3=-
1	.0	.0	.0	.0	UnuCat#1+ ClO4-
1	.0	.0	.0	.0	UnuCat#1+ NpO2(OH)2-
1	.0	.0	.0	.0	UnuCat#1+ NpO2CO3-
1	.0	.0	.0	.0	UnuCat#1+ NpO2(CO3)2=-
1	.0	.0	.0	.0	UnuCat#1+ NpO2(CO3)3==-
1	.0	.0	.0	.0	UnuCat#1+ H2PO4-
1	.0	.0	.0	.0	UnuCat#1+ HPO4=

```
 1  .0         .0        .0      .0       UnuCat#1+ PO4=-
 1  .0         .0        .0      .0       UnuCat#1+ Th(SO4)3=
 1  .0         .0        .0      .0       UnuCat#1+ Th(OH)3(CO3)-
 1  .0         .0        .0      .0       UnuCat#1+ Th(CO3)5===
 1  .0         .0        .0      .0       UnuCat#1+ HOx-
 1  .0         .0        .0      .0       UnuCat#1+ Ox=
 1  .0         .0        .0      .0       UnuCat#1+ Ac-
 1  .0         .0        .0      .0       UnuCat#1+ Lac-
 1  .0         .0        .0      .0       UnuCat#1+ H2Cit-
 1  .0         .0        .0      .0       UnuCat#1+ HCit=
 1  .0         .0        .0      .0       UnuCat#1+ Cit=-
 1  .0         .0        .0      .0       UnuCat#1+ H3EDTA-
 1  .0         .0        .0      .0       UnuCat#1+ H2EDTA=
 1  .0         .0        .0      .0       UnuCat#1+ HEDTA=-
 1  .0         .0        .0      .0       UnuCat#1+ EDTA==
 1  .0         .0        .0      .0       UnuCat#1+ AmEDTA-
 1  .0         .0        .0      .0       UnuCat#1+ NpO2Cit=
 1  .0         .0        .0      .0       UnuCat#1+ NpO2EDTA==-
 1  .0         .0        .0      .0       UnuCat#1+ NpO2Ox-
 1  .0         .0        .0      .0       UnuCat#1+ U(OH)4(CO3)2==
 1  .0         .0        .0      .0       UnuCat#1+ U(CO3)5===
 1  .0         .0        .0      .0       UnuCat#1+ U(SO4)3=
 1  .0         .0        .0      .0       UnuCat#1+ Am(CO3)4==-
 1  .0         .0        .0      .0       UnuCat#1+ Am(SO4)2-
 1  .0         .0        .0      .0       UnuCat#1+ NpO2H2EDTA-
 1  .0         .0        .0      .0       UnuCat#1+ CaCit-
 1  .0         .0        .0      .0       UnuCat#1+ CaEDTA=
 1  .0         .0        .0      .0       UnuCat#1+ UnuAn#2-
 1  .0         .0        .0      .0       UnuCat#1+ UnuAn#3-
 1  .0         .0        .0      .0       UnuCat#1+ UnuAn#4-
 1  .0         .0        .0      .0       UnuCat#1+ U(OH)2(CO3)2=
 1  .0         .0        .0      .0       UnuCat#1+ MgCit-
 1  .0         .0        .0      .0       UnuCat#1+ MgEDTA=
 1  .0         .0        .0      .0       UnuCat#1+ NpO2HEDTA=

-.012  .07  .07 0 .036 0 0 .1 0 .42 .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0  Na       1 w/2-39) theta  Th++++ RFSMMN, Am+++ FK98
      .032    0 0 .005 0 0 .1 0 .42  0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0  K:       2 w/3-39) theta  Th++++, Am+++ by analogy w/Na+ (RFSMMN, FK98)
           .007 0 .092 0 0 .2 0 .60 -.014  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 -.196 0 0 0
0 0 0 0 0 0 0  Ca:      3 w/4-39) theta  Am+++ FK98, Th++++ by analogy w/Mg++ (RFSMMN)
                0 .10  0 0 .2 0 .60 -.014  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 -.196 0 0 0
0 0 0 0 0 0 0  Mg:      4 w/5-39) theta  Th++++ RFSMMN, Am by analogy w/Ca++ (FK98)
                     0 0 0 0 0   0  0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0  MgOH:    5 w/6-39) theta
                       0 0 0 0 .60 .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0  H :      6 w/7-39) theta  Roy92

     0 0 0   0  0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  MgB(OH)4:
7 w/8-39) theta
       0 0   0  0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  CaB(OH)4:
8 w/9-39) theta
         0   0  0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  Am+++:
9 w/10-39) theta
             0  0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  AmCO3+:
10 w/11-39) theta
                0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  Th++++:
11 w/12-39) theta
                     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  AmCl++:
12 w/13-39) theta
                       0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  NpO2+:
13 w/14-39) theta
                         0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  U++++:
```

```
14 w/15-39) theta
                           0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  UOH+++:
15 w/16-39) theta
                             0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  UAc+++:
16 w/17-39) theta
                               0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  ThOx++
17 w/18-39) theta
                                 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  AmAc++
18 w/19-39) theta
                                   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  AmLac++
19 w/20-39) theta
                                     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  AmOx+
20 w/21-39) theta
                                       0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  UCit+
21 w/22-39) theta
                                         0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  ULac+++
22 w/23-39) theta
                                           0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  UOx++
23 w/24-39) theta
                                             0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  ThAc+++
24 w/25-39) theta
                                               0 0 0 0 0 0 0 0 0 0 0 0 0 0  ThCit+
25 w/26-39) theta
                                                 0 0 0 0 0 0 0 0 0 0 0 0 0  ThLac+++
26 w/27-39) theta
                                                   0 0 0 0 0 0 0 0 0 0 0 0  AmOH++
27 w/28-39) theta
                                                     0 0 0 0 0 0 0 0 0 0 0  Am(OH)2+
28 w/29-39) theta
                                                       0 0 0 0 0 0 0 0 0 0  AmCl2+
29 w/30-39) theta
                                                         0 0 0 0 0 0 0 0 0  AmSO4+
30 w/31-39) theta
                                                           0 0 0 0 0 0 0 0  Pu(OH)2+
31 w/32-39) theta
                                                             0 0 0 0 0 0 0  ThAc2++
32 w/33-39) theta
                                                               0 0 0 0 0 0  PuOx+
33 w/34-39) theta
                                                                 0 0 0 0 0  ThLac2++
34 w/35-39) theta
                                                                   0 0 0 0  CaAc+
35 w/36-39) theta
                                                                     0 0 0  CaLac+
36 w/37-39) theta
                                                                       0 0  MgAc+
37 w/38-39) theta
                                                                         0  MgLac+
38 w/39-39) theta
.02 -.006 -.05  .03 -.02 -.065  .12  .074 0 0 0     0 -.24 -.21 -.26 -.26 .1 0 0  0 0
1.8 0 0 -.09 0 0 0 0 0 0 0 0 0 0 0 0
                                                                                  0 0
0 0 0    0 0 0 0 0 0 0 0 0 0 0 0 0 Cl, Th FR99, Np FNK95
       0 -.013 .01  .02 -.012  .10   .12 0 0 0     0    0    0    0    0  0 0 0  0 0
0 0 0    0 0 0 0 0 0 0 0 0 0 0 0 0
                                                                                  0 0
0 0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 SO4
             0   0    0     0    0     0 0 0 0     0    0    0    0    0  0 0 0  0 0
0 0 0    0 0 0 0 0 0 0 0 0 0 0 0 0
                                                                                  0 0
0 0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 HSO4
                 0  .10     0    0     0 0 0 0 -.032    0    0    0    0  0 0 0  0 0
```

```
0 0 0    0 0 0 0 0 0 0 0 0 0 0 0 0
                                                                                  0 0
0 0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 OH
            -.04     0 -.10 -.087 0 0 0  .095    0    0    0    0  0 0 0  0 0
0 0 0    0 0 0 0 0 0 0 0 0 0 0 0 0
                                                                                  0 0
0 0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 HCO3

     0 0 0 0 0 0 .21 0 0 0  -1.9 0 0 0 0 0    0   0 0 0 0    0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 CO3, Np Novak et al 1997
       0 0 0 0 0   0 0 0 0     0 0 0 0 0 0    0   0 0 0 0    0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 B(OH)4
         0 0 0 0   0 0 0 0     0 0 0 0 0 0    0   0 0 0 0    0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 B3O3(OH)4
           0 0 0   0 0 0 0     0 0 0 0 0 0    0   0 0 0 0    0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 B4O5(OH)4
             0 0   0 0 0 0     0 0 0 0 0 0    0   0 0 0 0    0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Br
               0   0 0 0 0     0 0 0 0 0 0    0   0 0 0 0    0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Am(CO3)2-
                   0 0 0 0     0 0 0 0 0 0    0   0 0 0 0    0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Am(CO3)3=-
                     0 0 0     0 0 0 0 0 0  5.5   0 0 0 0    0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 ClO4-, Th FRSMHC97
                       0 0     0 0 0 0 0 0    0   0 0 0 0    0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 NpO2(OH)2-
                         0     0 0 0 0 0 0    0   0 0 0 0    0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 NpC-
                               0 0 0 0 0 0    0   0 0 0 0    0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 NpC2=-
                                 0 0 0 0 0    0   0 0 0 0    0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 NpC3==-
                                   0 0 0 0    0   0 0 0 0    0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 H2PO4-
                                     0 0 0    0   0 0 0 0    0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 HPO4=
                                       0 0    0   0 0 0 0    0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 PO4=-
                                         0    0   0 0 0 0    0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Th(SO4)=
                                              0   0 0 0 0    0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Th(OH)3CO3-
                                                  0 0 0 0    0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Th(CO3)5===
                                                    0 0 0    0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 HOx-
                                                      0 0    0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ox=
                                                        0    0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ac-
                                                             0     0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Lac-
                                                                   0     0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 H2Cit-
                                                                0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 HCit=
                                                                  0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 Cit=-
                                                                    0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H3EDTA-
                                                                      0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H2EDTA=
                                                                        0 0 0 0 0 0 0
```

```
0 0 0 0 0 0 0 0 0 0 0 0 0 HEDTA=-
                                                                            0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 EDTA==
                                                                              0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 AmEDTA-
                                                                                0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 NpO2Cit=
                                                                                  0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 NpO2EDTA==-
                                                                                    0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 NpO2Ox-
                                                                                      0
0 0 0 0 0 0 0 0 0 0 0 0 0 U(OH)3CO3-

0 0 0 0 0 0 0 0 0 0 0 0 0 U(CO3)5===

0 0 0 0 0 0 0 0 0 0 0 0 U(SO4)3=

0 0 0 0 0 0 0 0 0 0 0 Am(CO3)4==-

0 0 0 0 0 0 0 0 0 0 Am(SO4)2-

0 0 0 0 0 0 0 0 0 NpO2H2EDTA-

0 0 0 0 0 0 0 0 CaCit-

0 0 0 0 0 0 0 CaEDTA=

0 0 0 0 0 0 UnuAn#2-

0 0 0 0 0 UnuAn#3-

0 0 0 0 UnuAn#4-

0 0 0 U(OH)2(CO3)2=

0 0 MgCit-

0 MgEDTA=

-.0018 -.010     .0 0 -.003 .003 0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-K+:anions psi
 -.007 -.055     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-Ca++:
 -.012 -.015     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-Mg++:
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-MgOH+:
 -.004    .0 -.0129 0   .0   .0  0 0 0 0 0 0 -.016 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-H+:
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-MgB(OH)4+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-CaB(OH)4+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-Am+++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-AmCO3+
   .21    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-Th++++ RFSMMN
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-AmCl++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-NpO2++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-U++++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-UOH+++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-UAc+++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-ThOx++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-AmAc++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-AmLac++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-AmOx+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-UCit+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-ULac+++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-UOx++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-ThAc+++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-ThCit+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-ThLac+++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-AmOH++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-Am(OH)2+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-AmCl2+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-AmSO4+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-Pu(OH)2+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-ThAc2++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-PuOx+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-ThLac2++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-CaAc+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-CaLac+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-MgAc+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-MgLac+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-UnuCat#1+

-.025     .0     .0 0    0    0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-Ca:
-.022  -.048     .0 0    0    0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-Mg:
   .0     .0     .0 0    0    0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-MgOH:
-.011   .197 -.0265 0    0    0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-H :
   .0     .0     .0 0    0    0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-MgB(OH)4+
   .0     .0     .0 0    0     0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-CaB(OH)4+
   .0     .0     .0 0    0     0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-Am+++
   .0     .0     .0 0    0     0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-AmCO3+
   .21    .0     .0 0    0     0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-Th++++ analogy w/Na+ (RFSMMN)
   .0     .0     .0 0    0     0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-AmCl++
   .0     .0     .0 0    0     0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-NpO2++
   .0     .0     .0 0    0     0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-U++++
   .0     .0     .0 0    0     0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-UOH+++
   .0     .0     .0 0    0     0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-UAc+++
   .0     .0     .0 0    0     0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-ThOx++
   .0     .0     .0 0   .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-AmAc++
   .0     .0     .0 0   .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-AmLac++
   .0     .0     .0 0   .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-AmOx+
    .0    .0     .0 0   .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-UCit+
    .0    .0     .0 0   .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-ULac+++
    .0    .0     .0 0   .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-UOx++
    .0    .0     .0 0   .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-ThAc+++
    .0    .0     .0 0   .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-ThCit+
    .0    .0     .0 0   .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-ThLac+++
    .0    .0     .0 0   .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-AmOH++
    .0    .0     .0 0   .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-Am(OH)2+
    .0    .0     .0 0   .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-AmCl2+
    .0    .0     .0 0   .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-AmSO4+
    .0    .0     .0 0   .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-Pu(OH)2+
    .0    .0     .0 0   .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-ThAc2++
    .0    .0     .0 0   .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-PuOx+
    .0    .0     .0 0   .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-ThLac2++
    .0    .0     .0 0   .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-CaAc+
    .0    .0     .0 0   .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-CaLac+
    .0    .0     .0 0   .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-MgAc+
    .0    .0     .0 0   .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-MgLac+
```

```
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-UnuCat#1+

 -.012  .024      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-Mg:
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-MgOH:
 -.015     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-H :
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-MgB(OH)4+
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-Ca++B(OH)4+
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-Am+++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-AmCO3+
   .21     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-Th++++, analogy w/Mg++ (RFSMMN)
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-AmCl++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-NpO2++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-U++++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-UOH+++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-UAc+++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-ThOx++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-AmAc++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-AmLac++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-AmOx+
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-UCit+
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-ULac+++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-UOx++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-ThAc+++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-ThCit+
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-ThLac+++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-AmOH++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-Am(OH)2+
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-AmCl2+
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-AmSO4+
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-Pu(OH)2+
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-ThAc2++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0  .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-PuOx+
```

```
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-ThLac2++
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-CaAc+
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-CaLac+
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca+-MgAc+
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca+-MgLac+
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca+-UnuCat#1+

  .028     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-MgOH:
 -.011     .0 -.0178 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-H :
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-MgB(OH)4+
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-CaB(OH)4+
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-Am+++
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-AmCO3+
   .21     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-Th++++ RSFMMN
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-AmCl++
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-NpO2++
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-U++++
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-UOH+++
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-UAc+++
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-ThOx++
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-AmAc++
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-AmLac++
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-AmOx+
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-UCit+
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-ULac+++
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-UOx++
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-ThAc+++
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-ThCit+
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-ThLac+++
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-AmOH++
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-Am(OH)2+
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-AmCl2+
```

.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-AmSO4+
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-Pu(OH)2+
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-ThAc2++
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-PuOx+
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-ThLac2++
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-CaAc+
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-CaLac+
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-MgAc+
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-MgLac+
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-UnuCat#1+

.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-H :
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-MgB(OH)4+
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-CaB(OH)4+
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-Am+++
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-AmCO3+
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-Th++++
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-AmCl++
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-NpO2++
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-U++++
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-UOH+++
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-UAc+++
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-ThOx++
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-AmAc++
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-AmLac++
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-AmOx+
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-UCit+
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-ULac+++
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-UOx++
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-ThAc+++
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-ThCit+
.0 .0 .0 0 .0 .0 0 0 0 0 0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-ThLac+++

```
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-AmOH++
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-Am(OH)2+
    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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    .0     .0      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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0 0 0 0 0 0 0 0 0 0 ThLac+++-UnuCat#1+

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0 0 0 0 0 0 0 0 0 0 AmOH++-Am(OH)2+
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0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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0 0 0 0 0 0 0 0 0 0 CaLac+-MgAc+
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0 0 0 0 0 0 0 0 0 0 CaLac+-MgLac+
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 .0014    .0 -.018 -.004 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- SO4:(vs Cations) psi
 -.006    .0    .0    .0 0 .013 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- HSO4:
 -.006 -.006 -.025    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- OH:
 -.015    .0    .0 -.096 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- HCO3:
 .0085  .004    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- CO3:
-.0073    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- B(OH)4:
 -.024    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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0 0 0 0 0 0  Cl- B3O3(OH)4:
  .026    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- B4O5(OH)4:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Br:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Am(CO3)2:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Am(CO3)3: FK98
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- ClO4-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- NpO2(OH)2-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- NpO2CO3-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- NpO2(CO3)2=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- NpO2(CO3)3==-:
    .0   -.01   .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- H2PO4-: PS76
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- HPO4=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- PO4=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Th(SO4)3=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Th(OH)3CO3-:
   .30   .30    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Th(CO3)5===: FR99, K+ by analogy w/Na+
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- HOx-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Ox=
.01029    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Ac-     NBC96(Na+), K+ NOT by analogy w/Na+
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Lac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- H2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- U(OH)3CO3-
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    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- NpO2HEDTA=

-.0094 -.0677   .0 -.0425 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= HSO4:
 -.009 -.050    .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= OH:
 -.005    .0    .0 -.161 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= HCO3:
 -.005 -.009    .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= CO3:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= B(OH)4:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= B3O3(OH)4:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= B4O5(OH)4:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Br:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Am(CO3)2:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Am(CO3)3:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= ClO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= NpO2(OH)2-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= NpO2CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= NpO2(CO3)2=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= NpO2(CO3)3==-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= H2PO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= HPO4=:
```

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     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= PO4=-:
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Th(SO4)3=:
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Th(OH)3CO3-:
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Th(CO3)5===:
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= HOx-
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Ox=
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Ac-
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Lac-
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= H2Cit=
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= HCit=
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Cit=-
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= H3EDTA-
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= H2EDTA=
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= HEDTA=-
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= EDTA==
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= AmEDTA-
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= NpO2Cit=
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= NpO2EDTA==-
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= NpO2Ox-
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= U(OH)3CO3-
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= U(CO3)5===
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= U(SO4)3=
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Am(CO3)4==-
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Am(SO4)2-
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= NpO2H2EDTA-
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= CaCit-
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= CaEDTA=
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= UnuAn#2-
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= UnuAn#3-
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= UnuAn#4-
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= U(OH)2(CO3)2=
     .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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0 0 0 0 0 0  SO4= MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- OH:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- HCO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- CO3=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- B(OH)4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- B3O3(OH)4:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- B4O5(OH)4:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Br-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Am(CO3)2-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Am(CO3)2=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- ClO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- NpO2(OH)2-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- NpO2CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- NpO2(CO3)2=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- NpO2(CO3)3==-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- H2PO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- HPO4=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- PO4=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Th(SO4)3=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Th(OH)3CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Th(CO3)5===:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Ox=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  HSO4- H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- NpO2EDTA===-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- HCO3:
 -.017  -.01    .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- CO3:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- B(OH)4:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- B3O3(OH)4:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- B4O5(OH)4:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Br:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Am(CO3)2:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Am(CO3)3:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- ClO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  OH- NpO2(OH)2-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- NpO2CO3-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- NpO2(CO3)2=-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- NpO2(CO3)3==-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- H2PO4-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- HPO4=:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- PO4=-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Th(SO4)3=:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Th(OH)3CO3-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Th(CO3)5===:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- HOx-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Ox=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Ac-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Lac-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- H2Cit=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- HCit=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Cit=-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- H3EDTA-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- H2EDTA=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- HEDTA=-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- EDTA==
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- AmEDTA-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- NpO2Cit=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- NpO2EDTA==-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- NpO2Ox-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- U(OH)3CO3-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- U(CO3)5===
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- U(SO4)3=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Am(CO3)4==-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Am(SO4)2-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- NpO2H2EDTA-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- CaCit-
```

```
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- NpO2HEDTA=

   .002 .012    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-CO3:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-B(OH)4:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-B3O3(OH)4:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-B4O5(OH)4:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-Br:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-Am(CO3)2:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-Am(CO3)3:
 -.010    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-ClO4-:         NFRK95
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-NpO2(OH)2-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-NpO2CO3-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-NpO2(CO3)2=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-NpO2(CO3)3==-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-H2PO4-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-HPO4=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-PO4=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-Th(SO4)3=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-Th(OH)3CO3-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-Th(CO3)5===:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-HOx-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-Ox=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-Ac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-Lac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-H2Cit=
```

```
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= B(OH)4-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= B3O3(OH)4:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= B4O5(OH)4:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Br:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Am(CO3)2:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Am(CO3)3:
```

```
   -.024   .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= ClO4-:           NFRK95
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= NpO2(OH)2-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= NpO2CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= NpO2(CO3)2=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= NpO2(CO3)3==-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= H2PO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= HPO4=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= PO4=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Th(SO4)3=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Th(OH)3CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Th(CO3)5===:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Ox=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  CO3= NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- B3O3(OH)4:
    .0    .0    .0    .0 0  .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- B4O5(OH)4:
    .0    .0    .0    .0 0  .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Br:
    .0    .0    .0    .0 0  .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Am(CO3)2:
    .0    .0    .0    .0 0  .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Am(CO3)3:
    .0    .0    .0    .0 0  .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- ClO4-:
    .0    .0    .0    .0 0  .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- NpO2(OH)2-:
    .0    .0    .0    .0 0  .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- NpO2CO3-:
    .0    .0    .0    .0 0  .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- NpO2(CO3)2=-:
    .0    .0    .0    .0 0  .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- NpO2(CO3)3==-:
    .0    .0    .0    .0 0  .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- H2PO4-:
    .0    .0    .0    .0 0  .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- HPO4=:
    .0    .0    .0    .0 0  .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- PO4=-:
    .0    .0    .0    .0 0  .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Th(SO4)3=:
    .0    .0    .0    .0 0  .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Th(OH)3CO3-:
    .0    .0    .0    .0 0  .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Th(CO3)5===:
    .0    .0    .0    .0 0  .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- HOx-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Ox=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Ac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Lac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- H2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

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0 0 0 0 0 0  B(OH)4- HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- B4O5(OH)4:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Br:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Am(CO3)2:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Am(CO3)3:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- ClO4-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- NpO2(OH)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

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0 0 0 0 0 0  B3O3(OH)4- NpO2CO3-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- NpO2(CO3)2=-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- NpO2(CO3)3==-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- H2PO4-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- HPO4=:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- PO4=-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Th(SO4)3=:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Th(OH)3CO3-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Th(CO3)5===:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- HOx-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Ox=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Ac-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Lac-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- H2Cit=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- HCit=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Cit=-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- H3EDTA-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- H2EDTA=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- HEDTA=-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- EDTA==
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- AmEDTA-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- NpO2Cit=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- NpO2EDTA==-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- NpO2Ox-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- U(OH)3CO3-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- U(CO3)5===
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- U(SO4)3=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Am(CO3)4==-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Am(SO4)2-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- NpO2H2EDTA-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- CaCit-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- CaEDTA=
```

```
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Br:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Am(CO3)2:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Am(CO3)3:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= ClO4-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= NPO2(OH)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= NpO2CO3-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= NpO2(CO3)2=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= NpO2(CO3)3==-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= H2PO4-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= HPO4=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= PO4=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Th(SO4)3=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Th(OH)3CO3-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Th(CO3)5===:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= HOx-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Ox=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Ac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Lac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= H2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= HEDTA=-
```

.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 B4O5(OH)4= EDTA==
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 B4O5(OH)4= AmEDTA-
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 B4O5(OH)4= NpO2Cit=
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 B4O5(OH)4= NpO2EDTA==-
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 B4O5(OH)4= NpO2Ox-
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 B4O5(OH)4= U(OH)3CO3-
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 B4O5(OH)4= U(CO3)5===
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 B4O5(OH)4= U(SO4)3=
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 B4O5(OH)4= Am(CO3)4==-
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 B4O5(OH)4= Am(SO4)2-
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 B4O5(OH)4= NpO2H2EDTA-
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 B4O5(OH)4= CaCit-
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 B4O5(OH)4= CaEDTA=
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 B4O5(OH)4= UnuAn#2-
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 B4O5(OH)4= UnuAn#3-
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 B4O5(OH)4= UnuAn#4-
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 B4O5(OH)4= U(OH)2(CO3)2=
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 B4O5(OH)4= MgCit-
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 B4O5(OH)4= MgEDTA=
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 B4O5(OH)4= NpO2HEDTA=

.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 Br- Am(CO3)2:
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 Br- Am(CO3)3:
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 Br- ClO4-:
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 Br- NpO2(OH)2-:
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 Br- NpO2CO3-:
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 Br- NpO2(CO3)2=-:
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 Br- NpO2(CO3)3==-:
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 Br- H2PO4-:
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 Br- HPO4=:
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 Br- PO4=-:
.0 .0 .0 .0 0 .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 Br- Th(SO4)3=:

```
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- Th(OH)3CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- Th(CO3)5===:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- Ox=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  Br- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- Am(CO3)3:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- ClO4-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- NpO2(OH)2-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- NpO2CO3-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- NpO2(CO3)2=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- NpO2(CO3)3==-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- H2PO4-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- HPO4=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- PO4=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- Th(SO4)3=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- Th(OH)3CO3-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- Th(CO3)5===:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- HOx-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- Ox=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- Ac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- Lac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- H2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  Am(CO3)2- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- ClO4-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- NpO2(OH)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- NpO2CO3-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- NpO2(CO3)2=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- NpO2(CO3)3==-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- H2PO4-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- HPO4=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- PO4=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- Th(SO4)3=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- Th(OH)3CO3-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- Th(CO3)5===:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- HOx-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- Ox=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- Ac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- Lac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- H2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  Am(CO3)3=- H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- NpO2(OH)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- NpO2CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- NpO2(CO3)2=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- NpO2(CO3)3==-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- H2PO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- HPO4=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- PO4=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- Th(SO4)3=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- Th(OH)3CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  ClO4- Th(CO3)5===:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- HOx-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- Ox=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- Ac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- Lac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- H2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  NpO2(OH)2- NpO2CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- NpO2(CO3)2=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- NpO2(CO3)3==-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- H2PO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- HPO4=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- PO4=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- Th(SO4)3=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- Th(OH)3CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- Th(CO3)5===:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- Ox=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- CaEDTA=
```

```
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- UnuAn#2-
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- UnuAn#3-
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- UnuAn#4-
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- U(OH)2(CO3)2=
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- MgCit-
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- MgEDTA=
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- NpO2HEDTA=

    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- NpO2(CO3)2=-:
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- NpO2(CO3)3==-:
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- H2PO4-:
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- HPO4=:
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- PO4=-:
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- Th(SO4)3=:
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- Th(OH)3CO3-:
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- Th(CO3)5===:
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- HOx-
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- Ox=
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- Ac-
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- Lac-
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- H2Cit=
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- HCit=
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- Cit=-
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- H3EDTA-
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- H2EDTA=
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- HEDTA=-
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- EDTA==
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- AmEDTA-
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- NpO2Cit=
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- NpO2EDTA==-
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- NpO2Ox-
    .0      .0      .0      .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- U(OH)3CO3-
```

```
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- NpO2(CO3)3==-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- H2PO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- HPO4=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- PO4=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- Th(SO4)3=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- Th(OH)3CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- Th(CO3)5===:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- Ox=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- HEDTA=-
```

```
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- H2PO4-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- HPO4=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- PO4=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- Th(SO4)3=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- Th(OH)3CO3-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- Th(CO3)5===:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- HOx-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- Ox=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- Ac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- Lac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- H2Cit=
```

```
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- HCit=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- Cit=-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- H3EDTA-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- H2EDTA=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- HEDTA=-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- EDTA==
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- AmEDTA-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- NpO2Cit=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- NpO2EDTA==-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- NpO2Ox-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- U(OH)3CO3-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- U(CO3)5===
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- U(SO4)3=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- Am(CO3)4==-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- Am(SO4)2-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- NpO2H2EDTA-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- CaCit-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- CaEDTA=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- UnuAn#2-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- UnuAn#3-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- UnuAn#4-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- U(OH)2(CO3)2=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- MgCit-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- MgEDTA=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- NpO2HEDTA=

    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- HPO4=:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- PO4=-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- Th(SO4)3=:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- Th(OH)3CO3-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- Th(CO3)5===:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- HOx-
```

```
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- Ox=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- Ac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- Lac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- H2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= PO4=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= Th(SO4)3=:
```

```
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= Th(OH)3CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= Th(CO3)5===:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= Ox=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  HPO4= NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- Th(SO4)3=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- Th(OH)3CO3-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- Th(CO3)5===:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- HOx-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- Ox=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- Ac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- Lac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- H2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  PO4=- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= Th(OH)3CO3-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= Th(CO3)5===:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= HOx-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= Ox=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= Ac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= Lac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= H2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  Th(SO4)3= U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- Th(CO3)5===:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- Ox=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  Th(OH)4CO3- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)4CO3- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)4CO3- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)4CO3- NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== Ox=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  Th(CO3)5=== MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- Ox=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- Ac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- Lac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- H2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  HOx- NpO2HEDTA=

    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= Ac-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= Lac-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= H2Cit=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= HCit=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= Cit=-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= H3EDTA-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= H2EDTA=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= HEDTA=-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= EDTA==
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= AmEDTA-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= NpO2Cit=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= NpO2EDTA==-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= NpO2Ox-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= U(OH)3CO3-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= U(CO3)5===
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= U(SO4)3=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= Am(CO3)4==-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= Am(SO4)2-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= NpO2H2EDTA-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= CaCit-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= CaEDTA=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= UnuAn#2-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= UnuAn#3-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= UnuAn#4-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= U(OH)2(CO3)2=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= MgCit-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= MgEDTA=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= NpO2HEDTA=

    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- Lac-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- H2Cit=
```

```
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- H2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- HEDTA=-
```

```
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- U(OH)3CO3-
```

```
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= CaEDTA=
```

```
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  H3EDTA- H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  H2EDTA= Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  HEDTA=- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- CaEDTA=
```

```
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  NpO2EDTA=- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3-U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3-U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- CaCit-
```

```
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  U(SO4)3= MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(SO4)2- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(SO4)2- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(SO4)2- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(SO4)2- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(SO4)2- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(SO4)2- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(SO4)2- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(SO4)2- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(SO4)2- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(SO4)2- NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2H2EDTA- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2H2EDTA- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2H2EDTA- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2H2EDTA- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2H2EDTA- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2H2EDTA- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  NpO2H2EDTA- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2H2EDTA- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2H2EDTA- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaCit- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaCit- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaCit- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaCit- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaCit- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaCit- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaCit- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaCit- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaEDTA= UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaEDTA= UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaEDTA= UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaEDTA= U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaEDTA= MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaEDTA= MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaEDTA= NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#2- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#2- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#2- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#2- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#2- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#2- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#3- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#3- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#3- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#3- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#3- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  UnuAn#4- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#4- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#4- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#4- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)2(CO3)2= MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)2(CO3)2= MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)2(CO3)2= NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  MgCit- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  MgCit- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  MgEDTA= NpO2HEDTA=


 .100 .051  .183 .183 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   CO2-Cations      HMW84 lambda
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   CaCO3-Cations    HMW84
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   MgCO3-Cations    HMW84
-.097 -.14    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   B(OH)3-Cations   FW86
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   NpO2OH-Cations
   .0 -.07    .0   .0 .0  .29 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   H3PO4-Cations    PS76
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   Th(SO4)2-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   H2Ox-Cations     ERG_org_memo
  -.2  -.2    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   Am(OH)3(aq)-Cations Na+ FK98, K+ by analogy w Na
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   HAc-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   NpO2Ac-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   HLac-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   H3Citrate-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   AmCit-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   NpO2Lac-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   Th(OH)4-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   U(OH)4-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   U(SO4)2-Cations
  -.2  -.2    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   Pu(OH)3(aq)-Cations analogy w Am
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0   PuCit(aq)-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   CaOx(aq)-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   H4EDTA-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   ThEDTA-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   UEDTA-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   MgOx(aq)-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   UnuNeu#1-Cations

-.005 .097 -.003  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  CO2-An      HMW84
   .0   .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  CaCO3-An    HMW84
   .0   .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  MgCO3-An    HMW84
 .091 .018    .0  0 0 0 0 -.2 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  B(OH)3-An   FW86
 -.19   .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  NpO2OH-An   FNK95
   .0   .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0 -.4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  H3PO4-An    PS76
  .29   .0   .68  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  Th(SO4)2-An Roy92
   .0   .0   .0   0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  H2Ox-An     ERG_org_memo
  -.2   .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  Am(OH)3(aq)-An Cl- FK98
   .0   .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  HAc-An
-.104   .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  NpO2Ac-An   ERG_release_memo(Cl-)
   .0   .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  HLac-An
   .0   .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  H3Citrate-An
-.406   .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  AmCit-An    SAND99(Cl-)
 .015   .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  NpO2Lac-An  SAND99/Moore et al 99(Cl-)
   .0   .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  Th(OH)4-An
   .0   .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  U(OH)4-An
   .0   .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  U(SO4)2-An
  -.2   .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  Pu(OH)3(aq)-An analogy w Am
-.406   .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  PuCit(aq)-An   analogy w/ Am (SAND99(Cl-))
  .0189 .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  CaOx(aq)-An    analogy w/Mg (ERG_org_memo)
   .0   .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  H4EDTA-An
  .1111 .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  ThEDTA-An   ERG_org_memo (Cl-)
  .1111 .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  UEDTA-An    analogy w/ Th (ERG_org_memo (Cl-))
  .0189 .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  MgOx(aq)-An   ERG_org_memo (Cl-)
   .0   .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  UnuNeu#1-An

.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0   CO2-C-A
.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0     (C down
.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0      A acr
.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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.0  .0  .0  .0  .0  .0  0   0   0   0   0   0   0   0   0   0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0   CaCO3-Cation-Anion
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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99 (NpO2Lac-Na-Cl = 0)
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.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

  2   3   4   5   6   7      Na+       K+        Ca++      Mg++      MgOH+  H+
cation map ELMAP(1,)
 22  21  36  37  50  43      MgB(OH)4+ CaB(OH)4+ Am+++     AmCO3+    Th++++ AmCl++
 64  56  57 101  99  86      NpO2+     U++++     UOH+++    UAc+++    ThOx++ AmAc++
 90  89 102 104 105  96      AmLac++   AmOx+     UCit+     ULac+++  UOx++  ThAc+++
 97 100  40  41  44  47      ThCit+    ThLac+++  AmOH++    Am(OH)2+ AmCl2+ AmSO4+
 48  91  94  95 116 120      Pu(OH)2+  ThAc2++    PuOx+     ThLac2++  CaAc+  CaLac+
111 115 121                  MgAc+     MgLac+    UnuCat#1+

  8   9  10  11  12  13      Cl-        SO4=          HSO4-          OH-
HCO3-         CO3=        anion map ELMAP(2,)
 18  19  20  23  38  39      B(OH)4-    B3O3(OH)4-    B4O5(OH)4=     Br-
Am(CO3)2-     Am(CO3)3=-
 24  69  65  66  67  33      ClO4-      NpO2(OH)2-    NpO2CO3-       NpO2(CO3)2=-
NpO2(CO3)3==- H2PO4-
 34  35  55  52  51  82      HPO4=      PO4=-         Th(SO4)3=      Th(OH)3(CO3)-
Th(CO3)5===    HOx-
 83  71  85  73  74  75      Ox=        Ac-           Lac-           H2Cit-
```

```
HCit=          Cit=-
 77  78  79  80  88 107      H3EDTA-    H2EDTA=       HEDTA=-        EDTA==
AmEDTA-       NpO2Cit=
108 109  60  58  63  45      NpO2EDTA=- NpO2Ox-       U(OH)4(CO3)2== U(CO3)5===
U(SO4)3=       Am(CO3)4==-
 46  93 117 118 123 124      Am(SO4)2- NpO2H2EDTA-       CaCit-         CaEDTA=
UnuAn#2-       UnuAn#3-
125  59 112 113 122          UnuAn#4-   U(OH)2(CO3)2= MgCit-         MgEDTA=
NpO2HEDTA=

 14  15  16  17  68  32      CO2         CaCO3     MgCO3       B(OH)3  NpO2OH H3PO4
neutral map ELMAP(3,)
 54  81  42  70 106  84      Th(SO4)2    H2Ox      Am(OH)3(aq) HAc     NpO2Ac HLac
 72  87 110  53  61  62      H3Cit       AmCit     NpO2Lac     Th(OH)4 U(OH)4 U(SO4)2
 49  92 119  76  98 103      Pu(OH)3(aq) PuCit(aq) CaOx(aq)    H4EDTA  ThEDTA UEDTA
114 126                      MgOx(aq)    UnuNeu#1

'nEQUALACT' 0

2 (Oxygen)
'nREDOX' 0
'nIONEX' 0 0 'nMF'

1234567890123456789012345678901234567890123456789012345678901234567890123456
78901234567890123456789012345678901234567890123456789012
        1         2         3         4         5         6         7         8
9         0         1         2         3

1         1         1         1
```

This database release is described in Giambalvo memo to Brush, 20November02, "Release of FMT database 021120.chemdat."
(in records package 522977)
Data values without explicit references are from HMW84 or FW86

+III References
See Giambalvo memo to Brush, 25July2002, "Recommended Parameter Values for Modeling An(III) Solubility in WIPP Brines" for
overview and comparison to PAVT database. ERMS 522982.

FRF90 == Felmy, Rai, and Fulton, 1990. The solubility of AmOHCO3(c) and the aqueous thermodynamics of the
system Na-Am-HCO3-CO3-OH-H2O, RCA 50:193-204. (Am+++ - ClO4- Pitzers)

RFF92 == Rai, Felmy, and Fulton, 1992. Solubility and ion activity product of AmPO4.xH2O, RCA 56:7-14.

RFF95 == Rai, Felmy, and Fulton, 1995. Nd+++ and Am+++ ion interactions with sulfate ion and their influence on
NdPO4(c) solubility, J. Soln. Chem. 24(9):879-895. (Am+++ - H2PO4- Pitzers)

RRFFN96 == Rao, Rai, Felmy, Fulton, and Novak, 1996. Solubility of NaNd(CO3)2.6H2O in concentrated Na2CO3 and
NaHCO3 solutions, RCA 75:141-147.

FK98 == Fanghanel and Kim, 1998. Spectroscopic evaluation of thermodynamics of trivalent
actinides in brines. J. Alloys and Compounds, 271-273:728-737. (Review paper incl.
Fanghanel et al. 1994, Konnecke et al. 1997 and Fanghanel et al. 1999).

Fanghanel et al 1994 == Fanghanel, Kim, Paviet, Klenze, and Hauser, 1994. Thermodynamics of radioactive trace elements in
concentrated electrolyte solutions: Hydrolysis of Cm3+ in NaCl-solutions, RCA 66/67:81-87.

Konnecke et al. 1997 == Konnecke, Fanghanel, and Kim, 1997. Thermodynamics of trivalent actinides in concentrated
electrolyte solutions: Modelling the chloride complexation of Cm(III), RCA 76:131-135.

Fanghanel et al. 1999 == Fanghanel, Konnecke, Weger, Paviet-Hartmann, Neck, and Kim, 1999. Thermodynamics of Cm(III)
in concentrated salt solutions: Carbonate complexation in NaCl solution at 25C, J. Soln. Chem. 28(4):447-462.

+IV References

See Giambalvo memo to Brush 26July2002 "Recommended Parameter Values for Modeling An(IV) Solubility in WIPP Brines" for
overview and comparison to PAVT database. ERMS 522986.

FRM91 == Felmy, Rai, and Mason, 1991. The solubility of hydrous thorium(IV) oxide in chloride media:
Development of an aqueous ion-interaction model, RCA 55:177-185.
FR92 == Felmy and Rai, 1992. An aqueous thermodynamic model for a high valence 4:2 electrolyte Th4+-SO42-
in the system Na-K-Li-NH4-Th-SO4-HSO4-H2O to high concentration, J Soln Chem 21(5):407-423.
Roy92 == Roy, Vogel, Good, Davis, Roy, Johnson, Felmy, and Pitzer, 1992. Activity coefficients in electrolyte
mixtures: HCl + ThCl4 + H2O for 5-55 C, J Phys Chem 96(26):11065-11072.
RR87 == Ryan and Rai, 1987. Thorium(IV) hydrous oxide solubility, Inorg. Chem. 26:4140-4142.
RFSMMN == Rai et al. 1997 Solubility of Th(IV) and U(IV) Hydrous Oxides in Conc NaCl and MgCl2 Solutions
RCA 79:239-247
FRSMHC97 == Felmy,Rai,Sterner,Mason,Hess,Conradson, 1997 "Thermo Models for Hightly Charged Aq Species
Solubility of Th(IV) Hydrous Oxide in Conc NaHCO3 and Na2O3 Solns" J Soln Chem 26:233-248.
FR99 == Felmy and Rai, 1999. Application of Pitzer's Equations for Modeling the Aqueous Thermodynamics of Actinide
Species in Natural Waters: A Review. J. Soln. Chem. 28:533-553 (SAND99-0340J).
CFN960119 == Novak to Nowak, 19Jan96, "Preliminary inorganic model for thorium solubility in WIPP brines, in
database file HMW_3TH5_960119.CHEMDAT" WPO 30930.
ERG_th_memo == Giambalvo to Brush, 26July02, "Recommended Parameter Values for Modeling An(IV) Solubility in WIPP Brines"
ERMS 522986.
Rai96 == U(IV) Fax from Dhan Rai, 13 Mar 96

+V References

See Giambalvo memo to Brush 26July2002 "Recommended Parameter Values for Modeling An(V) Solubility in WIPP Brines" for
overview. ERMS# 522990.

NFRK95 == Neck, Fanghanel, Rudolph, and Kim, 1995. Thermodynamics of Np(V) in concentrated salt solutions:
Chloride complexation and ion interaction (Pitzer) parameters for the NpO2+ ion, RCA 69:39-47.
FNK95 == Fanghanel, Neck, and Kim, 1995. Thermodynamics of Np(V) in concentrated salt solutions: II.
Ion interaction (Pitzer) parameters for Np(V) hydrolysis species and carbonate complexes,
RCA 69:169-176.
Novak et al. 1997 == Novak, Al Mahamid, Becraft, Carpenter, Hakem, and Prussin, 1997. Measurement and
thermodynamic modeling of Np(V) solubility in aqueous K2CO3 solutions to high concentrations,
J. Soln. Chem. 26(7):681-697.
Al Mahamid et al. 1998 == Al Mahamid, Novak, Becraft, Carpenter, and Hakem, 1998. Solubility of Np(V) in K-Cl-CO3
and Na-K-Cl-CO3 solutions to high concentrations: Measurements and thermodynamic model predictions,
RCA 81:93-101. (see also SAND97-1230J)
ERG_release_memo == Giambalvo memo to Brush 20November02 "Release of FMT Database

FMT_021120.CHEMDAT"

Organic Ligand References
See Giambalvo memo to Brush, 25July2002, "Recommended Parameter Values for Modeling Organic Ligands in WIPP Brines" for
overview and comparison to PAVT database. ERMS 522981
RCM96 == RC Moore, 22FEB96 memorandum "Final Model Parameters for Deprotponation of..."
NBC96 == Novak, Borkowski, and Choppin, 1996. Thermodynamic modeling of neptunium(V)-acetate complexation in
concentrated NaCl media, RCA 74:111-116.
SAND99 == Choppin et al., 2001. "Waste Isolation Pilot Plant Actinide Source Term Test Program: Solubility
Studies and Development of Modeling Parameters" SAND99-0943.
Mesmer et al 89 == Mesmer, Patterson, Busey, Holmes. Ionization of acetic acid in NaCl(aq) media: A
Potentiometric study to 573 K and 130 bar. J. Phys. Chem. 93:7483-7490.
Mizera == Mizera, Bond, Choppin, and Moore, 1999. "Dissociation constants of carboxylic acids at high ionic
strengths" in Reed et al., eds, Actinide Speciation in High Ionic Strength Media. p 113-124.
CEX96 == Choppin, Erten, Xia, 1996. Variation of stability constants of thorium citrate complexes with ionic
strength. RCA 74:123-127 (raw data used in SAND99).
BPBC99 == Bronikowski, Pokrovsky, Borkowski, Choppin, 1999. "UO2 and NpO2 complexation with citrate in brine
solutions" in Reed et al, eds, Actinide Speciation in High Ionic Strength Media.
PBMC98 == Pokrovsky, Bronikowski, Moore, Choppin, 1998. Interaction of neptunyl(V) and Uranyl(VI) with EDTA
in NaCl media: Experimental study and Pitzer modeling. RCA 80:23-29.
Moore et al 99 == Moore, Borkowski, Bronikowski, Chen, Pokrovsky, Xia, Choppin, 1999. Thermodynamic modeling of
actinide complexation with acetate and lactate at high ionic strength. J. Soln. Chem. 28:521-531.
Borkowski et al 01 == Borkowski, Moore, Bronikowski, Chen, Pokrovsky, Xia, Choppin, 2001. Thermodynamic modeling
of actinide complexation with oxalate at high ionic strength. J. Radioanalytical and Nuclear Chem. 248:467-471.
ERG_org_memo == Giambalvo to Brush, 25July02. "Recommended Parameter Values for Modeling Organic Ligands in WIPP Brines."
ERMS 522981
ERG_ox_memo == Giambalvo to Brush, 31July02. "Recommended u0/RT Values for Modeling the Solubility of Oxalate Solids
in WIPP Brines." ERMS 523057

General References
HMW84 == Harvie, Moller, Weare (1984) GCA 48 pp.723-751
FW86 == Felmy and Weare (1986) GCA 50 pp.2771-2783
PS76 == Pitzer and Silvester (1976) J Soln Chem 5#4 pp.269-278
P91 == Pitzer (1991) CRC Handbook, Activity Coef in Electrolyte Solns
CFN95a == Novak (1995a) 18Jan95 Memo "Creation and Definition of the Database for FMT called "HMW_NP_AM.CHEMDAT..."
R&H73 == Robie and Hemingway 1973 J.Reas.US.Geol.Surv. v1n5 pp 543-547
Lang65 == Langmuir 1965 j.Geology v73 730-754
FO76 == Fuger and Oetting, 1976, The Chemical Thermodynamics of Actinide Elements and Compounds. Part 2.
The Actinide Aqueous Ions., Int. Atomic Energy Agency, Vienna, Austria.
CFN950705 == Novak memo to EJNowak (perchlorate G/RT)

APPENDIX I: DATABASE FILE FOR FMT CODE

Used in geochemical calculations (solubilities) of radionuclides.

fmt_021120.chemdat

```
-----------------------------------------------------------------------
'FMT_021120.chemdat'
'ERG update of FMT_970407.chemdat (PAVT db)'

27 214 'nNEW T' 'nACTCOEF' 'nECHO' 'nABCD'
200 1.d-6 1.d-18
'NONE' 298.15 1.d0 1.d0

'Hydrogen' 'Oxygen' 'Sodium' 'Potassium' 'Magnesium' 'Calcium' 'Chlorine' 'Sulfur'
'Carbon' 'PosIon:EL'
  'NegIon:EL' 'Oxalate:EL' 'Boron' 'Bromine' 'Acetate:EL' 'Th(IV)' 'Am(III)' 'Pu(III)'
'Np(V)'
  'ClO4:EL' 'Phosphorus' 'U(IV)' 'Lactate:EL' 'EDTA:EL' 'Citrate:EL' 'Electron:EL'
'Charge:EL'
1.0079 15.9994 22.98977 39.0983 24.305 40.08 35.453 32.06 12.011 0.0 0.0 28.84 10.81
79.904 59.044
   232.0381 243.0 238.029 237.0482 99.4506 30.974 242.0 89.07 888.888 189.1 0.0 0.0

'H2O                         WATER'  2  1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1 -95.6635     HMW84
'Na+                           Na+'  0  0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  1   1 -105.651     HMW84
'K+                             K+'  0  0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  1   1 -113.957     HMW84
'Ca++                         Ca++'  0  0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  2   1 -223.30      HMW84
'Mg++                         Mg++'  0  0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  2   1 -183.468     HMW84
'MgOH+                       MgOH+'  1  1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  1   1 -251.94      HMW84
'H+                             H+'  1  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  1   1  0.          HMW84

'Cl-                           Cl-'  0  0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1 -52.955      HMW84
'SO4=                         SO4='  0  4 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -2   1 -300.386     HMW84
'HSO4-                       HSO4-'  1  4 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1 -304.942     HMW84
'OH-                           OH-'  1  1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1 -63.435      HMW84
'HCO3-                       HCO3-'  1  3 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1 -236.751     HMW84
'CO3=                         CO3='  0  3 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -2   1 -212.944     HMW84

'CO2(aq)                   CO2(aq)'  0  2 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1 -155.68      HMW84
'CaCO3(aq)               CaCO3(aq)'  0  3 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1 -443.5       HMW84
'MgCO3(aq)               MgCO3(aq)'  0  3 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1 -403.155     HMW84

'B(OH)3(aq)             B(OH)3(aq)'  3  3 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1 -390.81      FW86
'B(OH)4-                   B(OH)4-'  4  4 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1 -465.20      FW86
'B3O3(OH)4-             B3O3(OH)4-'  4  7 0 0 0 0 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1 -963.77      FW86
```

```
'B4O5(OH)4=             B4O5(OH)4='  4  9 0 0 0 0 0 0 0 0 0 0 4 0 0 0 0 0 0 0 0 0 0 0
0 0 -2   1 -1239.10     FW86
'CaB(OH)4+               CaB(OH)4+'  4  4 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0
0 0  1   1 -692.30      FW86
'MgB(OH)4+               MgB(OH)4+'  4  4 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0
0 0  1   1 -651.89      FW86
'Br-                           Br-'  0  0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0
0 0 -1   1 -999.99      arbitrary
'ClO4-                  perchlorate'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0
0 0 -1   1 -73.81       CFN950705

'NaOH(aq)       to.titrate.base.only'  1  1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1  500.        arbitrary
'HCl(aq)        to.titrate.acid.only'  1  0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1  500.        arbitrary
'HClO4(aq)      to.titrate.acid.only'  1  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0
0 0  0   1  500.        arbitrary
'PosIon                 POSITIVE.ION'  0  0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  1   1  0.          arbitrary
'NegIon                 NEGATIVE.ION'  0  0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1  0.          arbitrary
'PosIon(OH)(aq)      to.titrate.base'  1  1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1  500.        arbitrary
'HNegIon(aq)         to.titrate.acid'  1  0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1  500.        arbitrary

'H3PO4(aq)               H3PO4(aq)'  3  4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0
0 0  0   1 -460.90      RFF92
'H2PO4-                     H2PO4-'  2  4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0
0 0 -1   1 -455.96      RFF92
'HPO4=                       HPO4='  1  4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0
0 0 -2   1 -439.367     CFN95a
'PO4=-                       PO4=-'  0  4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0
0 0 -3   1 -410.947     RFF92

'Am+++                       Am+++'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0  3   1 -241.694     FO76
'AmCO3+                     AmCO3+'  0  3 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0  1   1 -473.29      FK98/Fanghanel et al 1999
'Am(CO3)2-               Am(CO3)2-'  0  6 0 0 0 0 0 2 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0 -1   1 -697.52      FK98/Fanghanel et al 1999
'Am(CO3)3=-             Am(CO3)3=-'  0  9 0 0 0 0 0 3 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0 -3   1 -915.53      FK98/Fanghanel et al 1999
'AmOH++                     AmOH++'  1  1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0  2   1 -319.96      FK98/Fanghanel et al 1994
'Am(OH)2+                 Am(OH)2+'  2  2 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0  1   1 -396.89      FK98/Fanghanel et al 1994
'Am(OH)3(aq)            Am(OH)3(aq)'  3  3 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0  0   1 -469.53      FK98/Fanghanel et al 1994
'AmCl++                     AmCl++'  0  0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0  2   1 -295.20      FK98/Konnecke et al 1997
'AmCl2+                     AmCl2+'  0  0 0 0 0 2 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0  1   1 -345.90      FK98/Konnecke et al 1997
'Am(CO3)4==-            Am(CO3)4==-'  0 12 0 0 0 0 0 4 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0 -5   1 -1123.40     FK98/Fanghanel et al 1999
'Am(SO4)2-               Am(SO4)2-'  0  8 0 0 0 0 2 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0 -1   1 -850.99      FK98
'AmSO4+                     AmSO4+'  0  4 0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0  1   1 -549.56      FK98

'Pu(OH)2+               deactivated'  2  2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0  1   1  999.999
'Pu(OH)3(aq)            deactivated'  3  3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
```

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0 0  0   1  999.999

'Th++++                      Th++++'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0  4   1 -284.227     FO76
'Th(CO3)5===            Th(CO3)5==='  0 15 0 0 0 0 0 0 5 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0 -6   1 -1411.378    CFN960119/FRSMHC97
'Th(OH)3(CO3)-        Th(OH)3(CO3)-'  3  6 0 0 0 0 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0 -1   1 -775.627     CFN960119/FRSMHC97
'Th(OH)4(aq)            Th(OH)4(aq)'  4  4 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0  0   1 -622.47      ERG_Th_memo/RR87
'Th(SO4)2(aq)          Th(SO4)2(aq)'  0  8 0 0 0 0 0 2 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0  0   1 -911.69      FR92
'Th(SO4)3=                Th(SO4)3='  0 12 0 0 0 0 0 3 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0 -2   1 -1214.0      FR92

'U++++                        U++++'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0  4   1 -214.19      RFSMMN
'UOH+++                      UOH+++'  1  1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0  3   1 -308.7       RFSMMN
'U(CO3)5===              U(CO3)5==='  0 15 0 0 0 0 0 0 5 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0 -6   1 -1345.393    Rai96
'U(OH)2(CO3)2=        U(OH)2(CO3)2='  2  8 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0 -2   1 -863.383     Rai96
'U(OH)4(CO3)2==      U(OH)4(CO3)2=='  4 10 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0 -4   1 -998.662     Rai96
'U(OH)4(aq)             deactivated'  4  4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0  0   1  999.999
'U(SO4)2(aq)            deactivated'  0  8 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0  0   1  999.999
'U(SO4)3=               deactivated'  0 12 0 0 0 0 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0 -2   1  999.999

'NpO2+                        NpO2+'  0  2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
0 0  1   1 -369.105     FO76
'NpO2CO3-                  NpO2CO3-'  0  5 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
0 0 -1   1 -593.601     FNK95
'NpO2(CO3)2=-          NpO2(CO3)2=-'  0  8 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
0 0 -3   1 -809.832     FNK95
'NpO2(CO3)3==-        NpO2(CO3)3==-'  0 11 0 0 0 0 0 0 3 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
0 0 -5   1 -1020.214    FNK95
'NpO2OH(aq)              NpO2OH(aq)'  1  3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
0 0  0   1 -438.730     FNK95
'NpO2(OH)2-              NpO2(OH)2-'  2  4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
0 0 -1   1 -506.238     FNK95

'HAc(aq)                AceticAcid'  1  0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0
0 0  0   1 -158.300     SAND99/NBC96
'Ac-                       Acetate-'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0
0 0 -1   1 -147.347     SAND99/NBC96

'H3Citrate(aq)          CitricAcid'  3  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1 0  0   1  000.000     SAND99/Mizera
'H2Citrate-             H2Citrate-'  2  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1 0 -1   1    7.476     SAND99/Mizera
'HCitrate=                HCitrate='  1  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1 0 -2   1   18.620     SAND99/Mizera
'Citrate=-                Citrate=-'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1 0 -3   1   33.410     SAND99/Mizera

'H4EDTA(aq)             H4EDTA(aq)'  4  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
0 0  0   1  000.000     SAND99/Mizera
'H3EDTA-                   H3EDTA-'  3  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
0 0 -1   1    5.761     SAND99/Mizera
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'H2EDTA=                   H2EDTA='  2  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
0 0 -2   1   12.870     SAND99/Mizera
'HEDTA=-                   HEDTA=-'  1  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
0 0 -3   1   28.710     SAND99/Mizera
'EDTA==                     EDTA=='  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
0 0 -4   1   53.050     SAND99/Mizera

'H2Ox(aq)                OxalicAcid'  2  0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1   0.000      SAND99/Mizera
'HOx-                    Bioxalate-'  1  0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1   3.209      SAND99/Mizera
'Ox=                       Oxalate='  0  0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -2   1  13.017      SAND99/Mizera

'HLactate(aq)            LacticAcid'  1  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0
0 0  0   1  000.000     SAND99
'Lactate-                  Lactate-'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0
0 0 -1   1    8.798     SAND99

'AmAc++                 AmAcetate++'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0
0 0  2   1 -395.356     ERG_org_memo
'AmCit(aq)            AmCitrate(aq)'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
1 0  0   1 -228.543     SAND99
'AmEDTA-                   AmEDTA-'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1
0 0 -1   1 -232.324     SAND99
'AmOx+                   AmOxalate+'  0  0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0
0 0  1   1 -242.853     SAND99/Borkowski et al 01
'AmLac++                AmLactate++'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0
0 0  2   1 -241.436     SAND99/Moore et al 99 deemed data insufficient

'ThAc2++               ThAcetate2++'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 2 1 0 0 0 0 0 0 0 0
0 0  2   1 -604.800     Moore et al 1999
'PuCit(aq)              deactivated'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
1 0  0   1  999.999
'NpO2H2EDTA-            NpO2H2EDTA-'  2  2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1
0 0 -1   1 -364.098     SAND99/PBMC98
'PuOx+                  deactivated'  0  0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0
0 0  1   1  999.999
'ThLac2++              ThLactate2++'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 2 0
0 0  2   1 -292.400     Moore et al 1999

'ThAc+++                   ThAc+++'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0
0 0  3   1 -448.525     SAND99
'ThCit+                     ThCit+'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
1 0  1   1 -285.898     SAND99/data of CEX96
'ThEDTA(aq)              ThEDTA(aq)'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1
0 0  0   1 -285.419     ERG_org_memo
'ThOx++                  Th(C2O4)++'  0  0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0
0 0  2   1 -297.428     SAND99/Borkowski et al 01
'ThLac+++                  ThLac+++'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1 0
0 0  3   1 -291.152     SAND99/Moore et al 99

'UAc+++                 deactivated'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1 0 0
0 0  3   1  999.999
'UCit+                  deactivated'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
1 0  1   1  999.999
'UEDTA(aq)              deactivated'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1
0 0  0   1  999.999
'ULac+++                deactivated'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0
0 0  3   1  999.999
'UOx++                  deactivated'  0  0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0
0 0  2   1  999.999
```

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'NpO2Ac(aq)              NpO2Ac(aq)'  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0
0 0  0   1 -519.615     ERG_release_memo
'NpO2Cit=              NpO2Citrate='  0  2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
1 0 -2   1 -343.747     SAND99/data of BPBC99
'NpO2EDTA=-              NpO2EDTA=-'  0  2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1
0 0 -3   1 -335.708     SAND99/PBMC98
'NpO2Ox-               NpO2Oxalate-'  0  2 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0
0 0 -1   1 -365.851     SAND99/Borkowski et al 01
'NpO2Lac(aq)        NpO2Lactate(aq)'  0  2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0
0 0  0   1 -364.837     SAND99/Moore et al 99

'MgAc+                        MgAc+'  0  0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0
0 0  1   1 -333.378     ERG_org_memo
'MgCit-                      MgCit-'  0  0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1 0 -1   1 -162.261     ERG_org_memo
'MgEDTA=                    MgEDTA='  0  0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
0 0 -2   1 -153.734     ERG_org_memo
'MgOx(aq)                  MgOx(aq)'  0  0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1 -179.185     ERG_org_memo
'MgLac+                      MgLac+'  0  0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0
0 0  1   1  999.999     No MgLac data

'CaAc+                  (Mg-analog)'  0  0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0
0 0  1   1 -373.210     analogy w/Mg++ (ERG_org_memo)
'CaCit-                 (Mg-analog)'  0  0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1 0 -1   1 -202.093     analogy w/Mg++ (ERG_org_memo)
'CaEDTA=                (Mg-analog)'  0  0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
0 0 -2   1 -193.566     analogy w/Mg++ (ERG_org_memo)
'CaOx(aq)               (Mg-analog)'  0  0 0 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1 -219.017     analogy w/Mg++ (ERG_org_memo)
'CaLac+                 (Mg-analog)'  0  0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0
0 0  1   1  999.999     No MgLac data

'UnuCat#1+                    UC#1+'  0  0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  1   1  999.999
'NpO2HEDTA=              NpO2HEDTA='  1  2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1
0 0 -2   1 -351.852     SAND99/PBMC98
'UnuAn#2-                     UA#2-'  0  0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1  999.999
'UnuAn#3-                     UA#3-'  0  0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1  999.999
'UnuAn#4-                     UA#4-'  0  0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   1  999.999
'UnuNeu#1(aq)              UN#1(aq)'  0  0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   1  999.999

'AmOHCO3(c)______________AmOHCO3(c)'  1  4 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0  0   2  -570.34     Fanghanel et al. 1999
'Am(OH)3(s)______________Am(OH)3(s)'  3  3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0  0   2  -495.32     Konnecke et al. 1997
'NaAm(CO3)2.6H2O(c)________________' 12 12 1 0 0 0 0 0 2 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
0 0  0   2 -1396.47     RRFFN96
'AmPO4(c)__________________AmPO4(c)'  0  4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0
0 0  0   2  -709.75     RFF92

'PuOHCO3(c)_____________deactivated'  1  4 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0  0   2   999.999
'Pu(OH)3(s)_____________deactivated'  3  3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0  0   2   999.999
'NaPu(CO3)2.6H2O(c)_____deactivated' 12 12 1 0 0 0 0 0 2 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0  0   2   999.999
'PuPO4(c)_______________deactivated'  0  4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 0 0 0
0 0  0   2   999.999
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'ThO2(am)_____Hydrous_Thorium_Oxide'  0  2 0  0 0 0 0  0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0 0  0   2 -451.408     FRM91
'Th(SO4)2.9H2O(s)__________________' 18 17 0  0 0 0 0  2 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0 0  0   2 -1775.90     FR92
'Th(SO4)2.8H2O(s)__________________' 16 16 0  0 0 0 0  2 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0 0  0   2 -1680.00     FR92
'Th(SO4)2.Na2SO4.6H2O(16C,s)_______' 12 18 2  0 0 0 0  3 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0 0  0   2 -2011.29     FR92
'Th(SO4)2.K2SO4.4H2O(16C,s)________'  8 16 0  2 0 0 0  3 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0 0  0   2 -1837.57     FR92
'Th(SO4)2.2K2SO4.2H2O(16C,s)_______'  4 18 0  4 0 0 0  4 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
0 0 0  0   2 -2181.81     FR92
'2[Th(SO4)2.7/2K2SO4(16C,s)]_______'  0 44 0 14 0 0 0 11 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0
0 0 0  0   2 -5581.66 =2[-2790.83] FR92

'UO2(am)________Hydrous_U(IV)_Oxide'  0  2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0  0   2 -399.67      RFSMMN

'NpO2OH(aged)__________NpO2OH(aged)'  1  3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
0 0  0   2  -454.369    FNK95/NFRK95
'NpO2OH(amor)__________NpO2OH(amor)'  1  3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
0 0  0   2  -452.757    FNK95/NFRK95
'2[NaNpO2CO3.7/2H2O(s)]____________' 14 17 2 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0
0 0  0   2 -2096.116    =2*(-1048.058)  FNK95/NFRK95
'Na3NpO2(CO3)2(s)__Na3NpO2(CO3)2(s)'  0  8 3 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
0 0  0   2 -1144.597    FNK95/NFRK95
'KNpO2CO3(s)____________KNpO2CO3(s)'  0  5 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
0 0  0   2  -727.330    Novak et al. 1997
'K3NpO2(CO3)2(s)____K3NpO2(CO3)2(s)'  0  8 0 3 0 0 0 0 2 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
0 0  0   2 -1173.546    Novak et al. 1997

'H2Ox.2H2O(s)________H2C2O4.2H2O(s)'  6  2 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -191.346     ERG_ox_memo
'NaHOx.H2O(s)________NaHC2O4.H2O(s)'  3  1 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -202.253     ERG_ox_memo
'Na2Ox(s)________________Na2C2O4(s)'  0  0 2 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -203.823     ERG_ox_memo
'CO2("solid",DISABLED)_____________'  0  2 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2    0.0

'CaSO4_____________________Anhydrite'  0  4 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -533.73      HMW84
'NaK3(SO4)2__Aphthitalite/Glaserite'  0  8 1 3 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1057.05     HMW84
'CaCl2.6H2O____________Antarcticite' 12  6 0 0 0 1 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -893.65      HMW84
'CaCO3_____________________Aragonite'  0  3 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -455.17      HMW84
'K2SO4______________________Arcanite'  0  4 0 2 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -532.39      HMW84
'MgCl2.6H2O______________Bischofite' 12  6 0 0 1 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -853.1       HMW84
'Na2Mg(SO4)2.4H2O__________Bloedite'  8 12 2 0 1 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1383.6      HMW84
'Mg(OH)2_____________________Brucite'  2  2 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -335.4       HMW84
'Na6CO3(SO4)2______________Burkeite'  0 11 6 0 0 0 0 2 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1449.4      HMW84
'CaCO3________________________Calcite'  0  3 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -455.6       HMW84
'CaCl2.4H2O______CaCl2_Tetrahydrite'  8  4 0 0 0 1 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -698.7       HMW84
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'Ca4Cl2(OH)6.13H2O__CaOxychloride_A' 32 19 0 0 0 4 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -2658.45     HMW84
'Ca2Cl2(OH)2.H2O____CaOxychloride_B'  4  3 0 0 0 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -778.41      HMW84
'KMgCl3.6H2O_____________Carnallite' 12  6 0 1 1 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1020.3      HMW84
'MgSO4.7H2O________________Epsomite' 14 11 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1157.83     HMW84
'CaNa2(CO3)2.5H2O________Gaylussite' 10 11 2 0 0 1 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1360.5      HMW84
'Na2Ca(SO4)2_____________Glauberite'  0  8 2 0 0 1 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1047.45     HMW84
'CaSO4.2H2O__________________Gypsum'  4  6 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -725.56      HMW84
'NaCl________________________Halite'  0  0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -154.99      HMW84
'MgSO4.6H2O_____________Hexahydrite' 12 10 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1061.60     HMW84
'KMgClSO4.3H2O______________Kainite'  6  7 0 1 1 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -938.2       HMW84
'KHCO3___________________Kalicinite'  1  3 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -350.06      HMW84
'MgSO4.H2O________________Kieserite'  2  5 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -579.80      HMW84
'K2Mg(SO4)2.4H2O____________Leonite'  8 12 0 2 1 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1403.97     HMW84
'Na4Ca(SO4)3.2H2O_______Labile_Salt'  4 14 4 0 0 1 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1751.45     HMW84
'MgCO3____________________Magnesite'  0  3 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -414.45      HMW84
'Mg2Cl(OH)3.4H2O______MgOxychloride' 11  7 0 0 2 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1029.6      HMW84
'KHSO4___________________Mercallite'  1  4 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -417.57      HMW84
'Na2SO4.10H2O____________Mirabilite' 20 14 2 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1471.15     HMW84
'K8H6(SO4)7________________Misenite'  6 28 0 8 0 0 0 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -3039.24     HMW84
'NaHCO3___________________Nahcolite'  1  3 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -343.33      HMW84
'Na2CO3.10H2O________________Natron' 20 13 2 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1382.78     HMW84
'MgCO3.3H2O____________Nesquehonite'  6  6 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -695.3       HMW84
'K2Mg(SO4)2.6H2O_Picromerite/Schoen' 12 14 0 2 1 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1596.1      HMW84
'Na2Ca(CO3)2.2H2O________Pirssonite'  4  8 2 0 0 1 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1073.1      HMW84
'K2MgCa2(SO4)4.2H2O______Polyhalite'  4 18 0 2 1 2 0 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -2282.5      HMW84
'Ca(OH)2________________Portlandite'  2  2 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -362.12      HMW84
'K2CO3.3/2H2O___Potassium_Carbonate' 3 4.5 0 2 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -577.37      HMW84
'K8H4(CO3)6.3H2O___K-Sequicarbonate' 10 21 0 8 0 0 0 0 6 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -2555.4      HMW84
'KNaCO3.6H2O_________K-Na-Carbonate' 12  9 1 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1006.8      HMW84
'K2NaH(CO3)2.2H2O___Potassium_Trona'  5  8 1 2 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -971.74      HMW84
'K3H(SO4)2__Sesquipotassium_Sulfate'  1  8 0 3 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -950.8       HMW84
'Na3H(SO4)2____Sesquisodium_Sulfate'  1  8 3 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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0 0  0   2 -919.6       HMW84
'Na2CO3.7H2O____Na2CO3-Heptahydrate' 14 10 2 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1094.95     HMW84
'KCl_________________________Sylvite'  0  0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -164.84      HMW84
'K2Ca(SO4)2.H2O___________Syngenite'  2  9 0 2 0 1 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1164.8      HMW84
'Mg2CaCl6.12H2O________Tachyhydrite' 24 12 0 0 2 1 6 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -2015.9      HMW84
'Na2SO4___________________Thenardite'  0  4 2 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -512.35      HMW84
'Na2CO3.H2O___________Thermonatrite'  2  4 2 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -518.8       HMW84
'Na3H(CO3)2.2H2O______________Trona'  5  8 3 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -960.38      HMW84
'Na2B4O7.10H2O________________Borax' 20 17 2 0 0 0 0 0 0 0 0 4 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -2224.16     FW86
'B(OH)3____________Borix_Acid_Solid'  3  3 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -390.88      FW86
'KB5O8.4H2O____K-Pentaborate_(30_C)'  8 12 0 1 0 0 0 0 0 0 0 5 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1770.26     FW86
'K2B4O7.4H2O___K-Tetraborate_(30_C)'  8 11 0 2 0 0 0 0 0 0 0 4 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1663.47     FW86
'NaBO2.4H2O_______Sodium_Metaborate'  8  6 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -761.42      FW86
'NaB5O8.5H2O_____Sodium_Pentaborate' 10 13 1 0 0 0 0 0 0 0 0 5 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1854.80     FW86
'NaBO2.NaCl.2H2O___Teepleite_(20_C)'  4  4 2 0 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -725.77      FW86
'CaMg(CO3)2________________Dolomite'  0  6 0 0 1 1 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -871.99      HMW84
'Mg5(CO3)4(OH)2.4H2O_HydroMagne5424' 10 18 0 0 5 0 0 0 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -2364.06     R&H73
'Mg4(CO3)3(OH)2.3H2O_HydroMagne4323'  8 14 0 0 4 0 0 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  0   2 -1856.104    Lang65
'H+(solid)________________to.set.aH+'  1  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0  1   2  0.0
'OH-/H2O(solid)___________to.set.aH+' -1  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 -1   2  0.0

'nDG_BYPASS' 0
'PITZACT'
39 #Cations
53 #Anions
26 #Neutrals

 1  .0765     .2644    .0     .00127   Na+ Cl-           HMW84 (beta0, beta1, beta2,
cphi) NOTE: HMW gives .2644; P91 gives .2664
 1  .01958   1.113     .0     .00497   Na+ SO4=          HMW84
 1  .0454     .398     .0     .0       Na+ HSO4-         HMW84
 1  .0864     .253     .0     .0044    Na+ OH-           HMW84
 1  .0277     .0411    .0     .0       Na+ HCO3-         HMW84
 1  .0399    1.389     .0     .0044    Na+ CO3=          HM284
 1 -.0427     .089     .0     .0114    Na+ B(OH)4-       FW86
 1 -.056     -.910     .0     .0       Na+ B3O3(OH)4-    FW86
 1 -.11      -.40      .0     .0       Na+ B4O5(OH)4=    FW86
 1  .0        .0       .0     .0       Na+ Br-
 1 -.240      .224     .0     .0284    Na+ Am(CO3)2-     FK98/Fanghanel et al. 1999
 1  .125     4.73      .0     .0007    Na+ Am(CO3)3=-    FK98/Fanghanel et al. 1999
 1  .0554     .2755    .0    -.00118   Na+ ClO4-         P91
 1  .0        .0       .0     .0       Na+ NpO2(OH)2-    FNK95
 1  .10       .34      .0     .0       Na+ NpO2CO3-      FNK95
 1  .48      4.4       .0     .0       Na+ NpO2(CO3)2=-  FNK95
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 1  1.80     22.7      .0     .0       Na+ NpO2(CO3)3==- FNK95
 1 -.0533     .0396    .0     .00795   Na+ H2PO4-        P91
 1 -.0583    1.466     .0     .0294    Na+ HPO4=         P91
 1  .1781    3.851     .0    -.05154   Na+ PO4=-         P91
 1  .12       .0       .0     .0       Na+ Th(SO4)3=     FR92
 1  .0        .0       .0     .0       Na+ Th(OH)3(CO3)-
 1  1.31    30.        .0     .0       Na+ Th(CO3)5===   FRSMHC97
 1 -0.2448    .29      .0     .068     Na+ HOx-          SAND99/Mizera
 1 -0.2176   1.74      .0     .122     Na+ Ox=           SAND99/Mizera
 1  0.1426    .22      .0    -.00629   Na+ Ac-           SAND99/NBC96
 1 -0.0563    .29      .0     .047     Na+ Lac-          SAND99/Moore et al 99
 1 -0.1296    .29      .0     .013     Na+ H2Cit-        SAND99/Mizera
 1 -0.0989   1.74      .0     .027     Na+ HCit=         SAND99/Mizera
 1  0.0887   5.22      .0     .047     Na+ Cit=-         SAND99/Mizera
 1 -0.2345    .29      .0     .059     Na+ H3EDTA-       SAND99/Mizera
 1 -0.1262   1.74      .0     .054     Na+ H2EDTA=       SAND99/Mizera
 1  0.5458   5.22      .0   -0.048     Na+ HEDTA=-       SAND99/Mizera
 1  1.016   11.6       .0     .001     Na+ EDTA==        SAND99/Mizera
 1 -.2239     .29      .0     .002     Na+ AmEDTA-       SAND99
 1 -.4226    1.75      .0     .142     Na+ NpO2Cit=      SAND99
 1  .683     5.911     .0     .0       Na+ NpO2EDTA=-    SAND99/PBMC98
 1 -.5418     .29      .0     .095     Na+ NpO2Ox-       SAND99/Borkowski et al 01
 1  .41      17.25     .0     .0       Na+ U(OH)4(CO3)2==  Rai96
 1 1.31      30.0      .0     .0       Na+ U(CO3)5===      Rai96
 1  .0        .0       .0     .0       Na+ U(SO4)3=
 1 2.022     19.22     .0    -.305     Na+ Am(CO3)4==-   FK98/Fanghanel et al. 1999
 1 -.354     0.40      .0     .051     Na+ Am(SO4)2-     FK98
 1 -.8285     .2575    .0     .256     Na+ NpO2H2EDTA-   PBMC98
 1  .1742     .29      .0    -.06923   Na+ CaCit-        analogy w/Mg  (ERG_org_memo)
 1  .2134    1.74      .0     .00869   Na+ CaEDTA=       analogy w/Mg  (ERG_org_memo)
 1  .0        .0       .0     .0       Na+ UnuAn#2-
 1  .0        .0       .0     .0       Na+ UnuAn#3-
 1  .0        .0       .0     .0       Na+ UnuAn#4-
 1  .0        .0       .0     .0       Na+ U(OH)2(CO3)2=
 1  .1742     .29      .0    -.06923   Na+ MgCit-          ERG_org_memo
 1  .2134    1.74      .0     .00869   Na+ MgEDTA=         ERG_org_memo
 1  .4733   -1.504     .0     .0       Na+ NpO2HEDTA=      PBMC98

 1  .04835    .2122    .0    -.00084   K+ Cl-            HMW84
 1  .04995    .7793    .0     .0       K+ SO4=           HMW84
 1 -.0003     .1735    .0     .0       K+ HSO4-          HMW84
 1  .1298     .320     .0     .0041    K+ OH-            HMW84
 1  .0296    -.013     .0    -.008     K+ HCO3-          HMW84
 1  .1488    1.43      .0    -.0015    K+ CO3=           HMW84
 1  .035      .14      .0     .0       K+ B(OH)4-        FW86
 1 -.13       .0       .0     .0       K+ B3O3(OH)4-     FW86
 1 -.022      .0       .0     .0       K+ B4O5(OH)4=     FW86
 1  .0        .0       .0     .0       K+ Br-
 1 -.240      .224     .0     .0284    K+ Am(CO3)2-      analogy w/ Na (FK98)
 1  .125     4.73      .0     .0007    K+ Am(CO3)3=-     analogy w/ Na (FK98)
 1  .0        .0       .0     .0       K+ ClO4-
 1  .0        .0       .0     .0       K+ NpO2(OH)2-     Novak et al. 1997 (made
analogy w/Na+)
 1  .10       .34      .0     .0       K+ NpO2CO3-       Novak et al. 1997 (made
analogy w/Na+)
 1  .48      4.4       .0     .0       K+ NpO2(CO3)2=-   Novak et al. 1997 (made
analogy w/Na+)
 1 2.34     22.7     -96.    -.22      K+ NpO2(CO3)3==-  Novak et al. 1997 (calculated
from K+ data)
 1 -.0678    -.1042    .0     .0       K+ H2PO4-         P91
 1  .0248    1.274     .0     .0164    K+ HPO4=          P91
 1  .3729    3.972     .0    -.08680   K+ PO4=-          P91
 1  .90       .0       .0     .0       K+ Th(SO4)3=      FR92
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 1  .0        .0       .0     .0       K+ Th(OH)3(CO3)-
 1 1.31     30.       .0     .0       K+ Th(CO3)5===    analogy w/ Na (FRSMHC97)
 1 -0.2448    .29      .0     .068     K+ HOx-           analogy w/ Na (SAND99/Mizera)
 1 -0.2176   1.74      .0     .122     K+ Ox=            analogy w/ Na (SAND99/Mizera)
 1  .1587     .3251    .0    -.0066    K+ Ac-            P91
 1 -0.0563    .29      .0     .047     K+ Lac-           analogy w/ Na (SAND99/Moore
et al 99)
 1 -0.1296    .29      .0     .013     K+ H2Cit-         analogy w/ Na (SAND99/Mizera)
 1 -0.0989   1.74      .0     .027     K+ HCit=          analogy w/ Na (SAND99/Mizera)
 1  0.0887   5.22      .0     .047     K+ Cit=-          analogy w/ Na (SAND99/Mizera)
 1 -0.2345    .29      .0     .059     K+ H3EDTA-        analogy w/ Na (SAND99/Mizera)
 1 -0.1262   1.74      .0     .054     K+ H2EDTA=        analogy w/ Na (SAND99/Mizera)
 1  0.5458   5.22      .0   -0.048     K+ HEDTA=-        analogy w/ Na (SAND99/Mizera)
 1  1.016   11.6       .0     .001     K+ EDTA==         analogy w/ Na (SAND99/Mizera)
 1 -.2239     .29      .0     .002     K+ AmEDTA-        analogy w/ Na (SAND99)
 1 -.4226    1.75      .0     .142     K+ NpO2Cit=       analogy w/ Na (SAND99)
 1  .683     5.911     .0     .0       K+ NpO2EDTA=-     analogy w/ Na (SAND99/PBMC98)
 1 -.5418     .29      .0     .095     K+ NpO2Ox-        analogy w/ Na
(SAND99/Borkowski et al 01)
 1  .41     17.25      .0     .0       K+ U(OH)4(CO3)2== analogy w/ Na (Rai96)
 1 1.31     30.0       .0     .0       K+ U(CO3)5===     analogy w/ Na, analogy w/Th
(FRSMHC97)
 1  .0        .0       .0     .0       K+ U(SO4)3=
 1 2.022    19.22      .0    -.305     K+ Am(CO3)4==-    analogy w/ Na (FK98)
 1 -.354     0.40      .0     .051     K+ Am(SO4)2-      analogy w/ Na (FK98)
 1 -.8285    .2575     .0     .256     K+ NpO2H2EDTA-    analogy w/ Na (PBMC98)
 1  .1742     .29      .0    -.06923   K+ CaCit-         analogy w/ Na, analogy w/ Mg
(ERG_org_memo)
 1  .2134    1.74      .0     .00869   K+ CaEDTA=        analogy w/ Na, analogy w/ Mg
(ERG_org_memo)
 1  .0        .0       .0     .0       K+ UnuAn#2-
 1  .0        .0       .0     .0       K+ UnuAn#3-
 1  .0        .0       .0     .0       K+ UnuAn#4-
 1  .0        .0       .0     .0       K+ U(OH)2(CO3)2=
 1  .1742     .29      .0    -.06923   K+ MgCit-          analogy w/ Na (ERG_org_memo)
 1  .2134    1.74      .0     .00869   K+ MgEDTA=         analogy w/ Na (ERG_org_memo)
 1  .4733   -1.504     .0     .0       K+ NpO2HEDTA=      analogy w/ Na (PBMC98)

 1  .3159     1.614    .0    -.00034   Ca++ Cl-          HMW84
 2  .20       3.1973 -54.24   .0       Ca++ SO4=         HMW84
 1  .2145     2.53     .0     .0       Ca++ HSO4-        HMW84
 1 -.1747     -.2303  -5.72   .0       Ca++ OH-          HMW84
 1  .4        2.977    .0     .0       Ca++ HCO3-        HMW84
 2  .0        .0       .0     .0       Ca++ CO3=         HMW84
 1  .0        .0       .0     .0       Ca++ B(OH)4-      FW86
 1  .0        .0       .0     .0       Ca++ B3O3(OH)4-   FW86
 2  .0        .0       .0     .0       Ca++ B4O5(OH)4=   FW86
 1  .0        .0       .0     .0       Ca++ Br-
 1  .0        .0       .0     .0       Ca++ Am(CO3)2-
 3  .0        .0       .0     .0       Ca++ Am(CO3)3=-
 1  .4511     1.756    .0    -.00500   Ca++ ClO4-        P91
 1  .0        .0       .0     .0       Ca++ NpO2(OH)2-
 1  .10       .34      .0     .0       Ca++ NpO2CO3-      by analogy w/ Mg++ (Al
Mahamid et al. 1998)
 3  .48       4.4      .0     .0       Ca++ NpO2(CO3)2=-  by analogy w/ Mg++ (Al
Mahamid et al. 1998)
 3  2.07     22.7     -48.   -.11      Ca++ NpO2(CO3)3==- by analogy w/ Mg++ (Al
Mahamid et al. 1998)
 1  .0        .0       .0     .0       Ca++ H2PO4-
 2  .0        .0       .0     .0       Ca++ HPO4=
 3  .0        .0       .0     .0       Ca++ PO4=-
 2  .0        .0       .0     .0       Ca++ Th(SO4)3=
 1  .0        .0       .0     .0       Ca++ Th(OH)3(CO3)-
```

```
 3  .0         .0        .0      .0       Ca++ Th(CO3)5===
 1  .0         .0        .0      .0       Ca++ HOx-
 2  .0         .0        .0      .0       Ca++ Ox=
 1  .0         .0        .0      .0       Ca++ Ac-
 1  .0         .0        .0      .0       Ca++ Lac-
 1  .0         .0        .0      .0       Ca++ H2Cit-
 2  .0         .0        .0      .0       Ca++ HCit=
 3  .0         .0        .0      .0       Ca++ Cit=-
 3  .0         .0        .0      .0       Ca++ H3EDTA-
 3  .0         .0        .0      .0       Ca++ H2EDTA=
 3  .0         .0        .0      .0       Ca++ HEDTA=-
 3  .0         .0        .0      .0       Ca++ EDTA==
 3  .0         .0        .0      .0       Ca++ AmEDTA-
 2  .0         .0        .0      .0       Ca++ NpO2Cit=
 3  .0         .0        .0      .0       Ca++ NpO2EDTA==-
 1  .0         .0        .0      .0       Ca++ NpO2Ox-
 3  .0         .0        .0      .0       Ca++ U(OH)4(CO3)2==
 3  .0         .0        .0      .0       Ca++ U(CO3)5===
 2  .0         .0        .0      .0       Ca++ U(SO4)3=
 3  .0         .0        .0      .0       Ca++ Am(CO3)4==-
 1  .0         .0        .0      .0       Ca++ Am(SO4)2-
 1  .0         .0        .0      .0       Ca++ NpO2H2EDTA-
 1  .0         .0        .0      .0       Ca++ CaCit-
 3  .0         .0        .0      .0       Ca++ CaEDTA=
 3  .0         .0        .0      .0       Ca++ UnuAn#2-
 1  .0         .0        .0      .0       Ca++ UnuAn#3-
 3  .0         .0        .0      .0       Ca++ UnuAn#4-
 2  .0         .0        .0      .0       Ca++ U(OH)2(CO3)2=
 1  .0         .0        .0      .0       Ca++ MgCit-
 2  .0         .0        .0      .0       Ca++ MgEDTA=
 2  .0         .0        .0      .0       Ca++ NpO2HEDTA=

 1  .35235   1.6815    .0      .00519   Mg++ Cl-           HMW84
 2  .2210    3.343   -37.23    .025     Mg++ SO4=          HMW84
 1  .4746    1.729     .0      .0       Mg++ HSO4-         HMW84
 1  .0         .0        .0      .0       Mg++ OH-           HMW84
 1  .329       .6072     .0      .0       Mg++ HCO3-         HMW84
 2  .0         .0        .0      .0       Mg++ CO3=          HMW84
 1  .0         .0        .0      .0       Mg++ B(OH)4-       FW86
 1  .0         .0        .0      .0       Mg++ B3O3(OH)4-    FW86
 2  .0         .0        .0      .0       Mg++ B4O5(OH)4=    FW86
 1  .0         .0        .0      .0       Mg++ Br-
 1  .0         .0        .0      .0       Mg++ Am(CO3)2-
 3  .0         .0        .0      .0       Mg++ Am(CO3)3=-
 1  .4961    2.008     .0      .009578  Mg++ ClO4-           P91
 1  .0         .0        .0      .0       Mg++ NpO2(OH)2-
 1  .10        .34       .0      .0       Mg++ NpO2CO3-        Al Mahamid et al. 1998 (made
analogy w/ Na)
 3  .48      4.4       .0      .0       Mg++ NpO2(CO3)2=-    Al Mahamid et al. 1998 (made
analogy w/ Na)
 3  2.07     22.7     -48.    -.11      Mg++ NpO2(CO3)3==- Al Mahamid et al. 1998
(averaged Na and K values)
 1  .0         .0        .0      .0       Mg++ H2PO4-
 2  .0         .0        .0      .0       Mg++ HPO4=
 3  .0         .0        .0      .0       Mg++ PO4=-
 2  .0         .0        .0      .0       Mg++ Th(SO4)3=
 1  .0         .0        .0      .0       Mg++ Th(OH)3(CO3)-
 3  .0         .0        .0      .0       Mg++ Th(CO3)5===
 1  .0         .0        .0      .0       Mg++ HOx-
 2  .0         .0        .0      .0       Mg++ Ox=
 1  .0         .0        .0      .0       Mg++ Ac-
 1  .0         .0        .0      .0       Mg++ Lac-
 1  .0         .0        .0      .0       Mg++ H2Cit-
```

2	.0	.0	.0	.0	Mg++ HCit=	
3	.0	.0	.0	.0	Mg++ Cit=-	
3	.0	.0	.0	.0	Mg++ H3EDTA-	
3	.0	.0	.0	.0	Mg++ H2EDTA=	
3	.0	.0	.0	.0	Mg++ HEDTA=-	
3	.0	.0	.0	.0	Mg++ EDTA==	
3	.0	.0	.0	.0	Mg++ AmEDTA-	
2	.0	.0	.0	.0	Mg++ NpO2Cit=	
3	.0	.0	.0	.0	Mg++ NpO2EDTA==-	
1	.0	.0	.0	.0	Mg++ NpO2Ox-	
3	.0	.0	.0	.0	Mg++ U(OH)4(CO3)2==	
3	.0	.0	.0	.0	Mg++ U(CO3)5===	
2	.0	.0	.0	.0	Mg++ U(SO4)3=	
3	.0	.0	.0	.0	Mg++ Am(CO3)4==-	
1	.0	.0	.0	.0	Mg++ Am(SO4)2-	
1	.0	.0	.0	.0	Mg++ NpO2H2EDTA-	
1	.0	.0	.0	.0	Mg++ CaCit-	
3	.0	.0	.0	.0	Mg++ CaEDTA=	
3	.0	.0	.0	.0	Mg++ UnuAn#2-	
1	.0	.0	.0	.0	Mg++ UnuAn#3-	
2	.0	.0	.0	.0	Mg++ UnuAn#4-	
2	.0	.0	.0	.0	Mg++ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	Mg++ MgCit-	
2	.0	.0	.0	.0	Mg++ MgEDTA=	
2	.0	.0	.0	.0	Mg++ NpO2HEDTA=	
1	-.10	1.658	.0	.0	MgOH+ Cl-	HMW84
1	.0	.0	.0	.0	MgOH+ SO4=	HMW84
1	.0	.0	.0	.0	MgOH+ HSO4-	HMW84
1	.0	.0	.0	.0	MgOH+ OH-	HMW84
1	.0	.0	.0	.0	MgOH+ HCO3-	HMW84
1	.0	.0	.0	.0	MgOH+ CO3=	HMW84
1	.0	.0	.0	.0	MgOH+ B(OH)4-	
1	.0	.0	.0	.0	MgOH+ B3O3(OH)4-	
1	.0	.0	.0	.0	MgOH+ B4O5(OH)4=	
1	.0	.0	.0	.0	MgOH+ Br-	
1	.0	.0	.0	.0	MgOH+ Am(CO3)2-	
1	.0	.0	.0	.0	MgOH+ Am(CO3)3=-	
1	.0	.0	.0	.0	MgOH+ ClO4-	
1	.0	.0	.0	.0	MgOH+ NpO2(OH)2-	
1	.0	.0	.0	.0	MgOH+ NpO2CO3-	
1	.0	.0	.0	.0	MgOH+ NpO2(CO3)2=-	
1	.0	.0	.0	.0	MgOH+ NpO2(CO3)3==-	
1	.0	.0	.0	.0	MgOH+ H2PO4-	
1	.0	.0	.0	.0	MgOH+ HPO4=	
1	.0	.0	.0	.0	MgOH+ PO4=-	
1	.0	.0	.0	.0	MgOH+ Th(SO4)3=	
1	.0	.0	.0	.0	MgOH+ Th(OH)3(CO3)-	
1	.0	.0	.0	.0	MgOH+ Th(CO3)5===	
1	.0	.0	.0	.0	MgOH+ HOx-	
1	.0	.0	.0	.0	MgOH+ Ox=	
1	.0	.0	.0	.0	MgOH+ Ac-	
1	.0	.0	.0	.0	MgOH+ Lac-	
1	.0	.0	.0	.0	MgOH+ H2Cit-	
1	.0	.0	.0	.0	MgOH+ HCit=	
1	.0	.0	.0	.0	MgOH+ Cit=-	
1	.0	.0	.0	.0	MgOH+ H3EDTA-	
1	.0	.0	.0	.0	MgOH+ H2EDTA=	
1	.0	.0	.0	.0	MgOH+ HEDTA=-	
1	.0	.0	.0	.0	MgOH+ EDTA==	
1	.0	.0	.0	.0	MgOH+ AmEDTA-	
1	.0	.0	.0	.0	MgOH+ NpO2Cit=	
1	.0	.0	.0	.0	MgOH+ NpO2EDTA==-	

1	.0	.0	.0	.0	MgOH+ NpO2Ox-	
1	.0	.0	.0	.0	MgOH+ U(OH)4(CO3)2==	
1	.0	.0	.0	.0	MgOH+ U(CO3)5===	
1	.0	.0	.0	.0	MgOH+ U(SO4)3=	
1	.0	.0	.0	.0	MgOH+ Am(CO3)4==-	
1	.0	.0	.0	.0	MgOH+ Am(SO4)2-	
1	.0	.0	.0	.0	MgOH+ NpO2H2EDTA-	
1	.0	.0	.0	.0	MgOH+ CaCit-	
1	.0	.0	.0	.0	MgOH+ CaEDTA=	
1	.0	.0	.0	.0	MgOH+ UnuAn#2-	
1	.0	.0	.0	.0	MgOH+ UnuAn#3-	
1	.0	.0	.0	.0	MgOH+ UnuAn#4-	
1	.0	.0	.0	.0	MgOH+ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	MgOH+ MgCit-	
1	.0	.0	.0	.0	MgOH+ MgEDTA=	
1	.0	.0	.0	.0	MgOH+ NpO2HEDTA=	

1	.1775	.2945	.0	.0008	H+ Cl-	HMW84
1	.0298	.0	.0	.0438	H+ SO4=	HMW84
1	.2065	.5556	.0	.0	H+ HSO4-	HMW84
1	.0	.0	.0	.0	H+ OH-	HMW84
1	.0	.0	.0	.0	H+ HCO3-	HMW84
1	.0	.0	.0	.0	H+ CO3=	HMW84
1	.0	.0	.0	.0	H+ B(OH)4-	FW86
1	.0	.0	.0	.0	H+ B3O3(OH)4-	FW86
1	.0	.0	.0	.0	H+ B4O5(OH)4=	FW86
1	.0	.0	.0	.0	H+ Br-	
1	.0	.0	.0	.0	H+ Am(CO3)2-	
1	.0	.0	.0	.0	H+ Am(CO3)3=-	
1	.1747	.2931	.0	.00819	H+ ClO4-	P91
1	.0	.0	.0	.0	H+ NpO2(OH)2-	
1	.0	.0	.0	.0	H+ NpO2CO3-	
1	.0	.0	.0	.0	H+ NpO2(CO3)2=-	
1	.0	.0	.0	.0	H+ NpO2(CO3)3==-	
1	.0	.0	.0	.0	H+ H2PO4-	
1	.0	.0	.0	.0	H+ HPO4=	
1	.0	.0	.0	.0	H+ PO4=-	
1	.84	.0	.0	.0	H+ Th(SO4)3=	FR92
1	.0	.0	.0	.0	H+ Th(OH)3(CO3)-	
1	.0	.0	.0	.0	H+ Th(CO3)5===	
1	.0	.0	.0	.0	H+ HOx-	
1	.0	.0	.0	.0	H+ Ox=	
1	.0	.0	.0	.0	H+ Ac-	NBC96/Mesmer et al. 89
1	.0	.0	.0	.0	H+ Lac-	
1	.0	.0	.0	.0	H+ H2Cit-	
1	.0	.0	.0	.0	H+ HCit=	
1	.0	.0	.0	.0	H+ Cit=-	
1	.0	.0	.0	.0	H+ H3EDTA-	
1	.0	.0	.0	.0	H+ H2EDTA=	
1	.0	.0	.0	.0	H+ HEDTA=-	
1	.0	.0	.0	.0	H+ EDTA==	
1	.0	.0	.0	.0	H+ AmEDTA-	
1	.0	.0	.0	.0	H+ NpO2Cit=	
1	.0	.0	.0	.0	H+ NpO2EDTA==-	
1	.0	.0	.0	.0	H+ NpO2Ox-	
1	.0	.0	.0	.0	H+ U(OH)4(CO3)2==	
1	.0	.0	.0	.0	H+ U(CO3)5===	
1	.0	.0	.0	.0	H+ U(SO4)3=	
1	.0	.0	.0	.0	H+ Am(CO3)4==-	
1	.0	.0	.0	.0	H+ Am(SO4)2-	
1	.0	.0	.0	.0	H+ NpO2H2EDTA-	
1	.0	.0	.0	.0	H+ CaCit-	
1	.0	.0	.0	.0	H+ CaEDTA=	

1	.0	.0	.0	.0	H+ UnuAn#2-	
1	.0	.0	.0	.0	H+ UnuAn#3-	
1	.0	.0	.0	.0	H+ UnuAn#4-	
1	.0	.0	.0	.0	H+ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	H+ MgCit-	
1	.0	.0	.0	.0	H+ MgEDTA=	
1	.0	.0	.0	.0	H+ NpO2HEDTA=	

1	.16	.0	.0	.0	MgB(OH)4+ Cl-	FW86
1	.0	.0	.0	.0	MgB(OH)4+ SO4=	
1	.0	.0	.0	.0	MgB(OH)4+ HSO4-	
1	.0	.0	.0	.0	MgB(OH)4+ OH-	
1	.0	.0	.0	.0	MgB(OH)4+ HCO3-	
1	.0	.0	.0	.0	MgB(OH)4+ CO3=	
1	.0	.0	.0	.0	MgB(OH)4+ B(OH)4-	
1	.0	.0	.0	.0	MgB(OH)4+ B3O3(OH)4-	
1	.0	.0	.0	.0	MgB(OH)4+ B4O5(OH)4=	
1	.0	.0	.0	.0	MgB(OH)4+ Br-	
1	.0	.0	.0	.0	MgB(OH)4+ Am(CO3)2-	
1	.0	.0	.0	.0	MgB(OH)4+ Am(CO3)3=-	
1	.0	.0	.0	.0	MgB(OH)4+ ClO4-	
1	.0	.0	.0	.0	MgB(OH)4+ NpO2(OH)2-	
1	.0	.0	.0	.0	MgB(OH)4+ NpO2CO3-	
1	.0	.0	.0	.0	MgB(OH)4+ NpO2(CO3)2=-	
1	.0	.0	.0	.0	MgB(OH)4+ NpO2(CO3)3==-	
1	.0	.0	.0	.0	MgB(OH)4+ H2PO4-	
1	.0	.0	.0	.0	MgB(OH)4+ HPO4=	
1	.0	.0	.0	.0	MgB(OH)4+ PO4=-	
1	.0	.0	.0	.0	MgB(OH)4+ Th(SO4)3=	
1	.0	.0	.0	.0	MgB(OH)4+ Th(OH)3(CO3)-	
1	.0	.0	.0	.0	MgB(OH)4+ Th(CO3)5===	
1	.0	.0	.0	.0	MgB(OH)4+ HOx-	
1	.0	.0	.0	.0	MgB(OH)4+ Ox=	
1	.0	.0	.0	.0	MgB(OH)4+ Ac-	
1	.0	.0	.0	.0	MgB(OH)4+ Lac-	
1	.0	.0	.0	.0	MgB(OH)4+ H2Cit-	
1	.0	.0	.0	.0	MgB(OH)4+ HCit=	
1	.0	.0	.0	.0	MgB(OH)4+ Cit=-	
1	.0	.0	.0	.0	MgB(OH)4+ H3EDTA-	
1	.0	.0	.0	.0	MgB(OH)4+ H2EDTA=	
1	.0	.0	.0	.0	MgB(OH)4+ HEDTA=-	
1	.0	.0	.0	.0	MgB(OH)4+ EDTA==	
1	.0	.0	.0	.0	MgB(OH)4+ AmEDTA-	
1	.0	.0	.0	.0	MgB(OH)4+ NpO2Cit=	
1	.0	.0	.0	.0	MgB(OH)4+ NpO2EDTA==-	
1	.0	.0	.0	.0	MgB(OH)4+ NpO2Ox-	
1	.0	.0	.0	.0	MgB(OH)4+ U(OH)4(CO3)2==	
1	.0	.0	.0	.0	MgB(OH)4+ U(CO3)5===	
1	.0	.0	.0	.0	MgB(OH)4+ U(SO4)3=	
1	.0	.0	.0	.0	MgB(OH)4+ Am(CO3)4==-	
1	.0	.0	.0	.0	MgB(OH)4+ Am(SO4)2-	
1	.0	.0	.0	.0	MgB(OH)4+ NpO2H2EDTA-	
1	.0	.0	.0	.0	MgB(OH)4+ CaCit-	
1	.0	.0	.0	.0	MgB(OH)4+ CaEDTA=	
1	.0	.0	.0	.0	MgB(OH)4+ UnuAn#2-	
1	.0	.0	.0	.0	MgB(OH)4+ UnuAn#3-	
1	.0	.0	.0	.0	MgB(OH)4+ UnuAn#4-	
1	.0	.0	.0	.0	MgB(OH)4+ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	MgB(OH)4+ MgCit-	
1	.0	.0	.0	.0	MgB(OH)4+ MgEDTA=	
1	.0	.0	.0	.0	MgB(OH)4+ NpO2HEDTA=	

1	.12	.0	.0	.0	CaB(OH)4+ Cl-	FW86

```
1  .0         .0        .0      .0       CaB(OH)4+ SO4=
1  .0         .0        .0      .0       CaB(OH)4+ HSO4-
1  .0         .0        .0      .0       CaB(OH)4+ OH-
1  .0         .0        .0      .0       CaB(OH)4+ HCO3-
1  .0         .0        .0      .0       CaB(OH)4+ CO3=
1  .0         .0        .0      .0       CaB(OH)4+ B(OH)4-
1  .0         .0        .0      .0       CaB(OH)4+ B3O3(OH)4-
1  .0         .0        .0      .0       CaB(OH)4+ B4O5(OH)4=
1  .0         .0        .0      .0       CaB(OH)4+ Br-
1  .0         .0        .0      .0       CaB(OH)4+ Am(CO3)2-
1  .0         .0        .0      .0       CaB(OH)4+ Am(CO3)3=-
1  .0         .0        .0      .0       CaB(OH)4+ ClO4-
1  .0         .0        .0      .0       CaB(OH)4+ NpO2(OH)2-
1  .0         .0        .0      .0       CaB(OH)4+ NpO2CO3-
1  .0         .0        .0      .0       CaB(OH)4+ NpO2(CO3)2=-
1  .0         .0        .0      .0       CaB(OH)4+ NpO2(CO3)3==-
1  .0         .0        .0      .0       CaB(OH)4+ H2PO4-
1  .0         .0        .0      .0       CaB(OH)4+ HPO4=
1  .0         .0        .0      .0       CaB(OH)4+ PO4=-
1  .0         .0        .0      .0       CaB(OH)4+ Th(SO4)3=
1  .0         .0        .0      .0       CaB(OH)4+ Th(OH)3(CO3)-
1  .0         .0        .0      .0       CaB(OH)4+ Th(CO3)5===
1  .0         .0        .0      .0       CaB(OH)4+ HOx-
1  .0         .0        .0      .0       CaB(OH)4+ Ox=
1  .0         .0        .0      .0       CaB(OH)4+ Ac-
1  .0         .0        .0      .0       CaB(OH)4+ Lac-
1  .0         .0        .0      .0       CaB(OH)4+ H2Cit-
1  .0         .0        .0      .0       CaB(OH)4+ HCit=
1  .0         .0        .0      .0       CaB(OH)4+ Cit=-
1  .0         .0        .0      .0       CaB(OH)4+ H3EDTA-
1  .0         .0        .0      .0       CaB(OH)4+ H2EDTA=
1  .0         .0        .0      .0       CaB(OH)4+ HEDTA=-
1  .0         .0        .0      .0       CaB(OH)4+ EDTA==
1  .0         .0        .0      .0       CaB(OH)4+ AmEDTA-
1  .0         .0        .0      .0       CaB(OH)4+ NpO2Cit=
1  .0         .0        .0      .0       CaB(OH)4+ NpO2EDTA==-
1  .0         .0        .0      .0       CaB(OH)4+ NpO2Ox-
1  .0         .0        .0      .0       CaB(OH)4+ U(OH)4(CO3)2==
1  .0         .0        .0      .0       CaB(OH)4+ U(CO3)5===
1  .0         .0        .0      .0       CaB(OH)4+ U(SO4)3=
1  .0         .0        .0      .0       CaB(OH)4+ Am(CO3)4==-
1  .0         .0        .0      .0       CaB(OH)4+ Am(SO4)2-
1  .0         .0        .0      .0       CaB(OH)4+ NpO2H2EDTA-
1  .0         .0        .0      .0       CaB(OH)4+ CaCit-
1  .0         .0        .0      .0       CaB(OH)4+ CaEDTA=
1  .0         .0        .0      .0       CaB(OH)4+ UnuAn#2-
1  .0         .0        .0      .0       CaB(OH)4+ UnuAn#3-
1  .0         .0        .0      .0       CaB(OH)4+ UnuAn#4-
1  .0         .0        .0      .0       CaB(OH)4+ U(OH)2(CO3)2=
1  .0         .0        .0      .0       CaB(OH)4+ MgCit-
1  .0         .0        .0      .0       CaB(OH)4+ MgEDTA=
1  .0         .0        .0      .0       CaB(OH)4+ NpO2HEDTA=

1  .5856     5.6        .0   -0.0166     Am+++ Cl-           FK98/Konnecke et al. 1997
3 1.792     15.04       .0     .600      Am+++ SO4=          FK98
1  .0         .0        .0      .0       Am+++ HSO4-
1  .0         .0        .0      .0       Am+++ OH-
1  .0         .0        .0      .0       Am+++ HCO3-
3  .0         .0        .0      .0       Am+++ CO3=
1  .0         .0        .0      .0       Am+++ B(OH)4-
1  .0         .0        .0      .0       Am+++ B3O3(OH)4-
3  .0         .0        .0      .0       Am+++ B4O5(OH)4=
1  .0         .0        .0      .0       Am+++ Br-
```

1	.0	.0	.0	.0	Am+++ Am(CO3)2-	
3	.0	.0	.0	.0	Am+++ Am(CO3)3=-	
1	.80	5.35	.0	-0.0048	Am+++ ClO4-	FRF90
1	.0	.0	.0	.0	Am+++ NpO2(OH)2-	
1	.0	.0	.0	.0	Am+++ NpO2CO3-	
3	.0	.0	.0	.0	Am+++ NpO2(CO3)2=-	
3	.0	.0	.0	.0	Am+++ NpO2(CO3)3==-	
1	.0	.0	-92.9	.0	Am+++ H2PO4-	RFF95 (from Nd-H2PO4 value)
3	.0	.0	.0	.0	Am+++ HPO4=	
3	.0	.0	.0	.0	Am+++ PO4=-	
3	.0	.0	.0	.0	Am+++ Th(SO4)3=	
1	.0	.0	.0	.0	Am+++ Th(OH)3(CO3)-	
3	.0	.0	.0	.0	Am+++ Th(CO3)5===	
1	.0	.0	.0	.0	Am+++ HOx-	
3	.0	.0	.0	.0	Am+++ Ox=	
1	.0	.0	.0	.0	Am+++ Ac-	
1	.0	.0	.0	.0	Am+++ Lac-	
1	.0	.0	.0	.0	Am+++ H2Cit-	
3	.0	.0	.0	.0	Am+++ HCit=	
3	.0	.0	.0	.0	Am+++ Cit=-	
3	.0	.0	.0	.0	Am+++ H3EDTA-	
3	.0	.0	.0	.0	Am+++ H2EDTA=	
3	.0	.0	.0	.0	Am+++ HEDTA=-	
3	.0	.0	.0	.0	Am+++ EDTA==	
3	.0	.0	.0	.0	Am+++ AmEDTA-	
3	.0	.0	.0	.0	Am+++ NpO2Cit=	
3	.0	.0	.0	.0	Am+++ NpO2EDTA==-	
1	.0	.0	.0	.0	Am+++ NpO2Ox-	
3	.0	.0	.0	.0	Am+++ U(OH)4(CO3)2==	
3	.0	.0	.0	.0	Am+++ U(CO3)5===	
3	.0	.0	.0	.0	Am+++ U(SO4)3=	
3	.0	.0	.0	.0	Am+++ Am(CO3)4==-	
1	.0	.0	.0	.0	Am+++ Am(SO4)2-	
1	.0	.0	.0	.0	Am+++ NpO2H2EDTA-	
1	.0	.0	.0	.0	Am+++ CaCit-	
3	.0	.0	.0	.0	Am+++ CaEDTA=	
3	.0	.0	.0	.0	Am+++ UnuAn#2-	
1	.0	.0	.0	.0	Am+++ UnuAn#3-	
3	.0	.0	.0	.0	Am+++ UnuAn#4-	
3	.0	.0	.0	.0	Am+++ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	Am+++ MgCit-	
3	.0	.0	.0	.0	Am+++ MgEDTA=	
3	.0	.0	.0	.0	Am+++ NpO2HEDTA=	

1	-.072	.403	.0	.0388	AmCO3+ Cl-	FK98/Fanghanel et al. 1999
1	.0	.0	.0	.0	AmCO3+ SO4=	
1	.0	.0	.0	.0	AmCO3+ HSO4-	
1	.0	.0	.0	.0	AmCO3+ OH-	
1	.0	.0	.0	.0	AmCO3+ HCO3-	
1	.0	.0	.0	.0	AmCO3+ CO3=	
1	.0	.0	.0	.0	AmCO3+ B(OH)4-	
1	.0	.0	.0	.0	AmCO3+ B3O3(OH)4-	
1	.0	.0	.0	.0	AmCO3+ B4O5(OH)4=	
1	.0	.0	.0	.0	AmCO3+ Br-	
1	.0	.0	.0	.0	AmCO3+ Am(CO3)2-	
1	.0	.0	.0	.0	AmCO3+ Am(CO3)3=-	
1	.0	.0	.0	.0	AmCO3+ ClO4-	
1	.0	.0	.0	.0	AmCO3+ NpO2(OH)2-	
1	.0	.0	.0	.0	AmCO3+ NpO2CO3-	
1	.0	.0	.0	.0	AmCO3+ NpO2(CO3)2=-	
1	.0	.0	.0	.0	AmCO3+ NpO2(CO3)3==-	
1	.0	.0	.0	.0	AmCO3+ H2PO4-	
1	.0	.0	.0	.0	AmCO3+ HPO4=	

1	.0	.0	.0	.0	AmCO3+	PO4=-	
1	.0	.0	.0	.0	AmCO3+	Th(SO4)3=	
1	.0	.0	.0	.0	AmCO3+	Th(OH)3(CO3)-	
1	.0	.0	.0	.0	AmCO3+	Th(CO3)5===	
1	.0	.0	.0	.0	AmCO3+	HOx-	
1	.0	.0	.0	.0	AmCO3+	Ox=	
1	.0	.0	.0	.0	AmCO3+	Ac-	
1	.0	.0	.0	.0	AmCO3+	Lac-	
1	.0	.0	.0	.0	AmCO3+	H2Cit-	
1	.0	.0	.0	.0	AmCO3+	HCit=	
1	.0	.0	.0	.0	AmCO3+	Cit=-	
1	.0	.0	.0	.0	AmCO3+	H3EDTA-	
1	.0	.0	.0	.0	AmCO3+	H2EDTA=	
1	.0	.0	.0	.0	AmCO3+	HEDTA=-	
1	.0	.0	.0	.0	AmCO3+	EDTA==	
1	.0	.0	.0	.0	AmCO3+	AmEDTA-	
1	.0	.0	.0	.0	AmCO3+	NpO2Cit=	
1	.0	.0	.0	.0	AmCO3+	NpO2EDTA==-	
1	.0	.0	.0	.0	AmCO3+	NpO2Ox-	
1	.0	.0	.0	.0	AmCO3+	U(OH)4(CO3)2==	
1	.0	.0	.0	.0	AmCO3+	U(CO3)5===	
1	.0	.0	.0	.0	AmCO3+	U(SO4)3=	
1	.0	.0	.0	.0	AmCO3+	Am(CO3)4==-	
1	.0	.0	.0	.0	AmCO3+	Am(SO4)2-	
1	.0	.0	.0	.0	AmCO3+	NpO2H2EDTA-	
1	.0	.0	.0	.0	AmCO3+	CaCit-	
1	.0	.0	.0	.0	AmCO3+	CaEDTA=	
1	.0	.0	.0	.0	AmCO3+	UnuAn#2-	
1	.0	.0	.0	.0	AmCO3+	UnuAn#3-	
1	.0	.0	.0	.0	AmCO3+	UnuAn#4-	
1	.0	.0	.0	.0	AmCO3+	U(OH)2(CO3)2=	
1	.0	.0	.0	.0	AmCO3+	MgCit-	
1	.0	.0	.0	.0	AmCO3+	MgEDTA=	
1	.0	.0	.0	.0	AmCO3+	NpO2HEDTA=	

1	1.092	13.7	-160.	-.112	Th++++	Cl-	Roy92
3	1.56	.0	.0	.0	Th++++	SO4=	FR92
1	1.44	.0	.0	.0	Th++++	HSO4-	FR92
1	.0	.0	.0	.0	Th++++	OH-	
1	.0	.0	.0	.0	Th++++	HCO3-	
3	.0	.0	.0	.0	Th++++	CO3=	
1	.0	.0	.0	.0	Th++++	B(OH)4-	
1	.0	.0	.0	.0	Th++++	B3O3(OH)4-	
3	.0	.0	.0	.0	Th++++	B4O5(OH)4=	
1	.0	.0	.0	.0	Th++++	Br-	
1	.0	.0	.0	.0	Th++++	Am(CO3)2-	
3	.0	.0	.0	.0	Th++++	Am(CO3)3=-	
1	1.19	27.3	.0	-.057	Th++++	ClO4-	CFN960119
1	.0	.0	.0	.0	Th++++	NpO2(OH)2-	
1	.0	.0	.0	.0	Th++++	NpO2CO3-	
3	.0	.0	.0	.0	Th++++	NpO2(CO3)2=-	
3	.0	.0	.0	.0	Th++++	NpO2(CO3)3==-	
1	.0	.0	.0	.0	Th++++	H2PO4-	
3	.0	.0	.0	.0	Th++++	HPO4=	
3	.0	.0	.0	.0	Th++++	PO4=-	
3	.0	.0	.0	.0	Th++++	Th(SO4)3=	
1	.0	.0	.0	.0	Th++++	Th(OH)3(CO3)-	
3	.0	.0	.0	.0	Th++++	Th(CO3)5===	
1	.0	.0	.0	.0	Th++++	HOx-	
3	.0	.0	.0	.0	Th++++	Ox=	
1	.0	.0	.0	.0	Th++++	Ac-	
1	.0	.0	.0	.0	Th++++	Lac-	
1	.0	.0	.0	.0	Th++++	H2Cit-	

```
3  .0         .0        .0      .0       Th++++ HCit=
3  .0         .0        .0      .0       Th++++ Cit=-
3  .0         .0        .0      .0       Th++++ H3EDTA-
3  .0         .0        .0      .0       Th++++ H2EDTA=
3  .0         .0        .0      .0       Th++++ HEDTA=-
3  .0         .0        .0      .0       Th++++ EDTA==
3  .0         .0        .0      .0       Th++++ AmEDTA-
3  .0         .0        .0      .0       Th++++ NpO2Cit=
3  .0         .0        .0      .0       Th++++ NpO2EDTA==-
1  .0         .0        .0      .0       Th++++ NpO2Ox-
3  .0         .0        .0      .0       Th++++ U(OH)4(CO3)2==
3  .0         .0        .0      .0       Th++++ U(CO3)5===
3  .0         .0        .0      .0       Th++++ U(SO4)3=
3  .0         .0        .0      .0       Th++++ Am(CO3)4==-
1  .0         .0        .0      .0       Th++++ Am(SO4)2-
1  .0         .0        .0      .0       Th++++ NpO2H2EDTA-
1  .0         .0        .0      .0       Th++++ CaCit-
3  .0         .0        .0      .0       Th++++ CaEDTA=
3  .0         .0        .0      .0       Th++++ UnuAn#2-
1  .0         .0        .0      .0       Th++++ UnuAn#3-
3  .0         .0        .0      .0       Th++++ UnuAn#4-
3  .0         .0        .0      .0       Th++++ U(OH)2(CO3)2=
1  .0         .0        .0      .0       Th++++ MgCit-
3  .0         .0        .0      .0       Th++++ MgEDTA=
3  .0         .0        .0      .0       Th++++ NpO2HEDTA=

1  .593      3.15       .0   -0.006      AmCl++ Cl-           FK98/Konnecke et al. 1997
2  .0         .0        .0      .0       AmCl++ SO4=
1  .0         .0        .0      .0       AmCl++ HSO4-
1  .0         .0        .0      .0       AmCl++ OH-
1  .0         .0        .0      .0       AmCl++ HCO3-
2  .0         .0        .0      .0       AmCl++ CO3=
1  .0         .0        .0      .0       AmCl++ B(OH)4-
1  .0         .0        .0      .0       AmCl++ B3O3(OH)4-
2  .0         .0        .0      .0       AmCl++ B4O5(OH)4=
1  .0         .0        .0      .0       AmCl++ Br-
1  .0         .0        .0      .0       AmCl++ Am(CO3)2-
3  .0         .0        .0      .0       AmCl++ Am(CO3)3=-
1  .0         .0        .0      .0       AmCl++ ClO4-
1  .0         .0        .0      .0       AmCl++ NpO2(OH)2-
1  .0         .0        .0      .0       AmCl++ NpO2CO3-
3  .0         .0        .0      .0       AmCl++ NpO2(CO3)2=-
3  .0         .0        .0      .0       AmCl++ NpO2(CO3)3==-
1  .0         .0        .0      .0       AmCl++ H2PO4-
2  .0         .0        .0      .0       AmCl++ HPO4=
3  .0         .0        .0      .0       AmCl++ PO4=-
2  .0         .0        .0      .0       AmCl++ Th(SO4)3=
1  .0         .0        .0      .0       AmCl++ Th(OH)3(CO3)-
3  .0         .0        .0      .0       AmCl++ Th(CO3)5===
1  .0         .0        .0      .0       AmCl++ HOx-
2  .0         .0        .0      .0       AmCl++ Ox=
1  .0         .0        .0      .0       AmCl++ Ac-
1  .0         .0        .0      .0       AmCl++ Lac-
1  .0         .0        .0      .0       AmCl++ H2Cit-
2  .0         .0        .0      .0       AmCl++ HCit=
3  .0         .0        .0      .0       AmCl++ Cit=-
1  .0         .0        .0      .0       AmCl++ H3EDTA-
2  .0         .0        .0      .0       AmCl++ H2EDTA=
3  .0         .0        .0      .0       AmCl++ HEDTA=-
3  .0         .0        .0      .0       AmCl++ EDTA==
1  .0         .0        .0      .0       AmCl++ NpO2H2EDTA-
2  .0         .0        .0      .0       AmCl++ NpO2Cit=
3  .0         .0        .0      .0       AmCl++ NpO2EDTA==-
```

1	.0	.0	.0	.0	AmCl++ NpO2Ox-	
3	.0	.0	.0	.0	AmCl++ U(OH)4(CO3)2==	
3	.0	.0	.0	.0	AmCl++ U(CO3)5===	
2	.0	.0	.0	.0	AmCl++ U(SO4)3=	
3	.0	.0	.0	.0	AmCl++ Am(CO3)4==-	
1	.0	.0	.0	.0	AmCl++ Am(SO4)2-	
1	.0	.0	.0	.0	AmCl++ NpO2H2EDTA-	
1	.0	.0	.0	.0	AmCl++ CaCit-	
2	.0	.0	.0	.0	AmCl++ CaEDTA=	
1	.0	.0	.0	.0	AmCl++ UnuAn#2-	
1	.0	.0	.0	.0	AmCl++ UnuAn#3-	
1	.0	.0	.0	.0	AmCl++ UnuAn#4-	
2	.0	.0	.0	.0	AmCl++ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	AmCl++ MgCit-	
2	.0	.0	.0	.0	AmCl++ MgEDTA=	
2	.0	.0	.0	.0	AmCl++ NpO2HEDTA=	

1	.1415	.281	.0	.0	NpO2+ Cl-	NFRK95
1	.0	.0	.0	.0	NpO2+ SO4=	
1	.0	.0	.0	.0	NpO2+ HSO4-	
1	.0	.0	.0	.0	NpO2+ OH-	
1	.0	.0	.0	.0	NpO2+ HCO3-	
1	.0	.0	.0	.0	NpO2+ CO3=	
1	.0	.0	.0	.0	NpO2+ B(OH)4-	
1	.0	.0	.0	.0	NpO2+ B3O3(OH)4-	
1	.0	.0	.0	.0	NpO2+ B4O5(OH)4=	
1	.0	.0	.0	.0	NpO2+ Br-	
1	.0	.0	.0	.0	NpO2+ Am(CO3)2-	
1	.0	.0	.0	.0	NpO2+ Am(CO3)3=-	
1	.257	.180	.0	.0081	NpO2+ ClO4-	NFRK95
1	.0	.0	.0	.0	NpO2+ NpO2(OH)2-	
1	.0	.0	.0	.0	NpO2+ NpO2CO3-	
1	.0	.0	.0	.0	NpO2+ NpO2(CO3)2=-	
1	.0	.0	.0	.0	NpO2+ NpO2(CO3)3==-	
1	.0	.0	.0	.0	NpO2+ H2PO4-	
1	.0	.0	.0	.0	NpO2+ HPO4=	
1	.0	.0	.0	.0	NpO2+ PO4=-	
1	.0	.0	.0	.0	NpO2+ Th(SO4)3=	
1	.0	.0	.0	.0	NpO2+ Th(OH)3(CO3)-	
1	.0	.0	.0	.0	NpO2+ Th(CO3)5===	
1	.0	.0	.0	.0	NpO2+ HOx-	
1	.0	.0	.0	.0	NpO2+ Ox=	
1	.0	.0	.0	.0	NpO2+ Ac-	
1	.0	.0	.0	.0	NpO2+ Lac-	
1	.0	.0	.0	.0	NpO2+ H2Cit-	
1	.0	.0	.0	.0	NpO2+ HCit=	
1	.0	.0	.0	.0	NpO2+ Cit=-	
1	.0	.0	.0	.0	NpO2+ H3EDTA-	
1	.0	.0	.0	.0	NpO2+ H2EDTA=	
1	.0	.0	.0	.0	NpO2+ HEDTA=-	
1	.0	.0	.0	.0	NpO2+ EDTA==	
1	.0	.0	.0	.0	NpO2+ AmEDTA-	
1	.0	.0	.0	.0	NpO2+ NpO2Cit=	
1	.0	.0	.0	.0	NpO2+ NpO2EDTA==-	
1	.0	.0	.0	.0	NpO2+ NpO2Ox-	
1	.0	.0	.0	.0	NpO2+ U(OH)4(CO3)2==	
1	.0	.0	.0	.0	NpO2+ U(CO3)5===	
1	.0	.0	.0	.0	NpO2+ U(SO4)3=	
1	.0	.0	.0	.0	NpO2+ Am(CO3)4==-	
1	.0	.0	.0	.0	NpO2+ Am(SO4)2-	
1	.0	.0	.0	.0	NpO2+ NpO2H2EDTA-	
1	.0	.0	.0	.0	NpO2+ CaCit-	
1	.0	.0	.0	.0	NpO2+ CaEDTA=	

```
 1  .0        .0       .0      .0       NpO2+ UnuAn#2-
 1  .0        .0       .0      .0       NpO2+ UnuAn#3-
 1  .0        .0       .0      .0       NpO2+ UnuAn#4-
 1  .0        .0       .0      .0       NpO2+ U(OH)2(CO3)2=
 1  .0        .0       .0      .0       NpO2+ MgCit-
 1  .0        .0       .0      .0       NpO2+ MgEDTA=
 1  .0        .0       .0      .0       NpO2+ NpO2HEDTA=

 1 1.644    15.5       .0      .1       U++++ Cl-          RFSMMN  (values really are
different from Th++++ values)
 3  .0        .0       .0      .0       U++++ SO4=
 1  .0        .0       .0      .0       U++++ HSO4-
 1  .0        .0       .0      .0       U++++ OH-
 1  .0        .0       .0      .0       U++++ HCO3-
 3  .0        .0       .0      .0       U++++ CO3=
 1  .0        .0       .0      .0       U++++ B(OH)4-
 1  .0        .0       .0      .0       U++++ B3O3(OH)4-
 3  .0        .0       .0      .0       U++++ B4O5(OH)4=
 1  .0        .0       .0      .0       U++++ Br-
 1  .0        .0       .0      .0       U++++ Am(CO3)2-
 3  .0        .0       .0      .0       U++++ Am(CO3)3=-
 1  .0        .0       .0      .0       U++++ ClO4-
 1  .0        .0       .0      .0       U++++ NpO2(OH)2-
 1  .0        .0       .0      .0       U++++ NpO2CO3-
 3  .0        .0       .0      .0       U++++ NpO2(CO3)2=-
 3  .0        .0       .0      .0       U++++ NpO2(CO3)3==-
 1  .0        .0       .0      .0       U++++ H2PO4-
 3  .0        .0       .0      .0       U++++ HPO4=
 3  .0        .0       .0      .0       U++++ PO4=-
 3  .0        .0       .0      .0       U++++ Th(SO4)3=
 1  .0        .0       .0      .0       U++++ Th(OH)3(CO3)-
 3  .0        .0       .0      .0       U++++ Th(CO3)5===
 1  .0        .0       .0      .0       U++++ HOx-
 3  .0        .0       .0      .0       U++++ Ox=
 1  .0        .0       .0      .0       U++++ Ac-
 1  .0        .0       .0      .0       U++++ Lac-
 1  .0        .0       .0      .0       U++++ H2Cit-
 3  .0        .0       .0      .0       U++++ HCit=
 3  .0        .0       .0      .0       U++++ Cit=-
 3  .0        .0       .0      .0       U++++ H3EDTA-
 3  .0        .0       .0      .0       U++++ H2EDTA=
 3  .0        .0       .0      .0       U++++ HEDTA=-
 3  .0        .0       .0      .0       U++++ EDTA==
 3  .0        .0       .0      .0       U++++ AmEDTA-
 3  .0        .0       .0      .0       U++++ NpO2Cit=
 3  .0        .0       .0      .0       U++++ NpO2EDTA==-
 1  .0        .0       .0      .0       U++++ NpO2Ox-
 3  .0        .0       .0      .0       U++++ U(OH)4(CO3)2==
 3  .0        .0       .0      .0       U++++ U(CO3)5===
 3  .0        .0       .0      .0       U++++ U(SO4)3=
 3  .0        .0       .0      .0       U++++ Am(CO3)4==-
 1  .0        .0       .0      .0       U++++ Am(SO4)2-
 1  .0        .0       .0      .0       U++++ NpO2H2EDTA-
 1  .0        .0       .0      .0       U++++ CaCit-
 3  .0        .0       .0      .0       U++++ CaEDTA=
 3  .0        .0       .0      .0       U++++ UnuAn#2-
 1  .0        .0       .0      .0       U++++ UnuAn#3-
 3  .0        .0       .0      .0       U++++ UnuAn#4-
 3  .0        .0       .0      .0       U++++ U(OH)2(CO3)2=
 1  .0        .0       .0      .0       U++++ MgCit-
 3  .0        .0       .0      .0       U++++ MgEDTA=
 3  .0        .0       .0      .0       U++++ NpO2HEDTA=
```

```
1 1.0       7.856     .0     .0       UOH+++ Cl-          RFSMMN
3  .0        .0       .0     .0       UOH+++ SO4=
1  .0        .0       .0     .0       UOH+++ HSO4-
1  .0        .0       .0     .0       UOH+++ OH-
1  .0        .0       .0     .0       UOH+++ HCO3-
3  .0        .0       .0     .0       UOH+++ CO3=
1  .0        .0       .0     .0       UOH+++ B(OH)4-
1  .0        .0       .0     .0       UOH+++ B3O3(OH)4-
3  .0        .0       .0     .0       UOH+++ B4O5(OH)4=
1  .0        .0       .0     .0       UOH+++ Br-
1  .0        .0       .0     .0       UOH+++ Am(CO3)2-
3  .0        .0       .0     .0       UOH+++ Am(CO3)3=-
1  .0        .0       .0     .0       UOH+++ ClO4-
1  .0        .0       .0     .0       UOH+++ NpO2(OH)2-
1  .0        .0       .0     .0       UOH+++ NpO2CO3-
3  .0        .0       .0     .0       UOH+++ NpO2(CO3)2=-
3  .0        .0       .0     .0       UOH+++ NpO2(CO3)3==-
1  .0        .0       .0     .0       UOH+++ H2PO4-
3  .0        .0       .0     .0       UOH+++ HPO4=
3  .0        .0       .0     .0       UOH+++ PO4=-
3  .0        .0       .0     .0       UOH+++ Th(SO4)3=
1  .0        .0       .0     .0       UOH+++ Th(OH)3(CO3)-
3  .0        .0       .0     .0       UOH+++ Th(CO3)5===
1  .0        .0       .0     .0       UOH+++ HOx-
3  .0        .0       .0     .0       UOH+++ Ox=
1  .0        .0       .0     .0       UOH+++ Ac-
1  .0        .0       .0     .0       UOH+++ Lac-
1  .0        .0       .0     .0       UOH+++ H2Cit-
3  .0        .0       .0     .0       UOH+++ HCit=
3  .0        .0       .0     .0       UOH+++ Cit=-
3  .0        .0       .0     .0       UOH+++ H3EDTA-
3  .0        .0       .0     .0       UOH+++ H2EDTA=
3  .0        .0       .0     .0       UOH+++ HEDTA=-
3  .0        .0       .0     .0       UOH+++ EDTA==
3  .0        .0       .0     .0       UOH+++ AmEDTA-
3  .0        .0       .0     .0       UOH+++ NpO2Cit=
3  .0        .0       .0     .0       UOH+++ NpO2EDTA==-
1  .0        .0       .0     .0       UOH+++ NpO2Ox-
3  .0        .0       .0     .0       UOH+++ U(OH)4(CO3)2==
3  .0        .0       .0     .0       UOH+++ U(CO3)5===
3  .0        .0       .0     .0       UOH+++ U(SO4)3=
3  .0        .0       .0     .0       UOH+++ Am(CO3)4==-
1  .0        .0       .0     .0       UOH+++ Am(SO4)2-
1  .0        .0       .0     .0       UOH+++ NpO2H2EDTA-
1  .0        .0       .0     .0       UOH+++ CaCit-
3  .0        .0       .0     .0       UOH+++ CaEDTA=
3  .0        .0       .0     .0       UOH+++ UnuAn#2-
1  .0        .0       .0     .0       UOH+++ UnuAn#3-
3  .0        .0       .0     .0       UOH+++ UnuAn#4-
3  .0        .0       .0     .0       UOH+++ U(OH)2(CO3)2=
1  .0        .0       .0     .0       UOH+++ MgCit-
3  .0        .0       .0     .0       UOH+++ MgEDTA=
3  .0        .0       .0     .0       UOH+++ NpO2HEDTA=

1  1.061    5.22      .0     .109     UAc+++ Cl-           analogy w/ Th (SAND99)
3  .0        .0       .0     .0       UAc+++ SO4=
1  .0        .0       .0     .0       UAc+++ HSO4-
1  .0        .0       .0     .0       UAc+++ OH-
1  .0        .0       .0     .0       UAc+++ HCO3-
3  .0        .0       .0     .0       UAc+++ CO3=
1  .0        .0       .0     .0       UAc+++ B(OH)4-
1  .0        .0       .0     .0       UAc+++ B3O3(OH)4-
3  .0        .0       .0     .0       UAc+++ B4O5(OH)4=
```

1	.0	.0	.0	.0	UAc+++	Br-	
1	.0	.0	.0	.0	UAc+++	Am(CO3)2-	
3	.0	.0	.0	.0	UAc+++	Am(CO3)3=-	
1	.0	.0	.0	.0	UAc+++	ClO4-	
1	.0	.0	.0	.0	UAc+++	NpO2(OH)2-	
1	.0	.0	.0	.0	UAc+++	NpO2CO3-	
3	.0	.0	.0	.0	UAc+++	NpO2(CO3)2=-	
3	.0	.0	.0	.0	UAc+++	NpO2(CO3)3==-	
1	.0	.0	.0	.0	UAc+++	H2PO4-	
3	.0	.0	.0	.0	UAc+++	HPO4=	
3	.0	.0	.0	.0	UAc+++	PO4=-	
3	.0	.0	.0	.0	UAc+++	Th(SO4)3=	
1	.0	.0	.0	.0	UAc+++	Th(OH)3(CO3)-	
3	.0	.0	.0	.0	UAc+++	Th(CO3)5===	
1	.0	.0	.0	.0	UAc+++	HOx-	
1	.0	.0	.0	.0	UAc+++	Ox=	
1	.0	.0	.0	.0	UAc+++	Ac-	
1	.0	.0	.0	.0	UAc+++	Lac-	
1	.0	.0	.0	.0	UAc+++	H2Cit-	
3	.0	.0	.0	.0	UAc+++	HCit=	
3	.0	.0	.0	.0	UAc+++	Cit=-	
3	.0	.0	.0	.0	UAc+++	H3EDTA-	
3	.0	.0	.0	.0	UAc+++	H2EDTA=	
3	.0	.0	.0	.0	UAc+++	HEDTA=-	
3	.0	.0	.0	.0	UAc+++	EDTA==	
3	.0	.0	.0	.0	UAc+++	AmEDTA-	
3	.0	.0	.0	.0	UAc+++	NpO2Cit=	
3	.0	.0	.0	.0	UAc+++	NpO2EDTA==-	
1	.0	.0	.0	.0	UAc+++	NpO2Ox-	
3	.0	.0	.0	.0	UAc+++	U(OH)4(CO3)2==	
3	.0	.0	.0	.0	UAc+++	U(CO3)5===	
3	.0	.0	.0	.0	UAc+++	U(SO4)3=	
3	.0	.0	.0	.0	UAc+++	Am(CO3)4==-	
1	.0	.0	.0	.0	UAc+++	Am(SO4)2-	
1	.0	.0	.0	.0	UAc+++	NpO2H2EDTA-	
1	.0	.0	.0	.0	UAc+++	CaCit-	
3	.0	.0	.0	.0	UAc+++	CaEDTA=	
3	.0	.0	.0	.0	UAc+++	UnuAn#2-	
1	.0	.0	.0	.0	UAc+++	UnuAn#3-	
3	.0	.0	.0	.0	UAc+++	UnuAn#4-	
3	.0	.0	.0	.0	UAc+++	U(OH)2(CO3)2=	
1	.0	.0	.0	.0	UAc+++	MgCit-	
3	.0	.0	.0	.0	UAc+++	MgEDTA=	
3	.0	.0	.0	.0	UAc+++	NpO2HEDTA=	

1	-.343	1.74	.0	.5	ThOx++	Cl-	SAND99/Borkowski et al 01
2	.0	.0	.0	.0	ThOx++	SO4=	
1	.0	.0	.0	.0	ThOx++	HSO4-	
1	.0	.0	.0	.0	ThOx++	OH-	
1	.0	.0	.0	.0	ThOx++	HCO3-	
2	.0	.0	.0	.0	ThOx++	CO3=	
1	.0	.0	.0	.0	ThOx++	B(OH)4-	
1	.0	.0	.0	.0	ThOx++	B3O3(OH)4-	
2	.0	.0	.0	.0	ThOx++	B4O5(OH)4=	
1	.0	.0	.0	.0	ThOx++	Br-	
1	.0	.0	.0	.0	ThOx++	Am(CO3)2-	
3	.0	.0	.0	.0	ThOx++	Am(CO3)3=-	
1	.0	.0	.0	.0	ThOx++	ClO4-	
1	.0	.0	.0	.0	ThOx++	NpO2(OH)2-	
1	.0	.0	.0	.0	ThOx++	NpO2CO3-	
3	.0	.0	.0	.0	ThOx++	NpO2(CO3)2=-	
3	.0	.0	.0	.0	ThOx++	NpO2(CO3)3==-	
1	.0	.0	.0	.0	ThOx++	H2PO4-	

```
2  .0        .0       .0     .0       ThOx++ HPO4=
3  .0        .0       .0     .0       ThOx++ PO4=-
2  .0        .0       .0     .0       ThOx++ Th(SO4)3=
1  .0        .0       .0     .0       ThOx++ Th(OH)3(CO3)-
3  .0        .0       .0     .0       ThOx++ Th(CO3)5===
1  .0        .0       .0     .0       ThOx++ HOx-
2  .0        .0       .0     .0       ThOx++ Ox=
1  .0        .0       .0     .0       ThOx++ Ac-
1  .0        .0       .0     .0       ThOx++ Lac-
1  .0        .0       .0     .0       ThOx++ H2Cit-
2  .0        .0       .0     .0       ThOx++ HCit=
3  .0        .0       .0     .0       ThOx++ Cit=-
3  .0        .0       .0     .0       ThOx++ H3EDTA-
3  .0        .0       .0     .0       ThOx++ H2EDTA=
3  .0        .0       .0     .0       ThOx++ HEDTA=-
3  .0        .0       .0     .0       ThOx++ EDTA==
3  .0        .0       .0     .0       ThOx++ AmEDTA-
2  .0        .0       .0     .0       ThOx++ NpO2Cit=
3  .0        .0       .0     .0       ThOx++ NpO2EDTA==-
1  .0        .0       .0     .0       ThOx++ NpO2Ox-
3  .0        .0       .0     .0       ThOx++ U(OH)4(CO3)2==
3  .0        .0       .0     .0       ThOx++ U(CO3)5===
2  .0        .0       .0     .0       ThOx++ U(SO4)3=
3  .0        .0       .0     .0       ThOx++ Am(CO3)4==-
1  .0        .0       .0     .0       ThOx++ Am(SO4)2-
1  .0        .0       .0     .0       ThOx++ NpO2H2EDTA-
1  .0        .0       .0     .0       ThOx++ CaCit-
2  .0        .0       .0     .0       ThOx++ CaEDTA=
1  .0        .0       .0     .0       ThOx++ UnuAn#2-
1  .0        .0       .0     .0       ThOx++ UnuAn#3-
1  .0        .0       .0     .0       ThOx++ UnuAn#4-
2  .0        .0       .0     .0       ThOx++ U(OH)2(CO3)2=
1  .0        .0       .0     .0       ThOx++ MgCit-
2  .0        .0       .0     .0       ThOx++ MgEDTA=
2  .0        .0       .0     .0       ThOx++ NpO2HEDTA=

1  .3088    1.74      .0    -.132     AmAc++ Cl-      ERG_org_memo
2  .0        .0       .0     .0       AmAc++ SO4=
1  .0        .0       .0     .0       AmAc++ HSO4-
1  .0        .0       .0     .0       AmAc++ OH-
1  .0        .0       .0     .0       AmAc++ HCO3-
2  .0        .0       .0     .0       AmAc++ CO3=
1  .0        .0       .0     .0       AmAc++ B(OH)4-
1  .0        .0       .0     .0       AmAc++ B3O3(OH)4-
2  .0        .0       .0     .0       AmAc++ B4O5(OH)4=
1  .0        .0       .0     .0       AmAc++ Br-
1  .0        .0       .0     .0       AmAc++ Am(CO3)2-
3  .0        .0       .0     .0       AmAc++ Am(CO3)3=-
1  .0        .0       .0     .0       AmAc++ ClO4-
1  .0        .0       .0     .0       AmAc++ NpO2(OH)2-
1  .0        .0       .0     .0       AmAc++ NpO2CO3-
3  .0        .0       .0     .0       AmAc++ NpO2(CO3)2=-
3  .0        .0       .0     .0       AmAc++ NpO2(CO3)3==-
1  .0        .0       .0     .0       AmAc++ H2PO4-
2  .0        .0       .0     .0       AmAc++ HPO4=
3  .0        .0       .0     .0       AmAc++ PO4=-
2  .0        .0       .0     .0       AmAc++ Th(SO4)3=
1  .0        .0       .0     .0       AmAc++ Th(OH)3(CO3)-
3  .0        .0       .0     .0       AmAc++ Th(CO3)5===
1  .0        .0       .0     .0       AmAc++ HOx-
2  .0        .0       .0     .0       AmAc++ Ox=
1  .0        .0       .0     .0       AmAc++ Ac-
1  .0        .0       .0     .0       AmAc++ Lac-
```

1	.0	.0	.0	.0	AmAc++ H2Cit-	
2	.0	.0	.0	.0	AmAc++ HCit=	
3	.0	.0	.0	.0	AmAc++ Cit=-	
3	.0	.0	.0	.0	AmAc++ H3EDTA-	
3	.0	.0	.0	.0	AmAc++ H2EDTA=	
3	.0	.0	.0	.0	AmAc++ HEDTA=-	
3	.0	.0	.0	.0	AmAc++ EDTA==	
3	.0	.0	.0	.0	AmAc++ AmEDTA-	
2	.0	.0	.0	.0	AmAc++ NpO2Cit=	
3	.0	.0	.0	.0	AmAc++ NpO2EDTA==-	
1	.0	.0	.0	.0	AmAc++ NpO2Ox-	
3	.0	.0	.0	.0	AmAc++ U(OH)4(CO3)2==	
3	.0	.0	.0	.0	AmAc++ U(CO3)5===	
2	.0	.0	.0	.0	AmAc++ U(SO4)3=	
3	.0	.0	.0	.0	AmAc++ Am(CO3)4==-	
1	.0	.0	.0	.0	AmAc++ Am(SO4)2-	
1	.0	.0	.0	.0	AmAc++ NpO2H2EDTA-	
1	.0	.0	.0	.0	AmAc++ CaCit-	
2	.0	.0	.0	.0	AmAc++ CaEDTA=	
1	.0	.0	.0	.0	AmAc++ UnuAn#2-	
1	.0	.0	.0	.0	AmAc++ UnuAn#3-	
1	.0	.0	.0	.0	AmAc++ UnuAn#4-	
2	.0	.0	.0	.0	AmAc++ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	AmAc++ MgCit-	
2	.0	.0	.0	.0	AmAc++ MgEDTA=	
2	.0	.0	.0	.0	AmAc++ NpO2HEDTA=	

1	0.8397	1.74	.0	-0.332	AmLac++ Cl-	SAND99/Moore et al 1999
2	.0	.0	.0	.0	AmLac++ SO4=	
1	.0	.0	.0	.0	AmLac++ HSO4-	
1	.0	.0	.0	.0	AmLac++ OH-	
1	.0	.0	.0	.0	AmLac++ HCO3-	
2	.0	.0	.0	.0	AmLac++ CO3=	
1	.0	.0	.0	.0	AmLac++ B(OH)4-	
1	.0	.0	.0	.0	AmLac++ B3O3(OH)4-	
2	.0	.0	.0	.0	AmLac++ B4O5(OH)4=	
1	.0	.0	.0	.0	AmLac++ Br-	
1	.0	.0	.0	.0	AmLac++ Am(CO3)2-	
3	.0	.0	.0	.0	AmLac++ Am(CO3)3=-	
1	.0	.0	.0	.0	AmLac++ ClO4-	
1	.0	.0	.0	.0	AmLac++ NpO2(OH)2-	
1	.0	.0	.0	.0	AmLac++ NpO2CO3-	
3	.0	.0	.0	.0	AmLac++ NpO2(CO3)2=-	
3	.0	.0	.0	.0	AmLac++ NpO2(CO3)3==-	
1	.0	.0	.0	.0	AmLac++ H2PO4-	
2	.0	.0	.0	.0	AmLac++ HPO4=	
3	.0	.0	.0	.0	AmLac++ PO4=-	
2	.0	.0	.0	.0	AmLac++ Th(SO4)3=	
1	.0	.0	.0	.0	AmLac++ Th(OH)3(CO3)-	
3	.0	.0	.0	.0	AmLac++ Th(CO3)5===	
1	.0	.0	.0	.0	AmLac++ HOx-	
2	.0	.0	.0	.0	AmLac++ Ox=	
1	.0	.0	.0	.0	AmLac++ Ac-	
1	.0	.0	.0	.0	AmLac++ Lac-	
1	.0	.0	.0	.0	AmLac++ H2Cit-	
2	.0	.0	.0	.0	AmLac++ HCit=	
3	.0	.0	.0	.0	AmLac++ Cit=-	
3	.0	.0	.0	.0	AmLac++ H3EDTA-	
3	.0	.0	.0	.0	AmLac++ H2EDTA=	
3	.0	.0	.0	.0	AmLac++ HEDTA=-	
3	.0	.0	.0	.0	AmLac++ EDTA==	
3	.0	.0	.0	.0	AmLac++ AmEDTA-	
2	.0	.0	.0	.0	AmLac++ NpO2Cit=	

3	.0	.0	.0	.0	AmLac++ NpO2EDTA==-	
1	.0	.0	.0	.0	AmLac++ NpO2Ox-	
3	.0	.0	.0	.0	AmLac++ U(OH)4(CO3)2==	
3	.0	.0	.0	.0	AmLac++ U(CO3)5===	
2	.0	.0	.0	.0	AmLac++ U(SO4)3=	
3	.0	.0	.0	.0	AmLac++ Am(CO3)4==-	
1	.0	.0	.0	.0	AmLac++ Am(SO4)2-	
1	.0	.0	.0	.0	AmLac++ NpO2H2EDTA-	
1	.0	.0	.0	.0	AmLac++ CaCit-	
2	.0	.0	.0	.0	AmLac++ CaEDTA=	
1	.0	.0	.0	.0	AmLac++ UnuAn#2-	
1	.0	.0	.0	.0	AmLac++ UnuAn#3-	
1	.0	.0	.0	.0	AmLac++ UnuAn#4-	
2	.0	.0	.0	.0	AmLac++ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	AmLac++ MgCit-	
2	.0	.0	.0	.0	AmLac++ MgEDTA=	
2	.0	.0	.0	.0	AmLac++ NpO2HEDTA=	

1	-.9374	.29	.0	.248	AmOx+ Cl-	SAND99/Borkowski et al 01
1	.0	.0	.0	.0	AmOx+ SO4=	
1	.0	.0	.0	.0	AmOx+ HSO4-	
1	.0	.0	.0	.0	AmOx+ OH-	
1	.0	.0	.0	.0	AmOx+ HCO3-	
1	.0	.0	.0	.0	AmOx+ CO3=	
1	.0	.0	.0	.0	AmOx+ B(OH)4-	
1	.0	.0	.0	.0	AmOx+ B3O3(OH)4-	
2	.0	.0	.0	.0	AmOx+ B4O5(OH)4=	
1	.0	.0	.0	.0	AmOx+ Br-	
1	.0	.0	.0	.0	AmOx+ Am(CO3)2-	
1	.0	.0	.0	.0	AmOx+ Am(CO3)3=-	
1	.0	.0	.0	.0	AmOx+ ClO4-	
1	.0	.0	.0	.0	AmOx+ NpO2(OH)2-	
1	.0	.0	.0	.0	AmOx+ NpO2CO3-	
1	.0	.0	.0	.0	AmOx+ NpO2(CO3)2=-	
1	.0	.0	.0	.0	AmOx+ NpO2(CO3)3==-	
1	.0	.0	.0	.0	AmOx+ H2PO4-	
1	.0	.0	.0	.0	AmOx+ HPO4=	
1	.0	.0	.0	.0	AmOx+ PO4=-	
1	.0	.0	.0	.0	AmOx+ Th(SO4)3=	
1	.0	.0	.0	.0	AmOx+ Th(OH)3(CO3)-	
1	.0	.0	.0	.0	AmOx+ Th(CO3)5===	
1	.0	.0	.0	.0	AmOx+ HOx-	
1	.0	.0	.0	.0	AmOx+ Ox=	
1	.0	.0	.0	.0	AmOx+ Ac-	
1	.0	.0	.0	.0	AmOx+ Lac-	
1	.0	.0	.0	.0	AmOx+ H2Cit-	
1	.0	.0	.0	.0	AmOx+ HCit=	
1	.0	.0	.0	.0	AmOx+ Cit=-	
1	.0	.0	.0	.0	AmOx+ H3EDTA-	
1	.0	.0	.0	.0	AmOx+ H2EDTA=	
1	.0	.0	.0	.0	AmOx+ HEDTA=-	
1	.0	.0	.0	.0	AmOx+ EDTA==	
1	.0	.0	.0	.0	AmOx+ AmEDTA-	
1	.0	.0	.0	.0	AmOx+ NpO2Cit=	
1	.0	.0	.0	.0	AmOx+ NpO2EDTA==-	
1	.0	.0	.0	.0	AmOx+ NpO2Ox-	
1	.0	.0	.0	.0	AmOx+ U(OH)4(CO3)2==	
1	.0	.0	.0	.0	AmOx+ U(CO3)5===	
1	.0	.0	.0	.0	AmOx+ U(SO4)3=	
1	.0	.0	.0	.0	AmOx+ Am(CO3)4==-	
1	.0	.0	.0	.0	AmOx+ Am(SO4)2-	
1	.0	.0	.0	.0	AmOx+ NpO2H2EDTA-	
1	.0	.0	.0	.0	AmOx+ CaCit-	

```
1  .0        .0       .0      .0       AmOx+ CaEDTA=
1  .0        .0       .0      .0       AmOx+ UnuAn#2-
1  .0        .0       .0      .0       AmOx+ UnuAn#3-
1  .0        .0       .0      .0       AmOx+ UnuAn#4-
1  .0        .0       .0      .0       AmOx+ U(OH)2(CO3)2=
1  .0        .0       .0      .0       AmOx+ MgCit-
1  .0        .0       .0      .0       AmOx+ MgEDTA=
1  .0        .0       .0      .0       AmOx+ NpO2HEDTA=

1 -.7467     .29      .0      .319     UCit+ Cl-          analogy w/ Th (SAND99)
1  .0        .0       .0      .0       UCit+ SO4=
1  .0        .0       .0      .0       UCit+ HSO4-
1  .0        .0       .0      .0       UCit+ OH-
1  .0        .0       .0      .0       UCit+ HCO3-
1  .0        .0       .0      .0       UCit+ CO3=
1  .0        .0       .0      .0       UCit+ B(OH)4-
1  .0        .0       .0      .0       UCit+ B3O3(OH)4-
1  .0        .0       .0      .0       UCit+ B4O5(OH)4=
1  .0        .0       .0      .0       UCit+ Br-
1  .0        .0       .0      .0       UCit+ Am(CO3)2-
1  .0        .0       .0      .0       UCit+ Am(CO3)3=-
1  .0        .0       .0      .0       UCit+ ClO4-
1  .0        .0       .0      .0       UCit+ NpO2(OH)2-
1  .0        .0       .0      .0       UCit+ NpO2CO3-
1  .0        .0       .0      .0       UCit+ NpO2(CO3)2=-
1  .0        .0       .0      .0       UCit+ NpO2(CO3)3==-
1  .0        .0       .0      .0       UCit+ H2PO4-
1  .0        .0       .0      .0       UCit+ HPO4=
1  .0        .0       .0      .0       UCit+ PO4=-
1  .0        .0       .0      .0       UCit+ Th(SO4)3=
1  .0        .0       .0      .0       UCit+ Th(OH)3(CO3)-
1  .0        .0       .0      .0       UCit+ Th(CO3)5===
1  .0        .0       .0      .0       UCit+ HOx-
1  .0        .0       .0      .0       UCit+ Ox=
1  .0        .0       .0      .0       UCit+ Ac-
1  .0        .0       .0      .0       UCit+ Lac-
1  .0        .0       .0      .0       UCit+ H2Cit-
1  .0        .0       .0      .0       UCit+ HCit=
1  .0        .0       .0      .0       UCit+ Cit=-
1  .0        .0       .0      .0       UCit+ H3EDTA-
1  .0        .0       .0      .0       UCit+ H2EDTA=
1  .0        .0       .0      .0       UCit+ HEDTA=-
1  .0        .0       .0      .0       UCit+ EDTA==
1  .0        .0       .0      .0       UCit+ AmEDTA-
1  .0        .0       .0      .0       UCit+ NpO2Cit=
1  .0        .0       .0      .0       UCit+ NpO2EDTA==-
1  .0        .0       .0      .0       UCit+ NpO2Ox-
1  .0        .0       .0      .0       UCit+ U(OH)4(CO3)2==
1  .0        .0       .0      .0       UCit+ U(CO3)5===
1  .0        .0       .0      .0       UCit+ U(SO4)3=
1  .0        .0       .0      .0       UCit+ Am(CO3)4==-
1  .0        .0       .0      .0       UCit+ Am(SO4)2-
1  .0        .0       .0      .0       UCit+ NpO2H2EDTA-
1  .0        .0       .0      .0       UCit+ CaCit-
1  .0        .0       .0      .0       UCit+ CaEDTA=
1  .0        .0       .0      .0       UCit+ UnuAn#2-
1  .0        .0       .0      .0       UCit+ UnuAn#3-
1  .0        .0       .0      .0       UCit+ UnuAn#4-
1  .0        .0       .0      .0       UCit+ U(OH)2(CO3)2=
1  .0        .0       .0      .0       UCit+ MgCit-
1  .0        .0       .0      .0       UCit+ MgEDTA=
1  .0        .0       .0      .0       UCit+ NpO2HEDTA=
```

```
 1  .6677    5.22       .0      .341     ULac+++ Cl-        analogy w/ Th (SAND99/Moore
et al 1999)
 3  .0         .0       .0      .0       ULac+++ SO4=
 1  .0         .0       .0      .0       ULac+++ HSO4-
 1  .0         .0       .0      .0       ULac+++ OH-
 1  .0         .0       .0      .0       ULac+++ HCO3-
 3  .0         .0       .0      .0       ULac+++ CO3=
 1  .0         .0       .0      .0       ULac+++ B(OH)4-
 1  .0         .0       .0      .0       ULac+++ B3O3(OH)4-
 3  .0         .0       .0      .0       ULac+++ B4O5(OH)4=
 1  .0         .0       .0      .0       ULac+++ Br-
 1  .0         .0       .0      .0       ULac+++ Am(CO3)2-
 3  .0         .0       .0      .0       ULac+++ Am(CO3)3=-
 1  .0         .0       .0      .0       ULac+++ ClO4-
 1  .0         .0       .0      .0       ULac+++ NpO2(OH)2-
 1  .0         .0       .0      .0       ULac+++ NpO2CO3-
 3  .0         .0       .0      .0       ULac+++ NpO2(CO3)2=-
 3  .0         .0       .0      .0       ULac+++ NpO2(CO3)3==-
 1  .0         .0       .0      .0       ULac+++ H2PO4-
 3  .0         .0       .0      .0       ULac+++ HPO4=
 3  .0         .0       .0      .0       ULac+++ PO4=-
 3  .0         .0       .0      .0       ULac+++ Th(SO4)3=
 1  .0         .0       .0      .0       ULac+++ Th(OH)3(CO3)-
 3  .0         .0       .0      .0       ULac+++ Th(CO3)5===
 1  .0         .0       .0      .0       ULac+++ HOx-
 3  .0         .0       .0      .0       ULac+++ Ox=
 1  .0         .0       .0      .0       ULac+++ Ac-
 1  .0         .0       .0      .0       ULac+++ Lac-
 1  .0         .0       .0      .0       ULac+++ H2Cit-
 3  .0         .0       .0      .0       ULac+++ HCit=
 3  .0         .0       .0      .0       ULac+++ Cit=-
 3  .0         .0       .0      .0       ULac+++ H3EDTA-
 3  .0         .0       .0      .0       ULac+++ H2EDTA=
 3  .0         .0       .0      .0       ULac+++ HEDTA=-
 3  .0         .0       .0      .0       ULac+++ EDTA==
 3  .0         .0       .0      .0       ULac+++ AmEDTA-
 3  .0         .0       .0      .0       ULac+++ NpO2Cit=
 3  .0         .0       .0      .0       ULac+++ NpO2EDTA==-
 1  .0         .0       .0      .0       ULac+++ NpO2Ox-
 3  .0         .0       .0      .0       ULac+++ U(OH)4(CO3)2==
 3  .0         .0       .0      .0       ULac+++ U(CO3)5===
 3  .0         .0       .0      .0       ULac+++ U(SO4)3=
 3  .0         .0       .0      .0       ULac+++ Am(CO3)4==-
 1  .0         .0       .0      .0       ULac+++ Am(SO4)2-
 1  .0         .0       .0      .0       ULac+++ NpO2H2EDTA-
 1  .0         .0       .0      .0       ULac+++ CaCit-
 3  .0         .0       .0      .0       ULac+++ CaEDTA=
 1  .0         .0       .0      .0       ULac+++ UnuAn#2-
 1  .0         .0       .0      .0       ULac+++ UnuAn#3-
 1  .0         .0       .0      .0       ULac+++ UnuAn#4-
 3  .0         .0       .0      .0       ULac+++ U(OH)2(CO3)2=
 1  .0         .0       .0      .0       ULac+++ MgCit-
 3  .0         .0       .0      .0       ULac+++ MgEDTA=
 3  .0         .0       .0      .0       ULac+++ NpO2HEDTA=

 1 -.343     1.74       .0      .5       UOx++ Cl-         analogy w/Th
(SAND99/Borkowski et al 01)
 2  .0         .0       .0      .0       UOx++ SO4=
 1  .0         .0       .0      .0       UOx++ HSO4-
 1  .0         .0       .0      .0       UOx++ OH-
 1  .0         .0       .0      .0       UOx++ HCO3-
 2  .0         .0       .0      .0       UOx++ CO3=
 1  .0         .0       .0      .0       UOx++ B(OH)4-
```

1	.0	.0	.0	.0	UOx++ B3O3(OH)4-	
2	.0	.0	.0	.0	UOx++ B4O5(OH)4=	
1	.0	.0	.0	.0	UOx++ Br-	
1	.0	.0	.0	.0	UOx++ Am(CO3)2-	
3	.0	.0	.0	.0	UOx++ Am(CO3)3=-	
1	.0	.0	.0	.0	UOx++ ClO4-	
1	.0	.0	.0	.0	UOx++ NpO2(OH)2-	
1	.0	.0	.0	.0	UOx++ NpO2CO3-	
3	.0	.0	.0	.0	UOx++ NpO2(CO3)2=-	
3	.0	.0	.0	.0	UOx++ NpO2(CO3)3==-	
1	.0	.0	.0	.0	UOx++ H2PO4-	
2	.0	.0	.0	.0	UOx++ HPO4=	
3	.0	.0	.0	.0	UOx++ PO4=-	
2	.0	.0	.0	.0	UOx++ Th(SO4)3=	
1	.0	.0	.0	.0	UOx++ Th(OH)3(CO3)-	
3	.0	.0	.0	.0	UOx++ Th(CO3)5===	
1	.0	.0	.0	.0	UOx++ HOx-	
2	.0	.0	.0	.0	UOx++ Ox=	
1	.0	.0	.0	.0	UOx++ Ac-	
1	.0	.0	.0	.0	UOx++ Lac-	
1	.0	.0	.0	.0	UOx++ H2Cit-	
2	.0	.0	.0	.0	UOx++ HCit=	
3	.0	.0	.0	.0	UOx++ Cit=-	
3	.0	.0	.0	.0	UOx++ H3EDTA-	
3	.0	.0	.0	.0	UOx++ H2EDTA=	
3	.0	.0	.0	.0	UOx++ HEDTA=-	
3	.0	.0	.0	.0	UOx++ EDTA==	
3	.0	.0	.0	.0	UOx++ AmEDTA-	
3	.0	.0	.0	.0	UOx++ NpO2Cit=	
3	.0	.0	.0	.0	UOx++ NpO2EDTA==-	
1	.0	.0	.0	.0	UOx++ NpO2Ox-	
3	.0	.0	.0	.0	UOx++ U(OH)4(CO3)2==	
3	.0	.0	.0	.0	UOx++ U(CO3)5===	
2	.0	.0	.0	.0	UOx++ U(SO4)3=	
3	.0	.0	.0	.0	UOx++ Am(CO3)4==-	
1	.0	.0	.0	.0	UOx++ Am(SO4)2-	
1	.0	.0	.0	.0	UOx++ NpO2H2EDTA-	
1	.0	.0	.0	.0	UOx++ CaCit-	
2	.0	.0	.0	.0	UOx++ CaEDTA=	
1	.0	.0	.0	.0	UOx++ UnuAn#2-	
1	.0	.0	.0	.0	UOx++ UnuAn#3-	
1	.0	.0	.0	.0	UOx++ UnuAn#4-	
2	.0	.0	.0	.0	UOx++ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	UOx++ MgCit-	
2	.0	.0	.0	.0	UOx++ MgEDTA=	
2	.0	.0	.0	.0	UOx++ NpO2HEDTA=	

1	1.061	5.22	.0	.109	ThAc+++ Cl-	SAND99
3	.0	.0	.0	.0	ThAc+++ SO4=	
1	.0	.0	.0	.0	ThAc+++ HSO4-	
1	.0	.0	.0	.0	ThAc+++ OH-	
1	.0	.0	.0	.0	ThAc+++ HCO3-	
3	.0	.0	.0	.0	ThAc+++ CO3=	
1	.0	.0	.0	.0	ThAc+++ B(OH)4-	
1	.0	.0	.0	.0	ThAc+++ B3O3(OH)4-	
3	.0	.0	.0	.0	ThAc+++ B4O5(OH)4=	
1	.0	.0	.0	.0	ThAc+++ Br-	
1	.0	.0	.0	.0	ThAc+++ Am(CO3)2-	
3	.0	.0	.0	.0	ThAc+++ Am(CO3)3=-	
1	.0	.0	.0	.0	ThAc+++ ClO4-	
1	.0	.0	.0	.0	ThAc+++ NpO2(OH)2-	
1	.0	.0	.0	.0	ThAc+++ NpO2CO3-	
3	.0	.0	.0	.0	ThAc+++ NpO2(CO3)2=-	

```
3  .0        .0       .0      .0       ThAc+++ NpO2(CO3)3==-
1  .0        .0       .0      .0       ThAc+++ H2PO4-
3  .0        .0       .0      .0       ThAc+++ HPO4=
3  .0        .0       .0      .0       ThAc+++ PO4=-
3  .0        .0       .0      .0       ThAc+++ Th(SO4)3=
1  .0        .0       .0      .0       ThAc+++ Th(OH)3(CO3)-
3  .0        .0       .0      .0       ThAc+++ Th(CO3)5===
1  .0        .0       .0      .0       ThAc+++ HOx-
3  .0        .0       .0      .0       ThAc+++ Ox=
1  .0        .0       .0      .0       ThAc+++ Ac-
1  .0        .0       .0      .0       ThAc+++ Lac-
1  .0        .0       .0      .0       ThAc+++ H2Cit-
3  .0        .0       .0      .0       ThAc+++ HCit=
3  .0        .0       .0      .0       ThAc+++ Cit=-
3  .0        .0       .0      .0       ThAc+++ H3EDTA-
3  .0        .0       .0      .0       ThAc+++ H2EDTA=
3  .0        .0       .0      .0       ThAc+++ HEDTA=-
3  .0        .0       .0      .0       ThAc+++ EDTA==
3  .0        .0       .0      .0       ThAc+++ AmEDTA-
3  .0        .0       .0      .0       ThAc+++ NpO2Cit=
3  .0        .0       .0      .0       ThAc+++ NpO2EDTA==-
1  .0        .0       .0      .0       ThAc+++ NpO2Ox-
3  .0        .0       .0      .0       ThAc+++ U(OH)4(CO3)2==
3  .0        .0       .0      .0       ThAc+++ U(CO3)5===
3  .0        .0       .0      .0       ThAc+++ U(SO4)3=
3  .0        .0       .0      .0       ThAc+++ Am(CO3)4==-
1  .0        .0       .0      .0       ThAc+++ Am(SO4)2-
1  .0        .0       .0      .0       ThAc+++ NpO2H2EDTA-
1  .0        .0       .0      .0       ThAc+++ CaCit-
3  .0        .0       .0      .0       ThAc+++ CaEDTA=
1  .0        .0       .0      .0       ThAc+++ UnuAn#2-
1  .0        .0       .0      .0       ThAc+++ UnuAn#3-
1  .0        .0       .0      .0       ThAc+++ UnuAn#4-
3  .0        .0       .0      .0       ThAc+++ U(OH)2(CO3)2=
1  .0        .0       .0      .0       ThAc+++ MgCit-
3  .0        .0       .0      .0       ThAc+++ MgEDTA=
3  .0        .0       .0      .0       ThAc+++ NpO2HEDTA=

1 -.7467     .29      .0      .319     ThCit+ Cl-           SAND99
1  .0        .0       .0      .0       ThCit+ SO4=
1  .0        .0       .0      .0       ThCit+ HSO4-
1  .0        .0       .0      .0       ThCit+ OH-
1  .0        .0       .0      .0       ThCit+ HCO3-
1  .0        .0       .0      .0       ThCit+ CO3=
1  .0        .0       .0      .0       ThCit+ B(OH)4-
1  .0        .0       .0      .0       ThCit+ B3O3(OH)4-
1  .0        .0       .0      .0       ThCit+ B4O5(OH)4=
1  .0        .0       .0      .0       ThCit+ Br-
1  .0        .0       .0      .0       ThCit+ Am(CO3)2-
1  .0        .0       .0      .0       ThCit+ Am(CO3)3=-
1  .0        .0       .0      .0       ThCit+ ClO4-
1  .0        .0       .0      .0       ThCit+ NpO2(OH)2-
1  .0        .0       .0      .0       ThCit+ NpO2CO3-
1  .0        .0       .0      .0       ThCit+ NpO2(CO3)2=-
1  .0        .0       .0      .0       ThCit+ NpO2(CO3)3==-
1  .0        .0       .0      .0       ThCit+ H2PO4-
1  .0        .0       .0      .0       ThCit+ HPO4=
1  .0        .0       .0      .0       ThCit+ PO4=-
1  .0        .0       .0      .0       ThCit+ Th(SO4)3=
1  .0        .0       .0      .0       ThCit+ Th(OH)3(CO3)-
1  .0        .0       .0      .0       ThCit+ Th(CO3)5===
1  .0        .0       .0      .0       ThCit+ HOx-
1  .0        .0       .0      .0       ThCit+ Ox=
```

1	.0	.0	.0	.0	ThCit+ Ac-	
1	.0	.0	.0	.0	ThCit+ Lac-	
1	.0	.0	.0	.0	ThCit+ H2Cit-	
1	.0	.0	.0	.0	ThCit+ HCit=	
1	.0	.0	.0	.0	ThCit+ Cit=-	
1	.0	.0	.0	.0	ThCit+ H3EDTA-	
1	.0	.0	.0	.0	ThCit+ H2EDTA=	
1	.0	.0	.0	.0	ThCit+ HEDTA=-	
1	.0	.0	.0	.0	ThCit+ EDTA==	
1	.0	.0	.0	.0	ThCit+ AmEDTA-	
1	.0	.0	.0	.0	ThCit+ NpO2Cit=	
1	.0	.0	.0	.0	ThCit+ NpO2EDTA==-	
1	.0	.0	.0	.0	ThCit+ NpO2Ox-	
1	.0	.0	.0	.0	ThCit+ U(OH)4(CO3)2==	
1	.0	.0	.0	.0	ThCit+ U(CO3)5===	
1	.0	.0	.0	.0	ThCit+ U(SO4)3=	
1	.0	.0	.0	.0	ThCit+ Am(CO3)4==-	
1	.0	.0	.0	.0	ThCit+ Am(SO4)2-	
1	.0	.0	.0	.0	ThCit+ NpO2H2EDTA-	
1	.0	.0	.0	.0	ThCit+ CaCit-	
1	.0	.0	.0	.0	ThCit+ CaEDTA=	
1	.0	.0	.0	.0	ThCit+ UnuAn#2-	
1	.0	.0	.0	.0	ThCit+ UnuAn#3-	
1	.0	.0	.0	.0	ThCit+ UnuAn#4-	
1	.0	.0	.0	.0	ThCit+ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	ThCit+ MgCit-	
1	.0	.0	.0	.0	ThCit+ MgEDTA=	
1	.0	.0	.0	.0	ThCit+ NpO2HEDTA=	
1	.6677	5.22	.0	.341	ThLac+++ Cl-	SAND99/Moore et al 99
3	.0	.0	.0	.0	ThLac+++ SO4=	
1	.0	.0	.0	.0	ThLac+++ HSO4-	
1	.0	.0	.0	.0	ThLac+++ OH-	
1	.0	.0	.0	.0	ThLac+++ HCO3-	
3	.0	.0	.0	.0	ThLac+++ CO3=	
1	.0	.0	.0	.0	ThLac+++ B(OH)4-	
1	.0	.0	.0	.0	ThLac+++ B3O3(OH)4-	
3	.0	.0	.0	.0	ThLac+++ B4O5(OH)4=	
1	.0	.0	.0	.0	ThLac+++ Br-	
1	.0	.0	.0	.0	ThLac+++ Am(CO3)2-	
3	.0	.0	.0	.0	ThLac+++ Am(CO3)3=-	
1	.0	.0	.0	.0	ThLac+++ ClO4-	
1	.0	.0	.0	.0	ThLac+++ NpO2(OH)2-	
1	.0	.0	.0	.0	ThLac+++ NpO2CO3-	
3	.0	.0	.0	.0	ThLac+++ NpO2(CO3)2=-	
3	.0	.0	.0	.0	ThLac+++ NpO2(CO3)3==-	
1	.0	.0	.0	.0	ThLac+++ H2PO4-	
3	.0	.0	.0	.0	ThLac+++ HPO4=	
3	.0	.0	.0	.0	ThLac+++ PO4=-	
3	.0	.0	.0	.0	ThLac+++ Th(SO4)3=	
1	.0	.0	.0	.0	ThLac+++ Th(OH)3(CO3)-	
3	.0	.0	.0	.0	ThLac+++ Th(CO3)5===	
1	.0	.0	.0	.0	ThLac+++ HOx-	
3	.0	.0	.0	.0	ThLac+++ Ox=	
1	.0	.0	.0	.0	ThLac+++ Ac-	
1	.0	.0	.0	.0	ThLac+++ Lac-	
1	.0	.0	.0	.0	ThLac+++ H2Cit-	
3	.0	.0	.0	.0	ThLac+++ HCit=	
3	.0	.0	.0	.0	ThLac+++ Cit=-	
3	.0	.0	.0	.0	ThLac+++ H3EDTA-	
3	.0	.0	.0	.0	ThLac+++ H2EDTA=	
3	.0	.0	.0	.0	ThLac+++ HEDTA=-	
3	.0	.0	.0	.0	ThLac+++ EDTA==	

3	.0	.0	.0	.0	ThLac+++ AmEDTA-
3	.0	.0	.0	.0	ThLac+++ NpO2Cit=
3	.0	.0	.0	.0	ThLac+++ NpO2EDTA==-
1	.0	.0	.0	.0	ThLac+++ NpO2Ox-
3	.0	.0	.0	.0	ThLac+++ U(OH)4(CO3)2==
3	.0	.0	.0	.0	ThLac+++ U(CO3)5===
3	.0	.0	.0	.0	ThLac+++ U(SO4)3=
3	.0	.0	.0	.0	ThLac+++ Am(CO3)4==-
1	.0	.0	.0	.0	ThLac+++ Am(SO4)2-
1	.0	.0	.0	.0	ThLac+++ NpO2H2EDTA-
1	.0	.0	.0	.0	ThLac+++ CaCit-
3	.0	.0	.0	.0	ThLac+++ CaEDTA=
1	.0	.0	.0	.0	ThLac+++ UnuAn#2-
1	.0	.0	.0	.0	ThLac+++ UnuAn#3-
1	.0	.0	.0	.0	ThLac+++ UnuAn#4-
3	.0	.0	.0	.0	ThLac+++ U(OH)2(CO3)2=
1	.0	.0	.0	.0	ThLac+++ MgCit-
3	.0	.0	.0	.0	ThLac+++ MgEDTA=
3	.0	.0	.0	.0	ThLac+++ NpO2HEDTA=
1	-0.055	1.6	.0	0.050	AmOH++ Cl- FK98/Konnecke et al. 1997
2	.0	.0	.0	.0	AmOH++ SO4=
1	.0	.0	.0	.0	AmOH++ HSO4-
1	.0	.0	.0	.0	AmOH++ OH-
1	.0	.0	.0	.0	AmOH++ HCO3-
2	.0	.0	.0	.0	AmOH++ CO3=
1	.0	.0	.0	.0	AmOH++ B(OH)4-
1	.0	.0	.0	.0	AmOH++ B3O3(OH)4-
2	.0	.0	.0	.0	AmOH++ B4O5(OH)4=
1	.0	.0	.0	.0	AmOH++ Br-
1	.0	.0	.0	.0	AmOH++ Am(CO3)2-
3	.0	.0	.0	.0	AmOH++ Am(CO3)3=-
1	.0	.0	.0	.0	AmOH++ ClO4-
1	.0	.0	.0	.0	AmOH++ NpO2(OH)2-
1	.0	.0	.0	.0	AmOH++ NpO2CO3-
3	.0	.0	.0	.0	AmOH++ NpO2(CO3)2=-
3	.0	.0	.0	.0	AmOH++ NpO2(CO3)3==-
1	.0	.0	.0	.0	AmOH++ H2PO4-
2	.0	.0	.0	.0	AmOH++ HPO4=
3	.0	.0	.0	.0	AmOH++ PO4=-
2	.0	.0	.0	.0	AmOH++ Th(SO4)3=
1	.0	.0	.0	.0	AmOH++ Th(OH)3(CO3)-
3	.0	.0	.0	.0	AmOH++ Th(CO3)5===
1	.0	.0	.0	.0	AmOH++ HOx-
2	.0	.0	.0	.0	AmOH++ Ox=
1	.0	.0	.0	.0	AmOH++ Ac-
1	.0	.0	.0	.0	AmOH++ Lac-
1	.0	.0	.0	.0	AmOH++ H2Cit-
2	.0	.0	.0	.0	AmOH++ HCit=
3	.0	.0	.0	.0	AmOH++ Cit=-
3	.0	.0	.0	.0	AmOH++ H3EDTA-
3	.0	.0	.0	.0	AmOH++ H2EDTA=
3	.0	.0	.0	.0	AmOH++ HEDTA=-
3	.0	.0	.0	.0	AmOH++ EDTA==
3	.0	.0	.0	.0	AmOH++ AmEDTA-
3	.0	.0	.0	.0	AmOH++ NpO2Cit=
3	.0	.0	.0	.0	AmOH++ NpO2EDTA==-
1	.0	.0	.0	.0	AmOH++ NpO2Ox-
3	.0	.0	.0	.0	AmOH++ U(OH)4(CO3)2==
3	.0	.0	.0	.0	AmOH++ U(CO3)5===
2	.0	.0	.0	.0	AmOH++ U(SO4)3=
3	.0	.0	.0	.0	AmOH++ Am(CO3)4==-
1	.0	.0	.0	.0	AmOH++ Am(SO4)2-

1	.0	.0	.0	.0	AmOH++ NpO2H2EDTA-
1	.0	.0	.0	.0	AmOH++ CaCit-
2	.0	.0	.0	.0	AmOH++ CaEDTA=
1	.0	.0	.0	.0	AmOH++ UnuAn#2-
1	.0	.0	.0	.0	AmOH++ UnuAn#3-
1	.0	.0	.0	.0	AmOH++ UnuAn#4-
2	.0	.0	.0	.0	AmOH++ U(OH)2(CO3)2=
1	.0	.0	.0	.0	AmOH++ MgCit-
2	.0	.0	.0	.0	AmOH++ MgEDTA=
2	.0	.0	.0	.0	AmOH++ NpO2HEDTA=
1	-0.616	-0.45	.0	.050	Am(OH)2+ Cl- FK98/Konnecke et al. 1997
1	.0	.0	.0	.0	Am(OH)2+ SO4=
1	.0	.0	.0	.0	Am(OH)2+ HSO4-
1	.0	.0	.0	.0	Am(OH)2+ OH-
1	.0	.0	.0	.0	Am(OH)2+ HCO3-
1	.0	.0	.0	.0	Am(OH)2+ CO3=
1	.0	.0	.0	.0	Am(OH)2+ B(OH)4-
1	.0	.0	.0	.0	Am(OH)2+ B3O3(OH)4-
1	.0	.0	.0	.0	Am(OH)2+ B4O5(OH)4=
1	.0	.0	.0	.0	Am(OH)2+ Br-
1	.0	.0	.0	.0	Am(OH)2+ Am(CO3)2-
1	.0	.0	.0	.0	Am(OH)2+ Am(CO3)3=-
1	.0	.0	.0	.0	Am(OH)2+ ClO4-
1	.0	.0	.0	.0	Am(OH)2+ NpO2(OH)2-
1	.0	.0	.0	.0	Am(OH)2+ NpO2CO3-
1	.0	.0	.0	.0	Am(OH)2+ NpO2(CO3)2=-
1	.0	.0	.0	.0	Am(OH)2+ NpO2(CO3)3==-
1	.0	.0	.0	.0	Am(OH)2+ H2PO4-
1	.0	.0	.0	.0	Am(OH)2+ HPO4=
1	.0	.0	.0	.0	Am(OH)2+ PO4=-
1	.0	.0	.0	.0	Am(OH)2+ Th(SO4)3=
1	.0	.0	.0	.0	Am(OH)2+ Th(OH)3(CO3)-
1	.0	.0	.0	.0	Am(OH)2+ Th(CO3)5===
1	.0	.0	.0	.0	Am(OH)2+ HOx-
1	.0	.0	.0	.0	Am(OH)2+ Ox=
1	.0	.0	.0	.0	Am(OH)2+ Ac-
1	.0	.0	.0	.0	Am(OH)2+ Lac-
1	.0	.0	.0	.0	Am(OH)2+ H2Cit-
1	.0	.0	.0	.0	Am(OH)2+ HCit=
1	.0	.0	.0	.0	Am(OH)2+ Cit=-
1	.0	.0	.0	.0	Am(OH)2+ H3EDTA-
1	.0	.0	.0	.0	Am(OH)2+ H2EDTA=
1	.0	.0	.0	.0	Am(OH)2+ HEDTA=-
1	.0	.0	.0	.0	Am(OH)2+ EDTA==
1	.0	.0	.0	.0	Am(OH)2+ AmEDTA-
1	.0	.0	.0	.0	Am(OH)2+ NpO2Cit=
1	.0	.0	.0	.0	Am(OH)2+ NpO2EDTA==-
1	.0	.0	.0	.0	Am(OH)2+ NpO2Ox-
1	.0	.0	.0	.0	Am(OH)2+ U(OH)4(CO3)2==
1	.0	.0	.0	.0	Am(OH)2+ U(CO3)5===
1	.0	.0	.0	.0	Am(OH)2+ U(SO4)3=
1	.0	.0	.0	.0	Am(OH)2+ Am(CO3)4==-
1	.0	.0	.0	.0	Am(OH)2+ Am(SO4)2-
1	.0	.0	.0	.0	Am(OH)2+ NpO2H2EDTA-
1	.0	.0	.0	.0	Am(OH)2+ CaCit-
1	.0	.0	.0	.0	Am(OH)2+ CaEDTA=
1	.0	.0	.0	.0	Am(OH)2+ UnuAn#2-
1	.0	.0	.0	.0	Am(OH)2+ UnuAn#3-
1	.0	.0	.0	.0	Am(OH)2+ UnuAn#4-
1	.0	.0	.0	.0	Am(OH)2+ U(OH)2(CO3)2=
1	.0	.0	.0	.0	Am(OH)2+ MgCit-
1	.0	.0	.0	.0	Am(OH)2+ MgEDTA=

```
1  .0        .0       .0     .0       Am(OH)2+ NpO2HEDTA=

1  .516     1.75      .0     .010     AmCl2+ Cl-      FK98/Konnecke et al. 1997
1  .0        .0       .0     .0       AmCl2+ SO4=
1  .0        .0       .0     .0       AmCl2+ HSO4-
1  .0        .0       .0     .0       AmCl2+ OH-
1  .0        .0       .0     .0       AmCl2+ HCO3-
1  .0        .0       .0     .0       AmCl2+ CO3=
1  .0        .0       .0     .0       AmCl2+ B(OH)4-
1  .0        .0       .0     .0       AmCl2+ B3O3(OH)4-
1  .0        .0       .0     .0       AmCl2+ B4O5(OH)4=
1  .0        .0       .0     .0       AmCl2+ Br-
1  .0        .0       .0     .0       AmCl2+ Am(CO3)2-
1  .0        .0       .0     .0       AmCl2+ Am(CO3)3=-
1  .0        .0       .0     .0       AmCl2+ ClO4-
1  .0        .0       .0     .0       AmCl2+ NpO2(OH)2-
1  .0        .0       .0     .0       AmCl2+ NpO2CO3-
1  .0        .0       .0     .0       AmCl2+ NpO2(CO3)2=-
1  .0        .0       .0     .0       AmCl2+ NpO2(CO3)3==-
1  .0        .0       .0     .0       AmCl2+ H2PO4-
1  .0        .0       .0     .0       AmCl2+ HPO4=
1  .0        .0       .0     .0       AmCl2+ PO4=-
1  .0        .0       .0     .0       AmCl2+ Th(SO4)3=
1  .0        .0       .0     .0       AmCl2+ Th(OH)3(CO3)-
1  .0        .0       .0     .0       AmCl2+ Th(CO3)5===
1  .0        .0       .0     .0       AmCl2+ HOx-
1  .0        .0       .0     .0       AmCl2+ Ox=
1  .0        .0       .0     .0       AmCl2+ Ac-
1  .0        .0       .0     .0       AmCl2+ Lac-
1  .0        .0       .0     .0       AmCl2+ H2Cit-
1  .0        .0       .0     .0       AmCl2+ HCit=
1  .0        .0       .0     .0       AmCl2+ Cit=-
1  .0        .0       .0     .0       AmCl2+ H3EDTA-
1  .0        .0       .0     .0       AmCl2+ H2EDTA=
1  .0        .0       .0     .0       AmCl2+ HEDTA=-
1  .0        .0       .0     .0       AmCl2+ EDTA==
1  .0        .0       .0     .0       AmCl2+ AmEDTA-
1  .0        .0       .0     .0       AmCl2+ NpO2Cit=
1  .0        .0       .0     .0       AmCl2+ NpO2EDTA==-
1  .0        .0       .0     .0       AmCl2+ NpO2Ox-
1  .0        .0       .0     .0       AmCl2+ U(OH)4(CO3)2==
1  .0        .0       .0     .0       AmCl2+ U(CO3)5===
1  .0        .0       .0     .0       AmCl2+ U(SO4)3=
1  .0        .0       .0     .0       AmCl2+ Am(CO3)4==-
1  .0        .0       .0     .0       AmCl2+ Am(SO4)2-
1  .0        .0       .0     .0       AmCl2+ NpO2H2EDTA-
1  .0        .0       .0     .0       AmCl2+ CaCit-
1  .0        .0       .0     .0       AmCl2+ CaEDTA=
1  .0        .0       .0     .0       AmCl2+ UnuAn#2-
1  .0        .0       .0     .0       AmCl2+ UnuAn#3-
1  .0        .0       .0     .0       AmCl2+ UnuAn#4-
1  .0        .0       .0     .0       AmCl2+ U(OH)2(CO3)2=
1  .0        .0       .0     .0       AmCl2+ MgCit-
1  .0        .0       .0     .0       AmCl2+ MgEDTA=
1  .0        .0       .0     .0       AmCl2+ NpO2HEDTA=

1 -0.091    -.39      .0     0.048    AmSO4+ Cl-   FK98
1  .0        .0       .0     .0       AmSO4+ SO4=
1  .0        .0       .0     .0       AmSO4+ HSO4-
1  .0        .0       .0     .0       AmSO4+ OH-
1  .0        .0       .0     .0       AmSO4+ HCO3-
1  .0        .0       .0     .0       AmSO4+ CO3=
1  .0        .0       .0     .0       AmSO4+ B(OH)4-
```

```
1  .0         .0        .0      .0       AmSO4+ B3O3(OH)4-
1  .0         .0        .0      .0       AmSO4+ B4O5(OH)4=
1  .0         .0        .0      .0       AmSO4+ Br-
1  .0         .0        .0      .0       AmSO4+ Am(CO3)2-
1  .0         .0        .0      .0       AmSO4+ Am(CO3)3=-
1  .0         .0        .0      .0       AmSO4+ ClO4-
1  .0         .0        .0      .0       AmSO4+ NpO2(OH)2-
1  .0         .0        .0      .0       AmSO4+ NpO2CO3-
1  .0         .0        .0      .0       AmSO4+ NpO2(CO3)2=-
1  .0         .0        .0      .0       AmSO4+ NpO2(CO3)3==-
1  .0         .0        .0      .0       AmSO4+ H2PO4-
1  .0         .0        .0      .0       AmSO4+ HPO4=
1  .0         .0        .0      .0       AmSO4+ PO4=-
1  .0         .0        .0      .0       AmSO4+ Th(SO4)3=
1  .0         .0        .0      .0       AmSO4+ Th(OH)3(CO3)-
1  .0         .0        .0      .0       AmSO4+ Th(CO3)5===
1  .0         .0        .0      .0       AmSO4+ HOx-
1  .0         .0        .0      .0       AmSO4+ Ox=
1  .0         .0        .0      .0       AmSO4+ Ac-
1  .0         .0        .0      .0       AmSO4+ Lac-
1  .0         .0        .0      .0       AmSO4+ H2Cit-
1  .0         .0        .0      .0       AmSO4+ HCit=
1  .0         .0        .0      .0       AmSO4+ Cit=-
1  .0         .0        .0      .0       AmSO4+ H3EDTA-
1  .0         .0        .0      .0       AmSO4+ H2EDTA=
1  .0         .0        .0      .0       AmSO4+ HEDTA=-
1  .0         .0        .0      .0       AmSO4+ EDTA==
1  .0         .0        .0      .0       AmSO4+ AmEDTA-
1  .0         .0        .0      .0       AmSO4+ NpO2Cit=
1  .0         .0        .0      .0       AmSO4+ NpO2EDTA==-
1  .0         .0        .0      .0       AmSO4+ NpO2Ox-
1  .0         .0        .0      .0       AmSO4+ U(OH)4(CO3)2==
1  .0         .0        .0      .0       AmSO4+ U(CO3)5===
1  .0         .0        .0      .0       AmSO4+ U(SO4)3=
1  .0         .0        .0      .0       AmSO4+ Am(CO3)4==-
1  .0         .0        .0      .0       AmSO4+ Am(SO4)2-
1  .0         .0        .0      .0       AmSO4+ NpO2H2EDTA-
1  .0         .0        .0      .0       AmSO4+ CaCit-
1  .0         .0        .0      .0       AmSO4+ CaEDTA=
1  .0         .0        .0      .0       AmSO4+ UnuAn#2-
1  .0         .0        .0      .0       AmSO4+ UnuAn#3-
1  .0         .0        .0      .0       AmSO4+ UnuAn#4-
1  .0         .0        .0      .0       AmSO4+ U(OH)2(CO3)2=
1  .0         .0        .0      .0       AmSO4+ MgCit-
1  .0         .0        .0      .0       AmSO4+ MgEDTA=
1  .0         .0        .0      .0       AmSO4+ NpO2HEDTA=

1 -0.616     -0.45      .0     .050      Pu(OH)2+ Cl-   analogy w/ Am (FK98)
1  .0         .0        .0      .0       Pu(OH)2+ SO4=
1  .0         .0        .0      .0       Pu(OH)2+ HSO4-
1  .0         .0        .0      .0       Pu(OH)2+ OH-
1  .0         .0        .0      .0       Pu(OH)2+ HCO3-
1  .0         .0        .0      .0       Pu(OH)2+ CO3=
1  .0         .0        .0      .0       Pu(OH)2+ B(OH)4-
1  .0         .0        .0      .0       Pu(OH)2+ B3O3(OH)4-
1  .0         .0        .0      .0       Pu(OH)2+ B4O5(OH)4=
1  .0         .0        .0      .0       Pu(OH)2+ Br-
1  .0         .0        .0      .0       Pu(OH)2+ Am(CO3)2-
1  .0         .0        .0      .0       Pu(OH)2+ Am(CO3)3=-
1  .0         .0        .0      .0       Pu(OH)2+ ClO4-
1  .0         .0        .0      .0       Pu(OH)2+ NpO2(OH)2-
1  .0         .0        .0      .0       Pu(OH)2+ NpO2CO3-
1  .0         .0        .0      .0       Pu(OH)2+ NpO2(CO3)2=-
```

1	.0	.0	.0	.0	Pu(OH)2+ NpO2(CO3)3==-	
1	.0	.0	.0	.0	Pu(OH)2+ H2PO4-	
1	.0	.0	.0	.0	Pu(OH)2+ HPO4=	
1	.0	.0	.0	.0	Pu(OH)2+ PO4=-	
1	.0	.0	.0	.0	Pu(OH)2+ Th(SO4)3=	
1	.0	.0	.0	.0	Pu(OH)2+ Th(OH)3(CO3)-	
1	.0	.0	.0	.0	Pu(OH)2+ Th(CO3)5===	
1	.0	.0	.0	.0	Pu(OH)2+ HOx-	
1	.0	.0	.0	.0	Pu(OH)2+ Ox=	
1	.0	.0	.0	.0	Pu(OH)2+ Ac-	
1	.0	.0	.0	.0	Pu(OH)2+ Lac-	
1	.0	.0	.0	.0	Pu(OH)2+ H2Cit-	
1	.0	.0	.0	.0	Pu(OH)2+ HCit=	
1	.0	.0	.0	.0	Pu(OH)2+ Cit=-	
1	.0	.0	.0	.0	Pu(OH)2+ H3EDTA-	
1	.0	.0	.0	.0	Pu(OH)2+ H2EDTA=	
1	.0	.0	.0	.0	Pu(OH)2+ HEDTA=-	
1	.0	.0	.0	.0	Pu(OH)2+ EDTA==	
1	.0	.0	.0	.0	Pu(OH)2+ AmEDTA-	
1	.0	.0	.0	.0	Pu(OH)2+ NpO2Cit=	
1	.0	.0	.0	.0	Pu(OH)2+ NpO2EDTA==-	
1	.0	.0	.0	.0	Pu(OH)2+ NpO2Ox-	
1	.0	.0	.0	.0	Pu(OH)2+ U(OH)4(CO3)2==	
1	.0	.0	.0	.0	Pu(OH)2+ U(CO3)5===	
1	.0	.0	.0	.0	Pu(OH)2+ U(SO4)3=	
1	.0	.0	.0	.0	Pu(OH)2+ Am(CO3)4==-	
1	.0	.0	.0	.0	Pu(OH)2+ Am(SO4)2-	
1	.0	.0	.0	.0	Pu(OH)2+ NpO2H2EDTA-	
1	.0	.0	.0	.0	Pu(OH)2+ CaCit-	
1	.0	.0	.0	.0	Pu(OH)2+ CaEDTA=	
1	.0	.0	.0	.0	Pu(OH)2+ UnuAn#2-	
1	.0	.0	.0	.0	Pu(OH)2+ UnuAn#3-	
1	.0	.0	.0	.0	Pu(OH)2+ UnuAn#4-	
1	.0	.0	.0	.0	Pu(OH)2+ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	Pu(OH)2+ MgCit-	
1	.0	.0	.0	.0	Pu(OH)2+ MgEDTA=	
1	.0	.0	.0	.0	Pu(OH)2+ NpO2HEDTA=	

1	.4671	1.74	.0	.143	ThAc2++ Cl-	Moore et al 1999
2	.0	.0	.0	.0	ThAc2++ SO4=	
1	.0	.0	.0	.0	ThAc2++ HSO4-	
1	.0	.0	.0	.0	ThAc2++ OH-	
1	.0	.0	.0	.0	ThAc2++ HCO3-	
2	.0	.0	.0	.0	ThAc2++ CO3=	
1	.0	.0	.0	.0	ThAc2++ B(OH)4-	
1	.0	.0	.0	.0	ThAc2++ B3O3(OH)4-	
2	.0	.0	.0	.0	ThAc2++ B4O5(OH)4=	
1	.0	.0	.0	.0	ThAc2++ Br-	
1	.0	.0	.0	.0	ThAc2++ Am(CO3)2-	
3	.0	.0	.0	.0	ThAc2++ Am(CO3)3=-	
1	.0	.0	.0	.0	ThAc2++ ClO4-	
1	.0	.0	.0	.0	ThAc2++ NpO2(OH)2-	
1	.0	.0	.0	.0	ThAc2++ NpO2CO3-	
3	.0	.0	.0	.0	ThAc2++ NpO2(CO3)2=-	
3	.0	.0	.0	.0	ThAc2++ NpO2(CO3)3==-	
1	.0	.0	.0	.0	ThAc2++ H2PO4-	
2	.0	.0	.0	.0	ThAc2++ HPO4=	
3	.0	.0	.0	.0	ThAc2++ PO4=-	
2	.0	.0	.0	.0	ThAc2++ Th(SO4)3=	
1	.0	.0	.0	.0	ThAc2++ Th(OH)3(CO3)-	
3	.0	.0	.0	.0	ThAc2++ Th(CO3)5===	
1	.0	.0	.0	.0	ThAc2++ HOx-	
2	.0	.0	.0	.0	ThAc2++ Ox=	

```
 1  .0         .0        .0      .0       ThAc2++ Ac-
 1  .0         .0        .0      .0       ThAc2++ Lac-
 1  .0         .0        .0      .0       ThAc2++ H2Cit-
 2  .0         .0        .0      .0       ThAc2++ HCit=
 3  .0         .0        .0      .0       ThAc2++ Cit=-
 3  .0         .0        .0      .0       ThAc2++ H3EDTA-
 3  .0         .0        .0      .0       ThAc2++ H2EDTA=
 3  .0         .0        .0      .0       ThAc2++ HEDTA=-
 3  .0         .0        .0      .0       ThAc2++ EDTA==
 3  .0         .0        .0      .0       ThAc2++ AmEDTA-
 3  .0         .0        .0      .0       ThAc2++ NpO2Cit=
 3  .0         .0        .0      .0       ThAc2++ NpO2EDTA==-
 1  .0         .0        .0      .0       ThAc2++ NpO2Ox-
 3  .0         .0        .0      .0       ThAc2++ U(OH)4(CO3)2==
 3  .0         .0        .0      .0       ThAc2++ U(CO3)5===
 2  .0         .0        .0      .0       ThAc2++ U(SO4)3=
 3  .0         .0        .0      .0       ThAc2++ Am(CO3)4==-
 1  .0         .0        .0      .0       ThAc2++ Am(SO4)2-
 1  .0         .0        .0      .0       ThAc2++ NpO2H2EDTA-
 1  .0         .0        .0      .0       ThAc2++ CaCit-
 3  .0         .0        .0      .0       ThAc2++ CaEDTA=
 1  .0         .0        .0      .0       ThAc2++ UnuAn#2-
 1  .0         .0        .0      .0       ThAc2++ UnuAn#3-
 1  .0         .0        .0      .0       ThAc2++ UnuAn#4-
 2  .0         .0        .0      .0       ThAc2++ U(OH)2(CO3)2=
 1  .0         .0        .0      .0       ThAc2++ MgCit-
 2  .0         .0        .0      .0       ThAc2++ MgEDTA=
 2  .0         .0        .0      .0       ThAc2++ NpO2HEDTA=

 1 -.9374      .29       .0      .248     PuOx+ Cl-        analogy w/ Am
(SAND99/Borkowski et al 01)
 1  .0         .0        .0      .0       PuOx+ SO4=
 1  .0         .0        .0      .0       PuOx+ HSO4-
 1  .0         .0        .0      .0       PuOx+ OH-
 1  .0         .0        .0      .0       PuOx+ HCO3-
 1  .0         .0        .0      .0       PuOx+ CO3=
 1  .0         .0        .0      .0       PuOx+ B(OH)4-
 1  .0         .0        .0      .0       PuOx+ B3O3(OH)4-
 1  .0         .0        .0      .0       PuOx+ B4O5(OH)4=
 1  .0         .0        .0      .0       PuOx+ Br-
 1  .0         .0        .0      .0       PuOx+ Am(CO3)2-
 1  .0         .0        .0      .0       PuOx+ Am(CO3)3=-
 1  .0         .0        .0      .0       PuOx+ ClO4-
 1  .0         .0        .0      .0       PuOx+ NpO2(OH)2-
 1  .0         .0        .0      .0       PuOx+ NpO2CO3-
 1  .0         .0        .0      .0       PuOx+ NpO2(CO3)2=-
 1  .0         .0        .0      .0       PuOx+ NpO2(CO3)3==-
 1  .0         .0        .0      .0       PuOx+ H2PO4-
 1  .0         .0        .0      .0       PuOx+ HPO4=
 1  .0         .0        .0      .0       PuOx+ PO4=-
 1  .0         .0        .0      .0       PuOx+ Th(SO4)3=
 1  .0         .0        .0      .0       PuOx+ Th(OH)3(CO3)-
 1  .0         .0        .0      .0       PuOx+ Th(CO3)5===
 1  .0         .0        .0      .0       PuOx+ HOx-
 1  .0         .0        .0      .0       PuOx+ Ox=
 1  .0         .0        .0      .0       PuOx+ Ac-
 1  .0         .0        .0      .0       PuOx+ Lac-
 1  .0         .0        .0      .0       PuOx+ H2Cit-
 1  .0         .0        .0      .0       PuOx+ HCit=
 1  .0         .0        .0      .0       PuOx+ Cit=-
 1  .0         .0        .0      .0       PuOx+ H3EDTA-
 1  .0         .0        .0      .0       PuOx+ H2EDTA=
 1  .0         .0        .0      .0       PuOx+ HEDTA=-
```

```
1  .0        .0       .0     .0       PuOx+ EDTA==
1  .0        .0       .0     .0       PuOx+ AmEDTA-
1  .0        .0       .0     .0       PuOx+ NpO2Cit=
1  .0        .0       .0     .0       PuOx+ NpO2EDTA==-
1  .0        .0       .0     .0       PuOx+ NpO2Ox-
1  .0        .0       .0     .0       PuOx+ U(OH)4(CO3)2==
1  .0        .0       .0     .0       PuOx+ U(CO3)5===
1  .0        .0       .0     .0       PuOx+ U(SO4)3=
1  .0        .0       .0     .0       PuOx+ Am(CO3)4==-
1  .0        .0       .0     .0       PuOx+ Am(SO4)2-
1  .0        .0       .0     .0       PuOx+ NpO2H2EDTA-
1  .0        .0       .0     .0       PuOx+ CaCit-
1  .0        .0       .0     .0       PuOx+ CaEDTA=
1  .0        .0       .0     .0       PuOx+ UnuAn#2-
1  .0        .0       .0     .0       PuOx+ UnuAn#3-
1  .0        .0       .0     .0       PuOx+ UnuAn#4-
1  .0        .0       .0     .0       PuOx+ U(OH)2(CO3)2=
1  .0        .0       .0     .0       PuOx+ MgCit-
1  .0        .0       .0     .0       PuOx+ MgEDTA=
1  .0        .0       .0     .0       PuOx+ NpO2HEDTA=

1  .5058    1.74      .0    0.225     ThLac2++ Cl-       Moore et al 1999
2  .0        .0       .0     .0       ThLac2++ SO4=
1  .0        .0       .0     .0       ThLac2++ HSO4-
1  .0        .0       .0     .0       ThLac2++ OH-
1  .0        .0       .0     .0       ThLac2++ HCO3-
2  .0        .0       .0     .0       ThLac2++ CO3=
1  .0        .0       .0     .0       ThLac2++ B(OH)4-
1  .0        .0       .0     .0       ThLac2++ B3O3(OH)4-
2  .0        .0       .0     .0       ThLac2++ B4O5(OH)4=
1  .0        .0       .0     .0       ThLac2++ Br-
1  .0        .0       .0     .0       ThLac2++ Am(CO3)2-
3  .0        .0       .0     .0       ThLac2++ Am(CO3)3=-
1  .0        .0       .0     .0       ThLac2++ ClO4-
1  .0        .0       .0     .0       ThLac2++ NpO2(OH)2-
1  .0        .0       .0     .0       ThLac2++ NpO2CO3-
3  .0        .0       .0     .0       ThLac2++ NpO2(CO3)2=-
3  .0        .0       .0     .0       ThLac2++ NpO2(CO3)3==-
1  .0        .0       .0     .0       ThLac2++ H2PO4-
2  .0        .0       .0     .0       ThLac2++ HPO4=
3  .0        .0       .0     .0       ThLac2++ PO4=-
2  .0        .0       .0     .0       ThLac2++ Th(SO4)3=
1  .0        .0       .0     .0       ThLac2++ Th(OH)3(CO3)-
3  .0        .0       .0     .0       ThLac2++ Th(CO3)5===
1  .0        .0       .0     .0       ThLac2++ HOx-
2  .0        .0       .0     .0       ThLac2++ Ox=
1  .0        .0       .0     .0       ThLac2++ Ac-
1  .0        .0       .0     .0       ThLac2++ Lac-
1  .0        .0       .0     .0       ThLac2++ H2Cit-
2  .0        .0       .0     .0       ThLac2++ HCit=
3  .0        .0       .0     .0       ThLac2++ Cit=-
1  .0        .0       .0     .0       ThLac2++ H3EDTA-
2  .0        .0       .0     .0       ThLac2++ H2EDTA=
3  .0        .0       .0     .0       ThLac2++ HEDTA=-
3  .0        .0       .0     .0       ThLac2++ EDTA==
1  .0        .0       .0     .0       ThLac2++ AmEDTA-
2  .0        .0       .0     .0       ThLac2++ NpO2Cit=
3  .0        .0       .0     .0       ThLac2++ NpO2EDTA==-
1  .0        .0       .0     .0       ThLac2++ NpO2Ox-
3  .0        .0       .0     .0       ThLac2++ U(OH)4(CO3)2==
3  .0        .0       .0     .0       ThLac2++ U(CO3)5===
2  .0        .0       .0     .0       ThLac2++ U(SO4)3=
3  .0        .0       .0     .0       ThLac2++ Am(CO3)4==-
```

```
1  .0         .0       .0      .0       ThLac2++ Am(SO4)2-
1  .0         .0       .0      .0       ThLac2++ NpO2H2EDTA-
1  .0         .0       .0      .0       ThLac2++ CaCit-
2  .0         .0       .0      .0       ThLac2++ CaEDTA=
1  .0         .0       .0      .0       ThLac2++ UnuAn#2-
1  .0         .0       .0      .0       ThLac2++ UnuAn#3-
1  .0         .0       .0      .0       ThLac2++ UnuAn#4-
2  .0         .0       .0      .0       ThLac2++ U(OH)2(CO3)2=
1  .0         .0       .0      .0       ThLac2++ MgCit-
2  .0         .0       .0      .0       ThLac2++ MgEDTA=
2  .0         .0       .0      .0       ThLac2++ NpO2HEDTA=

1 -.0833      .29      .0      .0987    CaAc+ Cl-           analogy w/Mg (ERG_org_memo)
1  .0         .0       .0      .0       CaAc+ SO4=
1  .0         .0       .0      .0       CaAc+ HSO4-
1  .0         .0       .0      .0       CaAc+ OH-
1  .0         .0       .0      .0       CaAc+ HCO3-
1  .0         .0       .0      .0       CaAc+ CO3=
1  .0         .0       .0      .0       CaAc+ B(OH)4-
1  .0         .0       .0      .0       CaAc+ B3O3(OH)4-
1  .0         .0       .0      .0       CaAc+ B4O5(OH)4=
1  .0         .0       .0      .0       CaAc+ Br-
1  .0         .0       .0      .0       CaAc+ Am(CO3)2-
1  .0         .0       .0      .0       CaAc+ Am(CO3)3=-
1  .0         .0       .0      .0       CaAc+ ClO4-
1  .0         .0       .0      .0       CaAc+ NpO2(OH)2-
1  .0         .0       .0      .0       CaAc+ NpO2CO3-
1  .0         .0       .0      .0       CaAc+ NpO2(CO3)2=-
1  .0         .0       .0      .0       CaAc+ NpO2(CO3)3==-
1  .0         .0       .0      .0       CaAc+ H2PO4-
1  .0         .0       .0      .0       CaAc+ HPO4=
1  .0         .0       .0      .0       CaAc+ PO4=-
1  .0         .0       .0      .0       CaAc+ Th(SO4)3=
1  .0         .0       .0      .0       CaAc+ Th(OH)3(CO3)-
1  .0         .0       .0      .0       CaAc+ Th(CO3)5===
1  .0         .0       .0      .0       CaAc+ HOx-
1  .0         .0       .0      .0       CaAc+ Ox=
1  .0         .0       .0      .0       CaAc+ Ac-
1  .0         .0       .0      .0       CaAc+ Lac-
1  .0         .0       .0      .0       CaAc+ H2Cit-
1  .0         .0       .0      .0       CaAc+ HCit=
1  .0         .0       .0      .0       CaAc+ Cit=-
1  .0         .0       .0      .0       CaAc+ H3EDTA-
1  .0         .0       .0      .0       CaAc+ H2EDTA=
1  .0         .0       .0      .0       CaAc+ HEDTA=-
1  .0         .0       .0      .0       CaAc+ EDTA==
1  .0         .0       .0      .0       CaAc+ AmEDTA-
1  .0         .0       .0      .0       CaAc+ NpO2Cit=
1  .0         .0       .0      .0       CaAc+ NpO2EDTA==-
1  .0         .0       .0      .0       CaAc+ NpO2Ox-
1  .0         .0       .0      .0       CaAc+ U(OH)4(CO3)2==
1  .0         .0       .0      .0       CaAc+ U(CO3)5===
1  .0         .0       .0      .0       CaAc+ U(SO4)3=
1  .0         .0       .0      .0       CaAc+ Am(CO3)4==-
1  .0         .0       .0      .0       CaAc+ Am(SO4)2-
1  .0         .0       .0      .0       CaAc+ NpO2H2EDTA-
1  .0         .0       .0      .0       CaAc+ CaCit-
1  .0         .0       .0      .0       CaAc+ CaEDTA=
1  .0         .0       .0      .0       CaAc+ UnuAn#2-
1  .0         .0       .0      .0       CaAc+ UnuAn#3-
1  .0         .0       .0      .0       CaAc+ UnuAn#4-
1  .0         .0       .0      .0       CaAc+ U(OH)2(CO3)2=
1  .0         .0       .0      .0       CaAc+ MgCit-
```

1	.0	.0	.0	.0	CaAc+ MgEDTA=	
1	.0	.0	.0	.0	CaAc+ NpO2HEDTA=	

1	.0	.0	.0	.0	CaLac+ Cl-	
1	.0	.0	.0	.0	CaLac+ SO4=	
1	.0	.0	.0	.0	CaLac+ HSO4-	
1	.0	.0	.0	.0	CaLac+ OH-	
1	.0	.0	.0	.0	CaLac+ HCO3-	
1	.0	.0	.0	.0	CaLac+ CO3=	
1	.0	.0	.0	.0	CaLac+ B(OH)4-	
1	.0	.0	.0	.0	CaLac+ B3O3(OH)4-	
1	.0	.0	.0	.0	CaLac+ B4O5(OH)4=	
1	.0	.0	.0	.0	CaLac+ Br-	
1	.0	.0	.0	.0	CaLac+ Am(CO3)2-	
1	.0	.0	.0	.0	CaLac+ Am(CO3)3=-	
1	.0	.0	.0	.0	CaLac+ ClO4-	
1	.0	.0	.0	.0	CaLac+ NpO2(OH)2-	
1	.0	.0	.0	.0	CaLac+ NpO2CO3-	
1	.0	.0	.0	.0	CaLac+ NpO2(CO3)2=-	
1	.0	.0	.0	.0	CaLac+ NpO2(CO3)3==-	
1	.0	.0	.0	.0	CaLac+ H2PO4-	
1	.0	.0	.0	.0	CaLac+ HPO4=	
1	.0	.0	.0	.0	CaLac+ PO4=-	
1	.0	.0	.0	.0	CaLac+ Th(SO4)3=	
1	.0	.0	.0	.0	CaLac+ Th(OH)3(CO3)-	
1	.0	.0	.0	.0	CaLac+ Th(CO3)5===	
1	.0	.0	.0	.0	CaLac+ HOx-	
1	.0	.0	.0	.0	CaLac+ Ox=	
1	.0	.0	.0	.0	CaLac+ Ac-	
1	.0	.0	.0	.0	CaLac+ Lac-	
1	.0	.0	.0	.0	CaLac+ H2Cit-	
1	.0	.0	.0	.0	CaLac+ HCit=	
1	.0	.0	.0	.0	CaLac+ Cit=-	
1	.0	.0	.0	.0	CaLac+ H3EDTA-	
1	.0	.0	.0	.0	CaLac+ H2EDTA=	
1	.0	.0	.0	.0	CaLac+ HEDTA=-	
1	.0	.0	.0	.0	CaLac+ EDTA==	
1	.0	.0	.0	.0	CaLac+ AmEDTA-	
1	.0	.0	.0	.0	CaLac+ NpO2Cit=	
1	.0	.0	.0	.0	CaLac+ NpO2EDTA==-	
1	.0	.0	.0	.0	CaLac+ NpO2Ox-	
1	.0	.0	.0	.0	CaLac+ U(OH)4(CO3)2==	
1	.0	.0	.0	.0	CaLac+ U(CO3)5===	
1	.0	.0	.0	.0	CaLac+ U(SO4)3=	
1	.0	.0	.0	.0	CaLac+ Am(CO3)4==-	
1	.0	.0	.0	.0	CaLac+ Am(SO4)2-	
1	.0	.0	.0	.0	CaLac+ NpO2H2EDTA-	
1	.0	.0	.0	.0	CaLac+ CaCit-	
1	.0	.0	.0	.0	CaLac+ CaEDTA=	
1	.0	.0	.0	.0	CaLac+ UnuAn#2-	
1	.0	.0	.0	.0	CaLac+ UnuAn#3-	
1	.0	.0	.0	.0	CaLac+ UnuAn#4-	
1	.0	.0	.0	.0	CaLac+ U(OH)2(CO3)2=	
1	.0	.0	.0	.0	CaLac+ MgCit-	
1	.0	.0	.0	.0	CaLac+ MgEDTA=	
1	.0	.0	.0	.0	CaLac+ NpO2HEDTA=	

1	-.0833	.29	.0	.0987	MgAc+ Cl-	ERG_org_memo
1	.0	.0	.0	.0	MgAc+ SO4=	
1	.0	.0	.0	.0	MgAc+ HSO4-	
1	.0	.0	.0	.0	MgAc+ OH-	
1	.0	.0	.0	.0	MgAc+ HCO3-	
1	.0	.0	.0	.0	MgAc+ CO3=	

1	.0	.0	.0	.0	MgAc+ B(OH)4-
1	.0	.0	.0	.0	MgAc+ B3O3(OH)4-
1	.0	.0	.0	.0	MgAc+ B4O5(OH)4=
1	.0	.0	.0	.0	MgAc+ Br-
1	.0	.0	.0	.0	MgAc+ Am(CO3)2-
1	.0	.0	.0	.0	MgAc+ Am(CO3)3=-
1	.0	.0	.0	.0	MgAc+ ClO4-
1	.0	.0	.0	.0	MgAc+ NpO2(OH)2-
1	.0	.0	.0	.0	MgAc+ NpO2CO3-
1	.0	.0	.0	.0	MgAc+ NpO2(CO3)2=-
1	.0	.0	.0	.0	MgAc+ NpO2(CO3)3==-
1	.0	.0	.0	.0	MgAc+ H2PO4-
1	.0	.0	.0	.0	MgAc+ HPO4=
1	.0	.0	.0	.0	MgAc+ PO4=-
1	.0	.0	.0	.0	MgAc+ Th(SO4)3=
1	.0	.0	.0	.0	MgAc+ Th(OH)3(CO3)-
1	.0	.0	.0	.0	MgAc+ Th(CO3)5===
1	.0	.0	.0	.0	MgAc+ HOx-
1	.0	.0	.0	.0	MgAc+ Ox=
1	.0	.0	.0	.0	MgAc+ Ac-
1	.0	.0	.0	.0	MgAc+ Lac-
1	.0	.0	.0	.0	MgAc+ H2Cit-
1	.0	.0	.0	.0	MgAc+ HCit=
1	.0	.0	.0	.0	MgAc+ Cit=-
1	.0	.0	.0	.0	MgAc+ H3EDTA-
1	.0	.0	.0	.0	MgAc+ H2EDTA=
1	.0	.0	.0	.0	MgAc+ HEDTA=-
1	.0	.0	.0	.0	MgAc+ EDTA==
1	.0	.0	.0	.0	MgAc+ AmEDTA-
1	.0	.0	.0	.0	MgAc+ NpO2Cit=
1	.0	.0	.0	.0	MgAc+ NpO2EDTA==-
1	.0	.0	.0	.0	MgAc+ NpO2Ox-
1	.0	.0	.0	.0	MgAc+ U(OH)4(CO3)2==
1	.0	.0	.0	.0	MgAc+ U(CO3)5===
1	.0	.0	.0	.0	MgAc+ U(SO4)3=
1	.0	.0	.0	.0	MgAc+ Am(CO3)4==-
1	.0	.0	.0	.0	MgAc+ Am(SO4)2-
1	.0	.0	.0	.0	MgAc+ NpO2H2EDTA-
1	.0	.0	.0	.0	MgAc+ CaCit-
1	.0	.0	.0	.0	MgAc+ CaEDTA=
1	.0	.0	.0	.0	MgAc+ UnuAn#2-
1	.0	.0	.0	.0	MgAc+ UnuAn#3-
1	.0	.0	.0	.0	MgAc+ UnuAn#4-
1	.0	.0	.0	.0	MgAc+ U(OH)2(CO3)2=
1	.0	.0	.0	.0	MgAc+ MgCit-
1	.0	.0	.0	.0	MgAc+ MgEDTA=
1	.0	.0	.0	.0	MgAc+ NpO2HEDTA=

1	.0	.0	.0	.0	MgLac+ Cl-
1	.0	.0	.0	.0	MgLac+ SO4=
1	.0	.0	.0	.0	MgLac+ HSO4-
1	.0	.0	.0	.0	MgLac+ OH-
1	.0	.0	.0	.0	MgLac+ HCO3-
1	.0	.0	.0	.0	MgLac+ CO3=
1	.0	.0	.0	.0	MgLac+ B(OH)4-
1	.0	.0	.0	.0	MgLac+ B3O3(OH)4-
1	.0	.0	.0	.0	MgLac+ B4O5(OH)4=
1	.0	.0	.0	.0	MgLac+ Br-
1	.0	.0	.0	.0	MgLac+ Am(CO3)2-
1	.0	.0	.0	.0	MgLac+ Am(CO3)3=-
1	.0	.0	.0	.0	MgLac+ ClO4-
1	.0	.0	.0	.0	MgLac+ NpO2(OH)2-
1	.0	.0	.0	.0	MgLac+ NpO2CO3-

1	.0	.0	.0	.0	MgLac+ NpO2(CO3)2=-
1	.0	.0	.0	.0	MgLac+ NpO2(CO3)3==-
1	.0	.0	.0	.0	MgLac+ H2PO4-
1	.0	.0	.0	.0	MgLac+ HPO4=
1	.0	.0	.0	.0	MgLac+ PO4=-
1	.0	.0	.0	.0	MgLac+ Th(SO4)3=
1	.0	.0	.0	.0	MgLac+ Th(OH)3(CO3)-
1	.0	.0	.0	.0	MgLac+ Th(CO3)5===
1	.0	.0	.0	.0	MgLac+ HOx-
1	.0	.0	.0	.0	MgLac+ Ox=
1	.0	.0	.0	.0	MgLac+ Ac-
1	.0	.0	.0	.0	MgLac+ Lac-
1	.0	.0	.0	.0	MgLac+ H2Cit-
1	.0	.0	.0	.0	MgLac+ HCit=
1	.0	.0	.0	.0	MgLac+ Cit=-
1	.0	.0	.0	.0	MgLac+ H3EDTA-
1	.0	.0	.0	.0	MgLac+ H2EDTA=
1	.0	.0	.0	.0	MgLac+ HEDTA=-
1	.0	.0	.0	.0	MgLac+ EDTA==
1	.0	.0	.0	.0	MgLac+ AmEDTA-
1	.0	.0	.0	.0	MgLac+ NpO2Cit=
1	.0	.0	.0	.0	MgLac+ NpO2EDTA==-
1	.0	.0	.0	.0	MgLac+ NpO2Ox-
1	.0	.0	.0	.0	MgLac+ U(OH)4(CO3)2==
1	.0	.0	.0	.0	MgLac+ U(CO3)5===
1	.0	.0	.0	.0	MgLac+ U(SO4)3=
1	.0	.0	.0	.0	MgLac+ Am(CO3)4==-
1	.0	.0	.0	.0	MgLac+ Am(SO4)2-
1	.0	.0	.0	.0	MgLac+ NpO2H2EDTA-
1	.0	.0	.0	.0	MgLac+ CaCit-
1	.0	.0	.0	.0	MgLac+ CaEDTA=
1	.0	.0	.0	.0	MgLac+ UnuAn#2-
1	.0	.0	.0	.0	MgLac+ UnuAn#3-
1	.0	.0	.0	.0	MgLac+ UnuAn#4-
1	.0	.0	.0	.0	MgLac+ U(OH)2(CO3)2=
1	.0	.0	.0	.0	MgLac+ MgCit-
1	.0	.0	.0	.0	MgLac+ MgEDTA=
1	.0	.0	.0	.0	MgLac+ NpO2HEDTA=
1	.0	.0	.0	.0	UnuCat#1+ Cl-
1	.0	.0	.0	.0	UnuCat#1+ SO4=
1	.0	.0	.0	.0	UnuCat#1+ HSO4-
1	.0	.0	.0	.0	UnuCat#1+ OH-
1	.0	.0	.0	.0	UnuCat#1+ HCO3-
1	.0	.0	.0	.0	UnuCat#1+ CO3=
1	.0	.0	.0	.0	UnuCat#1+ B(OH)4-
1	.0	.0	.0	.0	UnuCat#1+ B3O3(OH)4-
1	.0	.0	.0	.0	UnuCat#1+ B4O5(OH)4=
1	.0	.0	.0	.0	UnuCat#1+ Br-
1	.0	.0	.0	.0	UnuCat#1+ Am(CO3)2-
1	.0	.0	.0	.0	UnuCat#1+ Am(CO3)3=-
1	.0	.0	.0	.0	UnuCat#1+ ClO4-
1	.0	.0	.0	.0	UnuCat#1+ NpO2(OH)2-
1	.0	.0	.0	.0	UnuCat#1+ NpO2CO3-
1	.0	.0	.0	.0	UnuCat#1+ NpO2(CO3)2=-
1	.0	.0	.0	.0	UnuCat#1+ NpO2(CO3)3==-
1	.0	.0	.0	.0	UnuCat#1+ H2PO4-
1	.0	.0	.0	.0	UnuCat#1+ HPO4=
1	.0	.0	.0	.0	UnuCat#1+ PO4=-
1	.0	.0	.0	.0	UnuCat#1+ Th(SO4)3=
1	.0	.0	.0	.0	UnuCat#1+ Th(OH)3(CO3)-
1	.0	.0	.0	.0	UnuCat#1+ Th(CO3)5===
1	.0	.0	.0	.0	UnuCat#1+ HOx-

```
 1  .0         .0        .0      .0       UnuCat#1+ Ox=
 1  .0         .0        .0      .0       UnuCat#1+ Ac-
 1  .0         .0        .0      .0       UnuCat#1+ Lac-
 1  .0         .0        .0      .0       UnuCat#1+ H2Cit-
 1  .0         .0        .0      .0       UnuCat#1+ HCit=
 1  .0         .0        .0      .0       UnuCat#1+ Cit=-
 1  .0         .0        .0      .0       UnuCat#1+ H3EDTA-
 1  .0         .0        .0      .0       UnuCat#1+ H2EDTA=
 1  .0         .0        .0      .0       UnuCat#1+ HEDTA=-
 1  .0         .0        .0      .0       UnuCat#1+ EDTA==
 1  .0         .0        .0      .0       UnuCat#1+ AmEDTA-
 1  .0         .0        .0      .0       UnuCat#1+ NpO2Cit=
 1  .0         .0        .0      .0       UnuCat#1+ NpO2EDTA==-
 1  .0         .0        .0      .0       UnuCat#1+ NpO2Ox-
 1  .0         .0        .0      .0       UnuCat#1+ U(OH)4(CO3)2==
 1  .0         .0        .0      .0       UnuCat#1+ U(CO3)5===
 1  .0         .0        .0      .0       UnuCat#1+ U(SO4)3=
 1  .0         .0        .0      .0       UnuCat#1+ Am(CO3)4==-
 1  .0         .0        .0      .0       UnuCat#1+ Am(SO4)2-
 1  .0         .0        .0      .0       UnuCat#1+ NpO2H2EDTA-
 1  .0         .0        .0      .0       UnuCat#1+ CaCit-
 1  .0         .0        .0      .0       UnuCat#1+ CaEDTA=
 1  .0         .0        .0      .0       UnuCat#1+ UnuAn#2-
 1  .0         .0        .0      .0       UnuCat#1+ UnuAn#3-
 1  .0         .0        .0      .0       UnuCat#1+ UnuAn#4-
 1  .0         .0        .0      .0       UnuCat#1+ U(OH)2(CO3)2=
 1  .0         .0        .0      .0       UnuCat#1+ MgCit-
 1  .0         .0        .0      .0       UnuCat#1+ MgEDTA=
 1  .0         .0        .0      .0       UnuCat#1+ NpO2HEDTA=

-.012  .07  .07 0 .036 0 0 .1 0 .42 .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0  Na       1 w/2-39) theta  Th++++ RFSMMN, Am+++ FK98
      .032    0 0 .005 0 0 .1 0 .42  0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0  K:       2 w/3-39) theta  Th++++, Am+++ by analogy w/Na+ (RFSMMN, FK98)
           .007 0 .092 0 0 .2 0 .60 -.014  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 -.196 0 0 0
0 0 0 0 0 0 0  Ca:      3 w/4-39) theta  Am+++ FK98, Th++++ by analogy w/Mg++ (RFSMMN)
                0 .10  0 0 .2 0 .60 -.014  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 -.196 0 0 0
0 0 0 0 0 0 0  Mg:      4 w/5-39) theta  Th++++ RFSMMN, Am by analogy w/Ca++ (FK98)
                     0 0 0 0 0   0  0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0  MgOH:    5 w/6-39) theta
                       0 0 0 0 .60 .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0  H :      6 w/7-39) theta  Roy92

     0 0 0   0  0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  MgB(OH)4:
7 w/8-39) theta
       0 0   0  0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  CaB(OH)4:
8 w/9-39) theta
         0   0  0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  Am+++:
9 w/10-39) theta
             0  0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  AmCO3+:
10 w/11-39) theta
                0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  Th++++:
11 w/12-39) theta
                     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  AmCl++:
12 w/13-39) theta
                       0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  NpO2+:
13 w/14-39) theta
                         0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  U++++:
14 w/15-39) theta
                           0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  UOH+++:
15 w/16-39) theta
                             0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  UAc+++:
16 w/17-39) theta
```

```
                                0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  ThOx++
17 w/18-39) theta
                                  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  AmAc++
18 w/19-39) theta
                                    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  AmLac++
19 w/20-39) theta
                                      0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  AmOx+
20 w/21-39) theta
                                        0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  UCit+
21 w/22-39) theta
                                          0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  ULac+++
22 w/23-39) theta
                                            0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  UOx++
23 w/24-39) theta
                                              0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  ThAc+++
24 w/25-39) theta
                                                0 0 0 0 0 0 0 0 0 0 0 0 0 0  ThCit+
25 w/26-39) theta
                                                  0 0 0 0 0 0 0 0 0 0 0 0 0  ThLac+++
26 w/27-39) theta
                                                    0 0 0 0 0 0 0 0 0 0 0 0  AmOH++
27 w/28-39) theta
                                                      0 0 0 0 0 0 0 0 0 0 0  Am(OH)2+
28 w/29-39) theta
                                                        0 0 0 0 0 0 0 0 0 0  AmCl2+
29 w/30-39) theta
                                                          0 0 0 0 0 0 0 0 0  AmSO4+
30 w/31-39) theta
                                                            0 0 0 0 0 0 0 0  Pu(OH)2+
31 w/32-39) theta
                                                              0 0 0 0 0 0 0  ThAc2++
32 w/33-39) theta
                                                                0 0 0 0 0 0  PuOx+
33 w/34-39) theta
                                                                  0 0 0 0 0  ThLac2++
34 w/35-39) theta
                                                                    0 0 0 0  CaAc+
35 w/36-39) theta
                                                                      0 0 0  CaLac+
36 w/37-39) theta
                                                                        0 0  MgAc+
37 w/38-39) theta
                                                                          0  MgLac+
38 w/39-39) theta
.02 -.006 -.05  .03 -.02 -.065  .12  .074 0 0 0     0 -.24 -.21 -.26 -.26 .1 0 0  0 0
1.8 0 0 -.09 0 0 0 0 0 0 0 0 0 0 0 0
                                                                                 0 0
0 0 0    0 0 0 0 0 0 0 0 0 0 0 0 0 Cl, Th FR99, Np FNK95
       0 -.013 .01  .02 -.012  .10   .12 0 0 0     0    0    0    0    0  0 0 0  0 0
0 0 0    0 0 0 0 0 0 0 0 0 0 0 0 0
                                                                                 0 0
0 0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 SO4
             0   0    0    0    0    0 0 0 0     0    0    0    0    0  0 0 0  0 0
0 0 0    0 0 0 0 0 0 0 0 0 0 0 0 0
                                                                                 0 0
0 0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 HSO4
                 0  .10     0    0     0 0 0 0 -.032    0    0    0    0  0 0 0  0 0
0 0 0    0 0 0 0 0 0 0 0 0 0 0 0 0
                                                                                 0 0
0 0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 OH
                   -.04     0 -.10 -.087 0 0 0  .095    0    0    0    0  0 0 0  0 0
0 0 0    0 0 0 0 0 0 0 0 0 0 0 0 0
```

0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 HCO3

0 0 0 0 0 0 .21 0 0 0 -1.9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 CO3, Np Novak et al 1997
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 B(OH)4
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 B3O3(OH)4
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 B4O5(OH)4
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Br
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Am(CO3)2-
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Am(CO3)3=-
0 0 0 0 0 0 0 0 0 5.5 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 ClO4-, Th FRSMHC97
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 NpO2(OH)2-
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 NpC-
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 NpC2=-
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 NpC3==-
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 H2PO4-
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 HPO4=
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 PO4=-
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Th(SO4)=
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Th(OH)3CO3-
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Th(CO3)5===
0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 HOx-
0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ox=
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ac-
0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Lac-
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 H2Cit-
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 HCit=
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 Cit=-
0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 H3EDTA-
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 H2EDTA=
0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 HEDTA=-
0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 EDTA==
0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 AmEDTA-

```
                                                                                0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 NpO2Cit=
                                                                                  0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 NpO2EDTA==-
                                                                                    0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 NpO2Ox-
                                                                                      0
0 0 0 0 0 0 0 0 0 0 0 0 0 U(OH)3CO3-

0 0 0 0 0 0 0 0 0 0 0 0 0 U(CO3)5===

0 0 0 0 0 0 0 0 0 0 0 0 U(SO4)3=

0 0 0 0 0 0 0 0 0 0 0 Am(CO3)4==-

0 0 0 0 0 0 0 0 0 0 Am(SO4)2-

0 0 0 0 0 0 0 0 0 NpO2H2EDTA-

0 0 0 0 0 0 0 0 CaCit-

0 0 0 0 0 0 0 CaEDTA=

0 0 0 0 0 0 UnuAn#2-

0 0 0 0 0 UnuAn#3-

0 0 0 0 UnuAn#4-

0 0 0 U(OH)2(CO3)2=

0 0 MgCit-

0 MgEDTA=

-.0018 -.010     .0 0 -.003 .003 0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-K+:anions psi
 -.007 -.055     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-Ca++:
 -.012 -.015     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-Mg++:
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-MgOH+:
 -.004    .0 -.0129 0   .0   .0  0 0 0 0 0 0 -.016 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-H+:
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-MgB(OH)4+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-CaB(OH)4+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-Am+++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-AmCO3+
   .21    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-Th++++ RFSMMN
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-AmCl++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-NpO2++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-U++++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-UOH+++
```

```
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-UAc+++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-ThOx++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-AmAc++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-AmLac++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-AmOx+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-UCit+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-ULac+++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-UOx++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-ThAc+++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-ThCit+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-ThLac+++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-AmOH++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-Am(OH)2+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-AmCl2+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-AmSO4+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-Pu(OH)2+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-ThAc2++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-PuOx+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-ThLac2++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-CaAc+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-CaLac+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-MgAc+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-MgLac+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Na+-UnuCat#1+

-.025     .0     .0 0    0    0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-Ca:
-.022  -.048     .0 0    0    0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-Mg:
   .0     .0     .0 0    0    0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-MgOH:
-.011   .197 -.0265 0    0    0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-H :
   .0     .0     .0 0    0    0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-MgB(OH)4+
   .0     .0     .0 0    0    0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-CaB(OH)4+
   .0     .0     .0 0    0    0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-Am+++
```

```
   .0       .0       .0 0     0     0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-AmCO3+
   .21      .0       .0 0     0     0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-Th++++ analogy w/Na+ (RFSMMN)
   .0       .0       .0 0     0     0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-AmCl++
   .0       .0       .0 0     0     0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-NpO2++
   .0       .0       .0 0     0     0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-U++++
   .0       .0       .0 0     0     0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-UOH+++
   .0       .0       .0 0     0     0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-UAc+++
   .0       .0       .0 0     0     0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-ThOx++
   .0       .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-AmAc++
   .0       .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-AmLac++
   .0       .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-AmOx+
    .0      .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-UCit+
    .0      .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-ULac+++
    .0      .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-UOx++
    .0      .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-ThAc+++
    .0      .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-ThCit+
    .0      .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-ThLac+++
    .0      .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-AmOH++
    .0      .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-Am(OH)2+
    .0      .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-AmCl2+
    .0      .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-AmSO4+
    .0      .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-Pu(OH)2+
    .0      .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-ThAc2++
    .0      .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-PuOx+
    .0      .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-ThLac2++
    .0      .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-CaAc+
    .0      .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-CaLac+
    .0      .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-MgAc+
    .0      .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-MgLac+
    .0      .0       .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 K+-UnuCat#1+

 -.012   .024      .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-Mg:
```

```
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-MgOH:
 -.015     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-H :
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-MgB(OH)4+
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-Ca++B(OH)4+
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-Am+++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-AmCO3+
   .21     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-Th++++, analogy w/Mg++ (RFSMMN)
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-AmCl++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-NpO2++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-U++++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-UOH+++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-UAc+++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-ThOx++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-AmAc++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-AmLac++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-AmOx+
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-UCit+
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-ULac+++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-UOx++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-ThAc+++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-ThCit+
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-ThLac+++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-AmOH++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-Am(OH)2+
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-AmCl2+
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-AmSO4+
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-Pu(OH)2+
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-ThAc2++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-PuOx+
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-ThLac2++
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-CaAc+
    .0     .0      .0 0    .0    .0   0 0 0 0 0 0   .0    0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca++-CaLac+
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca+-MgAc+
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca+-MgLac+
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Ca+-UnuCat#1+

  .028     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-MgOH:
 -.011     .0 -.0178 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-H :
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-MgB(OH)4+
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-CaB(OH)4+
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-Am+++
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-AmCO3+
   .21     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-Th++++ RSFMMN
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-AmCl++
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-NpO2++
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-U++++
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-UOH+++
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-UAc+++
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-ThOx++
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-AmAc++
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-AmLac++
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-AmOx+
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-UCit+
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-ULac+++
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-UOx++
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-ThAc+++
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-ThCit+
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-ThLac+++
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-AmOH++
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-Am(OH)2+
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-AmCl2+
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-AmSO4+
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-Pu(OH)2+
    .0     .0     .0 0    .0    .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-ThAc2++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-PuOx+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-ThLac2++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-CaAc+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-CaLac+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-MgAc+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-MgLac+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Mg++-UnuCat#1+

    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-H :
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-MgB(OH)4+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-CaB(OH)4+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-Am+++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-AmCO3+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-Th++++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-AmCl++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-NpO2++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-U++++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-UOH+++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-UAc+++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-ThOx++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-AmAc++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-AmLac++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-AmOx+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-UCit+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-ULac+++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-UOx++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-ThAc+++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-ThCit+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-ThLac+++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-AmOH++
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-Am(OH)2+
    .0    .0     .0 0   .0   .0  0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-AmCl2+
    .0    .0     .0 0    .0    .0   0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-AmSO4+
    .0    .0     .0 0    .0    .0   0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-Pu(OH)2+
    .0    .0     .0 0    .0    .0   0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-ThAc2++
    .0    .0     .0 0    .0    .0   0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-PuOx+
    .0    .0     .0 0    .0    .0   0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-ThLac2++
    .0    .0     .0 0    .0    .0   0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-CaAc+
    .0    .0     .0 0    .0    .0   0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-CaLac+
    .0    .0     .0 0    .0    .0   0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-MgAc+
    .0    .0     .0 0    .0    .0   0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-MgLac+
    .0    .0     .0 0    .0    .0   0 0 0 0 0 0  .0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 MgOH+-UnuCat#1+

    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-MgB(OH)4+
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-CaB(OH)4+
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-Am+++
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-AmCO3+
   .37 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-Th++++     Roy92
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-AmCl++
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-NpO2++
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-U++++
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-UOH+++
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-UAc+++
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-ThOx++
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-AmAc++
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-AmLac++
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-AmOx+
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-UCit+
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-ULac+++
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-UOx++
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-ThAc+++
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-ThCit+
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-ThLac+++
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-AmOH++
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-Am(OH)2+
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-AmCl2+
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-AmSO4+
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-Pu(OH)2+
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-ThAc2++
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-PuOx+
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-ThLac2++
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-CaAc+
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-CaLac+
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-MgAc+
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-MgLac+
    .0 0 0 0 0 0 0 0 0 0 0 0     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 H+-UnuCat#1+

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4-CaB(OH)4+
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4-Am+++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4-AmCO3+
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4-Th++++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4-AmCl++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4-NpO2++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4-U++++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4-UOH+++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4-UAc+++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4-ThOx++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4-AmAc++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4-AmLac++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4-AmOx+
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4-UCit+
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4-ULac+++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4-UOx++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4-ThAc+++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4-ThCit+
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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0 0 0 0 0 0 0 0 0 0 MgB(OH)4-ThLac+++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4+-AmOH++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4+-Am(OH)2+
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4+-AmCl2+
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4+-AmSO4+
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4+-Pu(OH)2+
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4+-ThAc2++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4+-PuOx+
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4+-ThLac2++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4+-CaAc+
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4+-CaLac+
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4+-MgAc+
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4+-MgLac+
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 MgB(OH)4+-UnuCat#1+

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 CaB(OH)4-Am+++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 CaB(OH)4-AmCO3+
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 CaB(OH)4-Th++++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 CaB(OH)4-AmCl++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 CaB(OH)4-NpO2++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 CaB(OH)4-U++++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 CaB(OH)4-UOH+++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 CaB(OH)4-UAc+++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 CaB(OH)4-ThOx++
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 CaB(OH)4-AmAc++
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0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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0 0 0 0 0 0 0 0 0 0 ThAc+++-CaLac+
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 .0014    .0 -.018 -.004 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- SO4:(vs Cations) psi
 -.006    .0    .0    .0 0 .013 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- HSO4:
 -.006 -.006 -.025    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- OH:
 -.015    .0    .0 -.096 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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 .0085  .004    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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-.0073    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- B(OH)4:
 -.024    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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  .026    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- B4O5(OH)4:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Br:
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    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Am(CO3)2:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Am(CO3)3: FK98
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- ClO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- NpO2(OH)2-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- NpO2CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- NpO2(CO3)2=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- NpO2(CO3)3==-:
    .0    -.01    .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- H2PO4-: PS76
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- HPO4=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- PO4=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Th(SO4)3=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Th(OH)3CO3-:
   .30    .30     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Th(CO3)5===: FR99, K+ by analogy w/Na+
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Ox=
.01029     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Ac-     NBC96(Na+), K+ NOT by analogy w/Na+
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  Cl- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cl- NpO2HEDTA=

-.0094 -.0677   .0 -.0425 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= HSO4:
 -.009 -.050    .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= OH:
 -.005     .0    .0 -.161 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= HCO3:
 -.005 -.009    .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= CO3:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= B(OH)4:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= B3O3(OH)4:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= B4O5(OH)4:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Br:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Am(CO3)2:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Am(CO3)3:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= ClO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= NpO2(OH)2-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= NpO2CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= NpO2(CO3)2=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= NpO2(CO3)3==-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= H2PO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= HPO4=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= PO4=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Th(SO4)3=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  SO4= Th(OH)3CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Th(CO3)5===:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Ox=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  SO4= NpO2HEDTA=
```

```
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- OH:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- HCO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- CO3=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- B(OH)4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- B3O3(OH)4:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- B4O5(OH)4:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Br-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Am(CO3)2-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Am(CO3)2=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- ClO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- NpO2(OH)2-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- NpO2CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- NpO2(CO3)2=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- NpO2(CO3)3==-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- H2PO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- HPO4=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- PO4=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Th(SO4)3=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Th(OH)3CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Th(CO3)5===:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Ox=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- EDTA==
```

```
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HSO4- NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- HCO3:
 -.017  -.01    .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- CO3:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- B(OH)4:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- B3O3(OH)4:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- B4O5(OH)4:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Br:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Am(CO3)2:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Am(CO3)3:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- ClO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- NpO2(OH)2-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- NpO2CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- NpO2(CO3)2=-:
```

```
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- NpO2(CO3)3==-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- H2PO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- HPO4=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- PO4=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Th(SO4)3=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Th(OH)3CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Th(CO3)5===:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Ox=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  OH- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  OH- NpO2HEDTA=

   .002 .012    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-CO3:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-B(OH)4:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-B3O3(OH)4:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-B4O5(OH)4:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-Br:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-Am(CO3)2:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-Am(CO3)3:
 -.010    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-ClO4-:         NFRK95
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-NpO2(OH)2-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-NpO2CO3-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-NpO2(CO3)2=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-NpO2(CO3)3==-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-H2PO4-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-HPO4=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-PO4=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-Th(SO4)3=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-Th(OH)3CO3-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-Th(CO3)5===:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-HOx-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-Ox=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-Ac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-Lac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-H2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  HCO3-H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3-U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCO3- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= B(OH)4-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= B3O3(OH)4:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= B4O5(OH)4:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Br:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Am(CO3)2:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Am(CO3)3:
   -.024  .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= ClO4-:          NFRK95
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= NpO2(OH)2-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  CO3= NpO2CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= NpO2(CO3)2=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= NpO2(CO3)3==-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= H2PO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= HPO4=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= PO4=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Th(SO4)3=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Th(OH)3CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Th(CO3)5===:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Ox=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= CaEDTA=
```

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    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= UnuAn#2-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= UnuAn#3-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= UnuAn#4-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= U(OH)2(CO3)2=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= MgCit-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= MgEDTA=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CO3= NpO2HEDTA=

    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- B3O3(OH)4:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- B4O5(OH)4:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Br:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Am(CO3)2:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Am(CO3)3:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- ClO4-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- NpO2(OH)2-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- NpO2CO3-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- NpO2(CO3)2=-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- NpO2(CO3)3==-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- H2PO4-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- HPO4=:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- PO4=-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Th(SO4)3=:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Th(OH)3CO3-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Th(CO3)5===:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- HOx-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Ox=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Ac-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Lac-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- H2Cit=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- HCit=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Cit=-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- H3EDTA-
```

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    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B(OH)4- NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- B4O5(OH)4:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Br:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Am(CO3)2:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Am(CO3)3:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- ClO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- NpO2(OH)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- NpO2CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- NpO2(CO3)2=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- NpO2(CO3)3==-:
```

```
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- H2PO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- HPO4=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- PO4=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Th(SO4)3=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Th(OH)3CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Th(CO3)5===:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Ox=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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0 0 0 0 0 0  B3O3(OH)4- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B3O3(OH)4- NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Br:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Am(CO3)2:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Am(CO3)3:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= ClO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= NPO2(OH)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= NpO2CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= NpO2(CO3)2=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= NpO2(CO3)3==-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= H2PO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= HPO4=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= PO4=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Th(SO4)3=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Th(OH)3CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Th(CO3)5===:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Ox=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

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0 0 0 0 0 0  B4O5(OH)4= NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  B4O5(OH)4= NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- Am(CO3)2:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- Am(CO3)3:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- ClO4-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- NpO2(OH)2-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- NpO2CO3-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- NpO2(CO3)2=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- NpO2(CO3)3==-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- H2PO4-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- HPO4=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- PO4=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- Th(SO4)3=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- Th(OH)3CO3-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- Th(CO3)5===:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  Br- HOx-
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- Ox=
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- Ac-
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- Lac-
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- H2Cit=
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- HCit=
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- Cit=-
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- H3EDTA-
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- H2EDTA=
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- HEDTA=-
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- EDTA==
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- AmEDTA-
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- NpO2Cit=
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- NpO2EDTA==-
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- NpO2Ox-
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- U(OH)3CO3-
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- U(CO3)5===
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- U(SO4)3=
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- Am(CO3)4==-
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- Am(SO4)2-
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- NpO2H2EDTA-
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- CaCit-
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- CaEDTA=
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- UnuAn#2-
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- UnuAn#3-
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- UnuAn#4-
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- U(OH)2(CO3)2=
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- MgCit-
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- MgEDTA=
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Br- NpO2HEDTA=

     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- Am(CO3)3:
     .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

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0 0 0 0 0 0  Am(CO3)2- ClO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- NpO2(OH)2-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- NpO2CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- NpO2(CO3)2=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- NpO2(CO3)3==-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- H2PO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- HPO4=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- PO4=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- Th(SO4)3=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- Th(OH)3CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- Th(CO3)5===:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- Ox=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- NpO2H2EDTA-
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    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- CaCit-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- CaEDTA=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- UnuAn#2-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- UnuAn#3-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- UnuAn#4-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- U(OH)2(CO3)2=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- MgCit-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- MgEDTA=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)2- NpO2HEDTA=

    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- ClO4-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- NpO2(OH)2-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- NpO2CO3-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- NpO2(CO3)2=-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- NpO2(CO3)3==-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- H2PO4-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- HPO4=:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- PO4=-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- Th(SO4)3=:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- Th(OH)3CO3-:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- Th(CO3)5===:
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- HOx-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- Ox=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- Ac-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- Lac-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- H2Cit=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- HCit=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- Cit=-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- H3EDTA-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- H2EDTA=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- HEDTA=-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- EDTA==
```

```
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)3=- NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- NpO2(OH)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- NpO2CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- NpO2(CO3)2=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- NpO2(CO3)3==-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- H2PO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- HPO4=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- PO4=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- Th(SO4)3=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- Th(OH)3CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- Th(CO3)5===:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- Ox=
```

```
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- Ac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- Lac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- H2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  ClO4- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- NpO2CO3-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- NpO2(CO3)2=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- NpO2(CO3)3==-:
```

```
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- H2PO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- HPO4=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- PO4=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- Th(SO4)3=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- Th(OH)3CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- Th(CO3)5===:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- Ox=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  NpO2(OH)2- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(OH)2- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- NpO2(CO3)2=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- NpO2(CO3)3==-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- H2PO4-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- HPO4=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- PO4=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- Th(SO4)3=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- Th(OH)3CO3-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- Th(CO3)5===:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- HOx-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- Ox=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- Ac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- Lac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- H2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  NpO2CO3- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2CO3- NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- NpO2(CO3)3==-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- H2PO4-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- HPO4=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- PO4=-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- Th(SO4)3=:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- Th(OH)3CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- Th(CO3)5===:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- Ox=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  NpO2(CO3)2=- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)2=- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- H2PO4-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- HPO4=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- PO4=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- Th(SO4)3=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- Th(OH)3CO3-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- Th(CO3)5===:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- HOx-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- Ox=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- Ac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- Lac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- H2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  NpO2(CO3)3==- H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2(CO3)3==- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- HPO4=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- PO4=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- Th(SO4)3=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- Th(OH)3CO3-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- Th(CO3)5===:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- HOx-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- Ox=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- Ac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  H2PO4- Lac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- H2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2PO4- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= PO4=-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= Th(SO4)3=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= Th(OH)3CO3-:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= Th(CO3)5===:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  HPO4= HOx-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= Ox=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= Ac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= Lac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= H2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HPO4= NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- Th(SO4)3=:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  PO4=- Th(OH)3CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- Th(CO3)5===:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- Ox=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  PO4=- NpO2HEDTA=
```

```
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= Th(OH)3CO3-:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= Th(CO3)5===:
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= Ox=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= MgEDTA=
```

```
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(SO4)3= NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- Th(CO3)5===:
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- HOx-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- Ox=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- Ac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- Lac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- H2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)3CO3- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)4CO3- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)4CO3- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)4CO3- MgEDTA=
```

```
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(OH)4CO3- NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== HOx-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== Ox=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Th(CO3)5=== NpO2HEDTA=
```

```
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- Ox=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- Lac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- H2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- HCit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HOx- NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= Ac-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  Ox= Lac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= H2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ox= NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- Lac-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- H2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  Ac- H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Ac- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- H2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  Lac- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Lac- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- HCit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- Cit=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  H2Cit- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2Cit- NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= Cit=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= H3EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= H2EDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= HEDTA=-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= EDTA==
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= AmEDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  HCit= UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HCit= NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- H3EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Cit=- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- H2EDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- HEDTA=-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- EDTA==
```

```
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- AmEDTA-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- NpO2Cit=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- NpO2EDTA==-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- NpO2Ox-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- U(OH)3CO3-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- U(CO3)5===
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- U(SO4)3=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- Am(CO3)4==-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- Am(SO4)2-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- NpO2H2EDTA-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- CaCit-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- CaEDTA=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- UnuAn#2-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- UnuAn#3-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- UnuAn#4-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- U(OH)2(CO3)2=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- MgCit-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- MgEDTA=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H3EDTA- NpO2HEDTA=

    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= HEDTA=-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= EDTA==
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= AmEDTA-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= NpO2Cit=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= NpO2EDTA==-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= NpO2Ox-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= U(OH)3CO3-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= U(CO3)5===
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= U(SO4)3=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= Am(CO3)4==-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= Am(SO4)2-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= NpO2H2EDTA-
```

```
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  H2EDTA= NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- EDTA==
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- NpO2Cit=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- NpO2EDTA==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- NpO2Ox-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  HEDTA=- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== AmEDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  EDTA== NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  EDTA== NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- NpO2Cit=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  AmEDTA- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  AmEDTA- NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= NpO2EDTA==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Cit= NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- NpO2Ox-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- U(OH)3CO3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- U(CO3)5===
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- U(SO4)3=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- Am(CO3)4==-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- CaEDTA=
```

```
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2EDTA=- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- U(OH)3CO3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2Ox- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3-U(CO3)5===
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3-U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0  U(OH)3CO3- UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)3CO3- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== U(SO4)3=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(CO3)5=== NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= Am(CO3)4==-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= Am(SO4)2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= NpO2H2EDTA-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= CaCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= CaEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= UnuAn#2-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= UnuAn#3-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= UnuAn#4-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= U(OH)2(CO3)2=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(SO4)3= NpO2HEDTA=
```

```
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- Am(SO4)2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(CO3)4==- NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(SO4)2- NpO2H2EDTA-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(SO4)2- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(SO4)2- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(SO4)2- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(SO4)2- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(SO4)2- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(SO4)2- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(SO4)2- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(SO4)2- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  Am(SO4)2- NpO2HEDTA=

    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2H2EDTA- CaCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2H2EDTA- CaEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2H2EDTA- UnuAn#2-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2H2EDTA- UnuAn#3-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2H2EDTA- UnuAn#4-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2H2EDTA- U(OH)2(CO3)2=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2H2EDTA- MgCit-
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2H2EDTA- MgEDTA=
    .0     .0     .0     .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  NpO2H2EDTA- NpO2HEDTA=
```

```
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaCit- CaEDTA=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaCit- UnuAn#2-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaCit- UnuAn#3-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaCit- UnuAn#4-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaCit- U(OH)2(CO3)2=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaCit- MgCit-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaCit- MgEDTA=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaCit- NpO2HEDTA=

    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaEDTA= UnuAn#2-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaEDTA= UnuAn#3-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaEDTA= UnuAn#4-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaEDTA= U(OH)2(CO3)2=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaEDTA= MgCit-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaEDTA= MgEDTA=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  CaEDTA= NpO2HEDTA=

    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#2- UnuAn#3-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#2- UnuAn#4-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#2- U(OH)2(CO3)2=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#2- MgCit-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#2- MgEDTA=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#2- NpO2HEDTA=

    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#3- UnuAn#4-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#3- U(OH)2(CO3)2=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#3- MgCit-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#3- MgEDTA=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#3- NpO2HEDTA=

    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#4- U(OH)2(CO3)2=
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#4- MgCit-
    .0     .0     .0     .0 0    .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#4- MgEDTA=
```

```
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  UnuAn#4- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)2(CO3)2= MgCit-
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)2(CO3)2= MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  U(OH)2(CO3)2= NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  MgCit- MgEDTA=
    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  MgCit- NpO2HEDTA=

    .0    .0    .0    .0 0   .0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0  MgEDTA= NpO2HEDTA=


 .100 .051  .183 .183 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   CO2-Cations      HMW84 lambda
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   CaCO3-Cations    HMW84
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   MgCO3-Cations    HMW84
-.097 -.14    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   B(OH)3-Cations   FW86
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   NpO2OH-Cations
   .0 -.07    .0   .0 .0  .29 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   H3PO4-Cations    PS76
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   Th(SO4)2-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   H2Ox-Cations     ERG_org_memo
  -.2  -.2    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   Am(OH)3(aq)-Cations Na+ FK98, K+ by analogy w Na
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   HAc-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   NpO2Ac-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   HLac-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   H3Citrate-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   AmCit-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   NpO2Lac-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   Th(OH)4-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   U(OH)4-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   U(SO4)2-Cations
  -.2  -.2    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   Pu(OH)3(aq)-Cations analogy w Am
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   PuCit(aq)-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   CaOx(aq)-Cations
   .0   .0    .0   .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   H4EDTA-Cations
```

```
   .0    .0     .0    .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   ThEDTA-Cations
   .0    .0     .0    .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   UEDTA-Cations
   .0    .0     .0    .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   MgOx(aq)-Cations
   .0    .0     .0    .0 .0  .0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0   UnuNeu#1-Cations

-.005 .097 -.003  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  CO2-An      HMW84
   .0    .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  CaCO3-An    HMW84
   .0    .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  MgCO3-An    HMW84
 .091 .018     .0  0 0 0 0 -.2 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  B(OH)3-An   FW86
 -.19   .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  NpO2OH-An   FNK95
   .0    .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0 -.4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  H3PO4-An    PS76
  .29   .0    .68  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  Th(SO4)2-An Roy92
   .0    .0    .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  H2Ox-An     ERG_org_memo
  -.2   .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  Am(OH)3(aq)-An Cl- FK98
   .0    .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  HAc-An
-.104   .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  NpO2Ac-An   ERG_release_memo(Cl-)
   .0    .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  HLac-An
   .0    .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  H3Citrate-An
-.406   .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  AmCit-An    SAND99(Cl-)
 .015   .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  NpO2Lac-An  SAND99/Moore et al 99(Cl-)
   .0    .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  Th(OH)4-An
   .0    .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  U(OH)4-An
   .0    .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  U(SO4)2-An
  -.2   .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  Pu(OH)3(aq)-An analogy w Am
-.406   .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  PuCit(aq)-An   analogy w/ Am (SAND99(Cl-))
  .0189 .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  CaOx(aq)-An    analogy w/Mg (ERG_org_memo)
   .0    .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  H4EDTA-An
  .1111 .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  ThEDTA-An   ERG_org_memo (Cl-)
  .1111 .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  UEDTA-An    analogy w/ Th (ERG_org_memo (Cl-))
  .0189 .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  MgOx(aq)-An   ERG_org_memo (Cl-)
   .0    .0     .0  0 0 0 0  .0 0 0 0 0 0 0 0 0 0   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  UnuNeu#1-An

.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0   CO2-C-A
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0    (C down
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0     A acr
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0   CaCO3-Cation-Anion
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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.0  .0  .0  .0  .0  .0  0  0  0  0  0  0  0  0  0  0  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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99 (NpO2Lac-Na-Cl = 0)
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  2   3   4   5   6   7      Na+       K+        Ca++      Mg++      MgOH+  H+
cation map ELMAP(1,)
 22  21  36  37  50  43      MgB(OH)4+ CaB(OH)4+ Am+++     AmCO3+    Th++++ AmCl++
 64  56  57 101  99  86      NpO2+     U++++     UOH+++    UAc+++    ThOx++ AmAc++
 90  89 102 104 105  96      AmLac++   AmOx+     UCit+     ULac+++  UOx++  ThAc+++
 97 100  40  41  44  47      ThCit+    ThLac+++  AmOH++    Am(OH)2+ AmCl2+ AmSO4+
 48  91  94  95 116 120      Pu(OH)2+  ThAc2++    PuOx+     ThLac2++  CaAc+  CaLac+
111 115 121                  MgAc+     MgLac+    UnuCat#1+

  8   9  10  11  12  13      Cl-        SO4=          HSO4-          OH-
HCO3-         CO3=        anion map ELMAP(2,)
 18  19  20  23  38  39      B(OH)4-    B3O3(OH)4-    B4O5(OH)4=     Br-
Am(CO3)2-     Am(CO3)3=-
 24  69  65  66  67  33      ClO4-      NpO2(OH)2-    NpO2CO3-       NpO2(CO3)2=-
NpO2(CO3)3==- H2PO4-
 34  35  55  52  51  82      HPO4=      PO4=-         Th(SO4)3=      Th(OH)3(CO3)-
Th(CO3)5===    HOx-
 83  71  85  73  74  75      Ox=        Ac-           Lac-           H2Cit-
HCit=         Cit=-
 77  78  79  80  88 107      H3EDTA-    H2EDTA=       HEDTA=-        EDTA==
AmEDTA-       NpO2Cit=
108 109  60  58  63  45      NpO2EDTA=- NpO2Ox-       U(OH)4(CO3)2== U(CO3)5===
U(SO4)3=      Am(CO3)4==-
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 46  93 117 118 123 124      Am(SO4)2- NpO2H2EDTA-       CaCit-         CaEDTA=
UnuAn#2-      UnuAn#3-
125  59 112 113 122          UnuAn#4-   U(OH)2(CO3)2= MgCit-         MgEDTA=
NpO2HEDTA=

 14  15  16  17  68  32      CO2         CaCO3     MgCO3       B(OH)3  NpO2OH H3PO4
neutral map ELMAP(3,)
 54  81  42  70 106  84      Th(SO4)2    H2Ox      Am(OH)3(aq) HAc     NpO2Ac HLac
 72  87 110  53  61  62      H3Cit       AmCit     NpO2Lac     Th(OH)4 U(OH)4 U(SO4)2
 49  92 119  76  98 103      Pu(OH)3(aq) PuCit(aq) CaOx(aq)    H4EDTA  ThEDTA UEDTA
114 126                      MgOx(aq)    UnuNeu#1

'nEQUALACT' 0

2 (Oxygen)
'nREDOX' 0
'nIONEX' 0 0 'nMF'

1234567890123456789012345678901234567890123456789012345678901234567890123456
789012345678901234567890123456789012
        1         2         3         4         5         6         7         8
9         0         1         2         3

1         1         1         1
This database release is described in Giambalvo memo to Brush, 20November02, "Release
of FMT database 021120.chemdat."
       (in records package 522977)
Data values without explicit references are from HMW84 or FW86

+III References
See Giambalvo memo to Brush, 25July2002, "Recommended Parameter Values for Modeling
An(III) Solubility in WIPP Brines" for
       overview and comparison to PAVT database. ERMS 522982.
 FRF90  ==  Felmy, Rai, and Fulton, 1990. The solubility of AmOHCO3(c) and the aqueous
thermodynamics of the
               system Na-Am-HCO3-CO3-OH-H2O, RCA 50:193-204. (Am+++ - ClO4- Pitzers)
 RFF92  ==  Rai, Felmy, and Fulton, 1992. Solubility and ion activity product of
AmPO4.xH2O, RCA 56:7-14.
 RFF95  ==  Rai, Felmy, and Fulton, 1995. Nd+++ and Am+++ ion interactions with
sulfate ion and their influence on
               NdPO4(c) solubility, J. Soln. Chem. 24(9):879-895. (Am+++ - H2PO4-
Pitzers)
 RRFFN96 ==  Rao, Rai, Felmy, Fulton, and Novak, 1996. Solubility of NaNd(CO3)2.6H2O
in concentrated Na2CO3 and
               NaHCO3 solutions, RCA 75:141-147.
 FK98 == Fanghanel and Kim, 1998. Spectroscopic evaluation of thermodynamics of
trivalent
        actinides in brines. J. Alloys and Compounds, 271-273:728-737. (Review paper
incl.
        Fanghanel et al. 1994, Konnecke et al. 1997 and Fanghanel et al. 1999).
 Fanghanel et al 1994 == Fanghanel, Kim, Paviet, Klenze, and Hauser, 1994.
Thermodynamics of radioactive trace elements in
        concentrated electrolyte solutions: Hydrolysis of Cm3+ in NaCl-solutions, RCA
66/67:81-87.
 Konnecke et al. 1997 == Konnecke, Fanghanel, and Kim, 1997. Thermodynamics of
trivalent actinides in concentrated
       electrolyte solutions: Modelling the chloride complexation of Cm(III), RCA
76:131-135.
 Fanghanel et al. 1999 == Fanghanel, Konnecke, Weger, Paviet-Hartmann, Neck, and Kim,
1999. Thermodynamics of Cm(III)
       in concentrated salt solutions: Carbonate complexation in NaCl solution at 25C,
J. Soln. Chem. 28(4):447-462.
```

+IV References
See Giambalvo memo to Brush 26July2002 "Recommended Parameter Values for Modeling An(IV) Solubility in WIPP Brines" for
overview and comparison to PAVT database. ERMS 522986.
FRM91 == Felmy, Rai, and Mason, 1991. The solubility of hydrous thorium(IV) oxide in chloride media:
Development of an aqueous ion-interaction model, RCA 55:177-185.
FR92 == Felmy and Rai, 1992. An aqueous thermodynamic model for a high valence 4:2 electrolyte Th4+-SO42-
in the system Na-K-Li-NH4-Th-SO4-HSO4-H2O to high concentration, J Soln Chem 21(5):407-423.
Roy92 == Roy, Vogel, Good, Davis, Roy, Johnson, Felmy, and Pitzer, 1992. Activity coefficients in electrolyte
mixtures: HCl + ThCl4 + H2O for 5-55 C, J Phys Chem 96(26):11065-11072.
RR87 == Ryan and Rai, 1987. Thorium(IV) hydrous oxide solubility, Inorg. Chem. 26:4140-4142.
RFSMMN == Rai et al. 1997 Solubility of Th(IV) and U(IV) Hydrous Oxides in Conc NaCl and MgCl2 Solutions
RCA 79:239-247
FRSMHC97 == Felmy,Rai,Sterner,Mason,Hess,Conradson, 1997 "Thermo Models for Hightly Charged Aq Species
Solubility of Th(IV) Hydrous Oxide in Conc NaHCO3 and Na2O3 Solns" J Soln Chem 26:233-248.
FR99 == Felmy and Rai, 1999. Application of Pitzer's Equations for Modeling the Aqueous Thermodynamics of Actinide
Species in Natural Waters: A Review. J. Soln. Chem. 28:533-553 (SAND99-0340J).
CFN960119 == Novak to Nowak, 19Jan96, "Preliminary inorganic model for thorium solubility in WIPP brines, in
database file HMW_3TH5_960119.CHEMDAT" WPO 30930.
ERG_th_memo == Giambalvo to Brush, 26July02, "Recommended Parameter Values for Modeling An(IV) Solubility in WIPP Brines"
ERMS 522986.
Rai96 == U(IV) Fax from Dhan Rai, 13 Mar 96

+V References
See Giambalvo memo to Brush 26July2002 "Recommended Parameter Values for Modeling An(V) Solubility in WIPP Brines" for
overview. ERMS# 522990.
NFRK95 == Neck, Fanghanel, Rudolph, and Kim, 1995. Thermodynamics of Np(V) in concentrated salt solutions:
Chloride complexation and ion interaction (Pitzer) parameters for the NpO2+ ion, RCA 69:39-47.
FNK95 == Fanghanel, Neck, and Kim, 1995. Thermodynamics of Np(V) in concentrated salt solutions: II.
Ion interaction (Pitzer) parameters for Np(V) hydrolysis species and carbonate complexes,
RCA 69:169-176.
Novak et al. 1997 == Novak, Al Mahamid, Becraft, Carpenter, Hakem, and Prussin, 1997. Measurement and
thermodynamic modeling of Np(V) solubility in aqueous K2CO3 solutions to high concentrations,
J. Soln. Chem. 26(7):681-697.
Al Mahamid et al. 1998 == Al Mahamid, Novak, Becraft, Carpenter, and Hakem, 1998. Solubility of Np(V) in K-Cl-CO3
and Na-K-Cl-CO3 solutions to high concentrations: Measurements and thermodynamic model predictions,
RCA 81:93-101. (see also SAND97-1230J)
ERG_release_memo == Giambalvo memo to Brush 20November02 "Release of FMT Database FMT_021120.CHEMDAT"

Organic Ligand References
See Giambalvo memo to Brush, 25July2002, "Recommended Parameter Values for Modeling Organic Ligands in WIPP Brines" for

overview and comparison to PAVT database. ERMS 522981
RCM96 == RC Moore, 22FEB96 memorandum "Final Model Parameters for Deprotponation of..."
NBC96 == Novak, Borkowski, and Choppin, 1996. Thermodynamic modeling of neptunium(V)-acetate complexation in
concentrated NaCl media, RCA 74:111-116.
SAND99 == Choppin et al., 2001. "Waste Isolation Pilot Plant Actinide Source Term Test Program: Solubility
Studies and Development of Modeling Parameters" SAND99-0943.
Mesmer et al 89 == Mesmer, Patterson, Busey, Holmes. Ionization of acetic acid in NaCl(aq) media: A
Potentiometric study to 573 K and 130 bar. J. Phys. Chem. 93:7483-7490.
Mizera == Mizera, Bond, Choppin, and Moore, 1999. "Dissociation constants of carboxylic acids at high ionic
strengths" in Reed et al., eds, Actinide Speciation in High Ionic Strength Media. p 113-124.
CEX96 == Choppin, Erten, Xia, 1996. Variation of stability constants of thorium citrate complexes with ionic
strength. RCA 74:123-127 (raw data used in SAND99).
BPBC99 == Bronikowski, Pokrovsky, Borkowski, Choppin, 1999. "UO2 and NpO2 complexation with citrate in brine
solutions" in Reed et al, eds, Actinide Speciation in High Ionic Strength Media.
PBMC98 == Pokrovsky, Bronikowski, Moore, Choppin, 1998. Interaction of neptunyl(V) and Uranyl(VI) with EDTA
in NaCl media: Experimental study and Pitzer modeling. RCA 80:23-29.
Moore et al 99 == Moore, Borkowski, Bronikowski, Chen, Pokrovsky, Xia, Choppin, 1999. Thermodynamic modeling of
actinide complexation with acetate and lactate at high ionic strength. J. Soln. Chem. 28:521-531.
Borkowski et al 01 == Borkowski, Moore, Bronikowski, Chen, Pokrovsky, Xia, Choppin, 2001. Thermodynamic modeling
of actinide complexation with oxalate at high ionic strength. J. Radioanalytical and Nuclear Chem. 248:467-471.
ERG_org_memo == Giambalvo to Brush, 25July02. "Recommended Parameter Values for Modeling Organic Ligands in WIPP Brines."
ERMS 522981
ERG_ox_memo == Giambalvo to Brush, 31July02. "Recommended u0/RT Values for Modeling the Solubility of Oxalate Solids
in WIPP Brines." ERMS 523057

General References
HMW84 == Harvie, Moller, Weare (1984) GCA 48 pp.723-751
FW86 == Felmy and Weare (1986) GCA 50 pp.2771-2783
PS76 == Pitzer and Silvester (1976) J Soln Chem 5#4 pp.269-278
P91 == Pitzer (1991) CRC Handbook, Activity Coef in Electrolyte Solns
CFN95a == Novak (1995a) 18Jan95 Memo "Creation and Definition of the Database for FMT called "HMW_NP_AM.CHEMDAT..."
R&H73 == Robie and Hemingway 1973 J.Reas.US.Geol.Surv. v1n5 pp 543-547
Lang65 == Langmuir 1965 j.Geology v73 730-754
FO76 == Fuger and Oetting, 1976, The Chemical Thermodynamics of Actinide Elements and Compounds. Part 2.
The Actinide Aqueous Ions., Int. Atomic Energy Agency, Vienna, Austria.
CFN950705 == Novak memo to EJNowak (perchlorate G/RT)