PHASE I FEPs

Composite FEP Records Package Screening Analysis

DR2: *Capillary Action (Wicking) Within the Waste*

DR3: *Dynamic Consolidation of the North End and Hallways*

DR6: *Brine Puddling in the Repository Due to Heterogeneities*

DR7: *Permeability Varying with Porosity in Closure Regions*

S6: *Dynamic Alteration of the Disturbed Rock Zone (DRZ) and Transition Zone*

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This records package contains the documentation for conducting sidebar screening calculations. This work was planned, conducted, and documented in accordance with the FEP Management Plan title, ***Features, Events, and Processes (FEPs) Screening: Analysis Plan, Version 5-2, for Phase I FEPs.***

SWCF-A:1.2.07.3:PA:QA:TSK:DR2,DR3,DR6,DR7,S6

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DR-2: CAPILLARY ACTION (WICKING) WITHIN THE WASTE MATERIALS
Summary Memo of Record

To: D.R. Anderson

From: P. Vaughn, M. Lord, R. MacKinnon

Subject: FEP Screening Issue DR-2

STATEMENT OF SCREENING DECISION

FEP Screening Issue DR-2 will be included in future system-level performance assessment calculations.

STATEMENT OF SCREENING ISSUE

This screening effort evaluates the need for including wicking in future system-level performance assessment calculations. Capillary action (wicking) is the ability of a material to carry a fluid by capillary forces above the level it would normally seek in response to gravity. Although the representation of wicking is implied by the use of two-phase Darcy flow, wicking in waste materials has been considered in the past to represent a level of detail that is beyond the available data for fundamentally defining the mechanism of wicking on gas generation. Nevertheless, the effect of wicking on gas generation and releases to the environment can be approximated and may be important and needs evaluation.

The present gas generation model estimates substantially different gas generation rates depending upon whether the waste is in direct contact with liquid or whether the waste is surrounded by water vapor in the gas phase. This behavior is consistent with experimental observations. Therefore, the physical extent of these regions of contact could be important. Present assumptions are that capillary action in cellulosics is not likely to be important because it applies to only a small portion of the total waste, which aside from its containers, is not likely to contain much metal. Similarly, capillarity in metal waste is also not likely because the sizes of the metal waste fragments are much larger than the 'pore' size needed to sustain capillarity. While 'pore' size of the sludges is probably small enough for capillary forces to be important, aside from the containers, the sludge is assumed to contain no free water because liquid sorbing materials such as dry portland cement are intentionally added to the sludge. Finally, while capillarity in the backfill is possible, it would be important only in regard to backfill that is in direct contact with metal (note there is no backfill in the current repository design).

The impact of wicking on direct releases to the surface during a drilling intrusion into the repository is also considered. Direct releases to the surface may occur during drilling due to cuttings and spallings in the drilling fluid and brine circulation from the repository to the surface in the wellbore. These releases are controlled by the prevailing pressure, permeability, and saturation conditions in the disposal room at the time of intrusion. The effect of wicking on these conditions may be important and needs to be evaluated.

APPROACH

The baseline gas generation model in BRAGFLO accounts for corrosion of iron and microbial degradation of cellulosics. The net reaction rate of these processes is directly dependent on brine saturation: an increase in brine saturation will increase the net reaction rate by weighting the inundated portion more heavily, while less weighting is applied to the slower humid portion. To simulate the effect of wicking on the net reaction rate, an effective brine saturation, which includes a wicking saturation contribution, is used to calculate reaction rates rather than the brine saturation. The wicking model is described on page 2 of Section C.

A series of BRAGFLO simulations were performed to determine if wicking has the potential to enhance contaminant migration to the accessible environment. Effects of all other FEP issues were disabled in the simulations. Two basic scenarios were considered in the screening analysis, undisturbed performance and disturbed performance. Both scenarios included a 1.0 degree formation dip downward to the south. Intrusion event E1 is considered in the disturbed scenario and consists of a borehole that penetrates the repository and pressurized brine in the underlying Castile Formation. Two variations of intrusion event E1 are examined, E1 Up-Dip and E1 Down-Dip. In the E1 Up-Dip event the intruded panel region is located on the up-dip (north) end of the repository (Figure 2 of Section B), whereas in the E1 Down-Dip event the intruded panel region is located on the down-dip (south) end of the repository (Figure 3 of Section B). These two E1 events permit evaluation of the possiblity of increased brine flow into the panel region due to higher brine saturations down-dip of the borehole and the potential for subsequent impacts on contaminant migration. To incorporate the effects of uncertainty in each case (E1 Up-Dip, E1 Down-Dip, and undisturbed), a Latin hypercube sample size of 20 was used resulting in a total of sixty simulations. To assess the sensitivity of system performance on wicking in the waste materials, conditional complementary cumulative distribution functions (CCDFs) of normalized contaminated brine releases to the Culebra via human intrusion and shaft system, as well as releases to the subsurface boundary of the accessible environment, were constructed and compared to the corresponding baseline model CCDFs. In the baseline model calculations, the effects of all FEP issues are disabled. These comparisons provide direct information about how the inclusion of wicking may influence repository performance. In addition, performance measures are examined for direct releases during drilling due to cuttings and spallings and brine circulation from the repository to the surface. Potential releases to the surface during drilling are strongly influenced by three drivers: brine pressures, brine saturations, and permeability in the waste disposal area. Spallings, cuttings, and brine releases tend to increase with an increase in each of these drivers. The exception to this trend is that at high brine saturations (or low gas saturations) brine releases tend to decrease because gas volumes become to small to maintain an appreciable gas drive (gas expansion).

RESULTS AND DISCUSSION

CCDFs for releases to the Culebra and lateral land withdrawal boundary for E1 Up-Dip, E1 Down-Dip, and undisturbed cases are provided in Figure 4 of Section B. Each figure compares CCDFs of normalized releases predicted by the baseline model and normalized releases predicted with capillary action. Note that releases to the Culebra via the shaft and intrusion borehole are shown on the left side of the figure whereas releases to the subsurface boundary of the accessible environment are presented on the right side of the figure. In all three cases (E1 Up-Dip, E1 Down-Dip, and undisturbed), the capillary action curves for releases to the Culebra are very close to the baseline curves for most of their lengths, with capillary action releases having only slightly higher values in the disturbed scenarios. In the E1 Up-Dip and E1 Down-Dip cases, CCDFs for releases to the subsurface boundary show higher probabilities for only small and insignificant releases. Undisturbed releases to the subsurface boundary of the accessible environment via the marker beds are consistently higher for the baseline model, with the baseline CCDF above and to the right of the capillary action CCDF. In summary, the differences in releases between the baseline and wicking results are minor and occur primarily in the low release regions of the CCDFs.

Performance measures for direct release during drilling, which include maximum, mean, medium, and minimum values of volume averaged brine pressures, brine saturations, porosity, and permeability in the waste region for undisturbed conditions at 100, 1000, and 10000 years, are given in Table 3 of Section B. Comparison of these table values with the baseline values given in Table 2 indicate that wicking produces slightly higher maximum, minimum, and median pressures at 100 years only and a higher median pressure at 1000 years. Note that these pressures are relatively low (hydrostatic pressure is approximately 7.8 MPa). In addition, all brine saturations, with the exception of the maximum value at 1000 years, are not significantly different than the corresponding baseline model values. Therefore, in all cases with the exception of the 1000 year intrusion time, direct releases during drilling will not be significantly different than those predicted by the baseline model.

The maximum brine saturation at 1000 years is approximately 7 per cent higher than the corresponding baseline value and this may result in releases greater than those predicted by the baseline model. A separate screening analysis of direct releases due to brine circulation from the repository to the surface is currently underway. The screening recommendation for wicking may be revisited in light of this analysis.

BASIS FOR RECOMMENDED SCREENING DECISION

Results indicate that wicking does not significantly impact releases to the accessible environment via the Culebra and Marker Beds. However, the impact of capillary action on potential releases due to a drilling intrusion may not be insignificant for intrusion times near 1000 years. Therefore, capillary action will be included in all future PA system-level modeling. This screening decision will be reevaluated once the separate and currently ongoing screening analysis of brine circulation to the surface is completed and the impact of wicking on this phenomena is further quantified.

DR-3: DYNAMIC CLOSURE OF THE NORTH-END AND HALLWAYS
Summary Memo of Record

To: D.R. Anderson

From: P. Vaughn, M. Lord, R. MacKinnon

Subject: FEP Screening Issue DR-3

STATEMENT OF SCREENING DECISION

FEP Screening Issue DR-3 need not be included in future system-level performance assessment calculations.

STATEMENT OF SCREENING ISSUE

This screening effort evaluates the need for including dynamic closure of the north-end and hallways in future system-level performance assessment calculations. In past calculations, the dynamic effect of halite creep and room consolidation on room porosity was modeled only in the waste disposal regions. Other portions of the repository, such as the experimental region in the north end and the hallways, were modeled assuming fixed (invariant with time) properties. In these regions, the permeability was held at a fixed high value representative of nearly unconsolidated material or modestly consolidated. The porosity in these regions was maintained at relatively low values associated with highly consolidated material. It was assumed that this combination of low porosity and high permeability would conservativly overestimate flow through these regions and minimize the capacity of this material to store fluids.

The impact of dynamic closure of the north-end and hallways on direct releases to the surface during a drilling intrusion into the repository is also considered. Direct releases to the surface may occur during drilling due to cuttings and spallings in the drilling fluid and brine circulation from the repository to the surface in the wellbore. These releases are controlled by the prevailing pressure, permeability, and saturation conditions in the disposal room at the time of intrusion. The effect of dynamic closure of the north-end and hallways on these conditions may be important and needs to be evaluated.

APPROACH

Consolidation of the north-end and hallways was implemented in BRAGFLO by relating pressure and time to porosity via the "porosity surface" method. The porosity surface is a look-up table within BRAGFLO that relates cavity closure (void volume) to time and pressure for different gas generation histories. This porosity surface is calculated independently of BRAGFLO by the computer code SANTOS (see Butcher et al. 1991). The porosity surface for the north-end and hallways is different than the one used for consolidation of the disposal room and is based on an empty excavation; it is described in detail in a memo from Stone and Arquello to Butcher entitled 'Porosity Surface Generation for a Disposal Room Without Crushed Salt Backfill' and dated 2/2/95 (SWCF WPO #: 30144).

A series of BRAGFLO simulations were performed to determine if dynamic consolidation of the north-end and hallways has the potential to enhance contaminant migration to the accessible environment. Effects of all other FEP issues were disabled in the simulations. Two basic scenarios were considered in the screening analysis, undisturbed performance and disturbed performance. Both scenarios included a 1.0 degree formation dip downward to the south. Intrusion event E1 is considered in the disturbed scenario and consists of a borehole that penetrates the repository and pressurized brine in the underlying Castile Formation. Two variations of intrusion event E1 are examined, E1 Up-Dip and E1 Down-Dip. In the E1 Up-Dip event the intruded panel region is located on the up-dip (north) end of the repository (Figure 2 of Section B), whereas in the E1 Down-Dip event the intruded panel region is located on the down-dip (south) end of the repository (Figure 3 of Section B). These two E1 events permit evaluation of the possiblity of increased brine flow into the panel region due to higher brine saturations down-dip of the borehole and the potential for subsequent impacts on contaminant migration. To incorporate the effects of uncertainty in each case (E1 Up-Dip, E1 Down-Dip, and undisturbed), a Latin hypercube sample size of 20 was used resulting in a total of sixty simulations. To assess the sensitivity of system performance to north-end and hallway consolidation, conditional complementary cumulative distribution functions (CCDFs) of normalized contaminated brine releases to the Culebra via human intrusion and shaft system, as well as releases to the subsurface boundary of the accessible environment, were constructed and compared to the corresponding baseline model CCDFs. In the baseline model calculations, the effects of all FEP issues were disabled. These comparisons provide direct information about how the inclusion of north-end and hallway consolidation may influence repository performance. In addition, performance measures are examined for direct releases during drilling due to cuttings and spallings and brine circulation from the repository to the surface. Potential releases to the surface during drilling are strongly influenced by three drivers: brine pressures, brine saturations, and permeability in the waste disposal area. Spallings, cuttings, and brine releases tend to increase with an increase in each of these drivers. The exception to this trend is that at high brine saturations (or low gas saturations) brine releases tend to decrease because gas volumes become to small to maintain an appreciable gas drive (gas expansion).

RESULTS AND DISCUSSION

CCDFs for releases to the Culebra and lateral land withdrawal boundary for E1 Up-Dip, E1 Down-Dip, and undisturbed cases are provided in Figure 5 of Section B. Each figure compares CCDFs of normalized releases predicted by the baseline model and normalized releases predicted with north-end and hallway consolidation. Note that releases to the Culebra via the shaft and intrusion borehole are shown on the left side of the figure whereas releases to the lateral land withdrawal boundary are presented on the right side of the figure. In the E01-Down and E01-Up cases , the dynamic consolidation curves for releases to the Culebra are very close to the baseline curves for most of their lengths. In the undisturbed case, the dynamic consolidation CCDF is above the baseline curve for only very small releases via the shaft to the Culebra. However, CCDFs for releases to the subsurface boundary of the accessible environment via the marker beds show only minor differences between the dynamic closure and baseline results with the baseline curve consistently above and to the right of the dynamic closure CCDF. These results can be explained in part by the fact that time-varying porosities of the north-end and hallways exceed the conservative cavity porosity (0.075) used in the baseline model for most of the 10000 yrs. This results in greater storage volume capacity and lower repository pressure. Lower pressures result in a lower driving force for release. The time-varying porosities are initially set to 1.0 and during the course of simulation they gradually decrease. For a short duration (500 to 1000 yrs), starting at around 500 yrs, cavity porosities drop slightly below 0.075 and then experience a gradual increase to values well above the value of 0.075.

Performance measures for direct release during drilling, which include maximum, mean, medium, and minimum values of volume averaged brine pressures, brine saturations, porosity, and permeability in the waste region for undisturbed conditions at 100, 1000, and 10000 years, are given in Table 4 of Section B. Comparison of these table values with the baseline values given in Table 2 indicate that brine pressures tend to be higher in the baseline case. Also, the differences in brine saturations between the baseline and closure model are insignificant, except possibly the maximum, medium, and mean brine saturation at 100 years. At these low saturations, however, the brine is relatively immobile and releases to the intruding wellbore will be small, both in the baseline and dynamic closure cases. This condition is further compounded by the fact that, besides pressures being less than the baseline case, the brine pressures are well below hydrostatic pressure in the wellbore (approximately 7.8 MPa). Pressures must exceed hydrostatic pressure before direct releases up the borehole during drilling can occur (based on a hydrostatic column of drilling mud). In summary, dynamic closure of the north-end and hallways has a negligible effect on waste room conditions relevant to releases during a drilling intrusion.

BASIS FOR RECOMMENDED SCREENING DECISION

Based on the CCDFs, the inclusion of consolidation of the north-end and hallways in BRAGFLO results in overall lower computed releases to the accessible environment than the baseline case. In addition, dynamic consolidation has an insignificant effect on waste room conditions relevant to direct releases during a drilling intrusion. As a result, the baseline model is conservative (over predicts potential releases) in its treatment of closure and consolidation of the north-end and hence the closure of the north-end can be eliminated from consideration in the baseline PA model.

DR-6: BRINE PUDDLING IN THE REPOSITORY DUE TO HETEROGENEITIES
Summary Memo of Record

To: D.R. Anderson

From: P. Vaughn, M. Lord, R. MacKinnon

Subject: FEP Screening Issue DR-6

STATEMENT OF SCREENING DECISION

FEP Screening Issue DR-6 need not be included in future system-level performance assessment calculations.

STATEMENT OF SCREENING ISSUE

This screening effort evaluates the need for including heterogeneity of disposal room contents in future system-level performance assessment calculations. Previous modeling of flow within the repository is based on homogenizing the room contents into large computational volumes. However, heterogeneity of room contents may influence gas and brine behavior in the room by causing fluid flow among channels or preferential paths in the waste, bypassing entire regions. This bypassing of entire regions may leave large volumes of brine immobile and available to react with the waste producing significant volumes of gas. Isolated regions could exist because (1) they may be isolated by low permeability waste barriers, 2) because connectivity with the interbeds may occur only at particular locations within the repository, or 3) the repository dip may promote preferential gas flow in the upper regions of the waste.

The impact of puddling on direct releases to the surface during a drilling intrusion into the repository is also considered. Direct releases to the surface may occur during drilling due to cuttings and spallings in the drilling fluid and brine circulation from the repository to the surface in the wellbore. These releases are controlled by the prevailing pressure, permeability, and saturation conditions in the disposal room at the time of intrusion. The effect of puddling on these conditions may be important and needs to be evaluated.

APPROACH

To address room heterogeneity issues and resulting impact of immobile brine, an additional parameter has been implemented in BRAGFLO to specify the minimum active (mobile) brine flow saturation (pseudo-residual brine saturation). Above this saturation, the normal descriptions of two-phase flow apply (i.e., either the Brooks/Corey or VanGenuchten/Parker relative permeability models). Below this minimum, brine is immobile, although it is available for reaction and it may still be consumed during the gas generation reactions. Justification for the saturation limit assumption is based on the presumed heterogeneity of the waste and the fact that the repository dips slightly. The saturation limit (puddling parameter) is applied uniformly throughout the disposal room in order to bound the impact of puddling. Implementation of the puddling parameter is described on page 3 of Section C.

A series of BRAGFLO simulations were performed to determine if puddling has the potential to enhance contaminant migration to the accessible environment. Effects of all other FEP issues were disabled in the simulations. Two basic scenarios were considered in the screening analysis, undisturbed performance and disturbed performance. Both scenarios included a 1.0 degree formation dip downward to the south. Intrusion event E1 is considered in the disturbed scenario and consists of a borehole that penetrates the repository and pressurized brine in the underlying

Castile Formation. Two variations of intrusion event E1 are examined, E1 Up-Dip and E1 Down-Dip. In the E1 Up-Dip event the intruded panel region is located on the up-dip (north) end of the repository (Figure 2 of Section B), whereas in the E1 Down-Dip event the intruded panel region is located on the down-dip (south) end of the repository (Figure 3 of Section B). These two E1 events permit evaluation of the possiblity of increased brine flow into the panel region due to higher brine saturations down-dip of the borehole and the potential for subsequent impacts on contaminant migration. To incorporate the effects of uncertainty in each case (E1 Up-Dip, E1 Down-Dip, and undisturbed), a Latin hypercube sample size of 20 was used resulting in a total of sixty simulations. To assess the sensitivity of system performance on puddling, conditional complementary cumulative distribution functions (CCDFs) of normalized contaminated brine releases to the Culebra via human intrusion and shaft system, as well as releases to the subsurface boundary of the accessible environment, were constructed and compared to the corresponding baseline model CCDFs. In the baseline model calculations, the effects of all FEP issues were disabled. These comparisons provide direct information about how the inclusion of puddling may influence repository performance. In addition, performance measures are examined for direct releases during drilling due to cuttings and spallings and brine circulation from the repository to the surface. Potential releases to the surface during drilling are strongly influenced by three drivers: brine pressures, brine saturations, and permeability in the waste disposal area. Spallings, cuttings, and brine releases tend to increase with an increase in each of these drivers. The exception to this trend is that at high brine saturations (or low gas saturations) brine releases tend to decrease because gas volumes become to small to maintain an appreciable gas drive (gas expansion).

RESULTS AND DISCUSSION

CCDFs for releases to the Culebra and subsurface boundary of the accessible environment for E1 Up-Dip, E1 Down-Dip, and undisturbed cases are provided in Figure 6 of Section B. Each figure compares CCDFs of normalized releases predicted by the baseline model and normalized releases predicted with puddling. Note that releases to the Culebra via the shaft and intrusion borehole are shown on the left side of the figure whereas releases to the subsurface boundary of the accessible environment are presented on the right side of the figure. In all three cases (E1 Up-Dip, E1 Down-Dip, and undisturbed), the puddling curves for releases to the Culebra are very close to the baseline curves for most of their lengths. In addtion, CCDFs for releases to the subsurface boundary via the marker beds show that the baseline CCDF is consistently above and to the right of the puddling CCDF. In summary, differences in releases between the baseline and puddling results are minor with the baseline model predicting consistently higher releases.

Performance measures for direct releases during drilling, which include maximum, mean, medium, and minimum values of volume averaged brine pressures, brine saturations, porosity, and permeability in the waste region for undisturbed conditions at 100, 1000, and 10000 years, are given in Table 5 of Section B. Comparison of these values with the baseline values given in Table 2 indicate that puddling produces slightly larger maximum, mean, and median brine saturations at 100, 1000, and 10000 years. All other performance measures are nearly equal between the baseline and puddling cases. The higher brine saturations, however, with the exception of the maximum values at 1000 and 10000 years, are small and the brine will not be sufficiently mobile for releases to be significant. Further, although the maximum brine saturation values at 1000 and 10000 years exceed the corresponding baseline values, they are too high to allow enough gas to be present to provide the gas drive needed to exceed baseline model releases. As a consequence, the corresponding maximum baseline saturations result in slightly larger releases with respect to direct releases due to a drilling intrusion. In summary, the baseline case is sufficiently conservative with respect to direct releases due to a drilling intrusion.

BASIS FOR RECOMMENDED SCREENING DECISION

Based on the CCDFs, the inclusion of puddling in BRAGFLO results in overall lower computed releases to the accessible environment than the baseline case. In addition, puddling has an insignificant effect on waste room conditions relevant to releases due to a drilling intrusion. As a result, the baseline model is conservative in its approach to homogenizing waste panel contents into large computational volumes and puddling can be eliminated from consideration in system-level PA calculations. It is emphasized that a separate screening analysis of direct releases due to brine circulation from the repository to the surface is currently underway and the impact of puddling on this phenomena will be examined in additional detail. This screening decision will be reevaluated once the separate screening analysis is completed and the impact of puddling on releases due to a drilling intrusion are further evaluated.

DR-7: PERMEABILITY VARYING WITH POROSITY IN CLOSURE REGIONS
Summary Memo of Record

To: D.R. Anderson

From: P. Vaughn, M. Lord, R. MacKinnon

Subject: FEP Screening Issue DR-7

STATEMENT OF SCREENING DECISION

FEP Screening Issue DR-7 need not be included in future system-level performance assessment calculations.

STATEMENT OF SCREENING ISSUE

This screening effort determines if dynamic variations in permeability with porosity and consolidation should be included in future system-level performance assessment calculations. In past calculations, the dynamic effects of halite creep and room consolidation on room porosity were only modeled in the waste disposal region. In addition, the permeability of the waste disposal region was uniformly fixed at a high value so that fluid flow would not be impeded. Direct releases to the surface via cuttings and spallings depend in part on the permeability of the waste region at the time of intrusion. These direct releases were calculated conditioned on a permeability that was consistent with the porosity and degree of consolidation at the time of intrusion. The determination of this permeability was done outside of the flow field calculations and was not the same value of permeability used to estimate the flow fields.

Other portions of the repository, such as the experimental region in the north end and the hallways, have been modeled assuming fixed (invariant with time) values for both porosity and permeability. In these regions the permeability was held at a fixed high value representative of nearly unconsolidated or modestly consolidated material. The porosity in these regions was maintained at relatively low values associated with highly consolidated material. It was assumed that this combination of low porosity and high permeability would conservatively overestimate flow through these regions and minimize the capacity of these regions to store fluids, thus providing a maximized release to the environment.

The impact of permeability varying with porosity in all repository regions on direct releases to the surface during a drilling intrusion into the repository is also considered. Direct releases to the surface may occur during drilling due to cuttings and spallings in the drilling fluid and brine circulation from the repository to the surface in the wellbore. These releases are controlled by the prevailing pressure, permeability, and saturation conditions in the disposal room at the time of intrusion. The effect of permeability varying with porosity in repository regions which consolidate on these conditions may be important and needs to be evaluated.

APPROACH

A model for estimating the change in permeability with porosity in all repository regions (waste disposal region, north end, and hallways) was implemented in BRAGFLO. This model is described on page 4 of Section C. A series of BRAGFLO simulations were then performed to determine if permeability varying with porosity in all regions had the potential to enhance contaminant migration (compared to using a time invariant permeability representation of unconsolidated material) to the accessible environment. Effects of all other FEP issues were disabled in the simulations. Two basic scenarios were considered in the screening analysis, undisturbed performance and disturbed performance.

Both scenarios included a 1.0 degree formation dip downward to the south. Intrusion event E1 is considered in the disturbed scenario and consists of a borehole that penetrates the repository and pressurized brine in the underlying Castile Formation. Two variations of intrusion event E1 are examined, E1 Up-Dip and E1 Down-Dip. In the E1 Up-Dip event the intruded panel region is located on the up-dip (north) end of the repository (Figure 2 of Section B), whereas in the E1 Down-Dip event the intruded panel region is located on the down-dip (south) end of the repository (Figure 3 of Section B). These two E1 events permit evaluation of the possiblity of increased brine flow into the panel region due to higher brine saturations down-dip of the borehole and the potential for subsequent impacts on contaminant migration. To incorporate the effects of uncertainty in each case (E1 Up-Dip, E1 Down-Dip, and undisturbed), a Latin hypercube sample size of 20 was used resulting in a total of sixty simulations. To assess the sensitivity of system performance on dynamic permeability in the closure regions, conditional complementary cumulative distribution functions (CCDFs) of normalized contaminated brine releases to the Culebra via human intrusion and shaft system, as well as releases to the subsurface boundary of the accessible environment, were constructed and compared to the corresponding baseline model CCDFs. In the baseline model calculations, the effects of all FEP issues were disabled. These comparisons provide direct information about how the inclusion of dynamic permeability in all repository regions may influence repository performance. In addition, performance measures are examined for direct releases during drilling due to cuttings and spallings and brine circulation from the repository to the surface. Potential releases to the surface during drilling are strongly influenced by three drivers, brine pressures, brine saturations, and permeability in the waste disposal area. Spallings, cuttings, and brine releases tend to increase with an increase in each of these drivers. The exception to this trend is that at high brine saturations (or low gas saturations) brine releases tend to decrease because gas volumes become to small to maintain an appreciable gas drive (gas expansion).

RESULTS AND DISCUSSION

CCDFs for releases to the Culebra and lateral land withdrawal boundary for E1 Up-Dip, E1 Down-Dip, and undisturbed cases are provided in Figure 7 of Section B. Each figure compares CCDFs of normalized releases predicted by the baseline model and normalized releases predicted with dynamic permeability. Note that releases to the Culebra via the shaft and intrusion borehole are shown on the left side of the figure whereas releases to the lateral land withdrawal boundary are presented on the right side of the figure. In all three cases (E1 Up-Dip, E1 Down-Dip, undisturbed), the varying permeability curves for releases to the Culebra are very close to the baseline curves for most of their lengths. The CCDFs for releases to the subsurface boundary of the accessible environment via the marker beds show only minor differences between the varying permeability and baseline results with the baseline CCDFs consistently above and to the right of the varying permeability CCDFs. These results are similar to those obtained in the analysis of dynamic consolidation of the north-end and hallways and can be explained in part by the fact that time-varying porosities of the north-end and hallways exceed the conservative cavity porosity (0.075) used in the baseline model for most of the 10000 yrs. This results in greater storage volume capacity and lower repository pressure. Lower pressures result in a lower driving force for release. The time-varying porosities are initially set to 1.0 and during the course of simulation they gradually decrease. For a short duration (500 to 1000 yrs), starting at around 500 yrs, cavity porosities drop slightly below 0.075 and then experience a gradual increase to values well above the value of 0.075. In summary, the reduction in permeability accompanying closure in the waste region and north-end and hallways appears to have little effect on releases to the accessible environment.

Performance measures for direct release during drilling, which include maximum, mean, medium, and minimum values of volume averaged brine pressures, brine saturations, porosity, and permeability in the waste region for undisturbed conditions at 100, 1000, and 10000 years, are given in Table 6 of Section B. Comparison of these table values with the baseline values given in Table 2 indicate that brine pressures tend to be higher in the baseline case. However, the maximum, median, and mean brine saturations for varying permeability at 100 yrs are only slightly higher than the corresponding baseline values. It is also important to note that these saturations, although slightly higher than the corresponding baseline values, are small and releases to the intruding wellbore will be small because of low brine mobility at these low saturations, both in the fixed permeability baseline and dynamically varying permeability cases. This condition is further compounded by the fact that, besides pressures being less than the baseline case, the brine pressures are well below hydrostatic pressure in the wellbore (approximately 7.8 MPa). Pressures must exceed hydrostatic pressure before direct releases up the borehole during drilling can occur (based on a hydrostatic column of drilling mud). In summary, permeability varying with closure has a negligible effect on waste room conditions relevant to releases due to a drilling intrusion.

BASIS FOR RECOMMENDED SCREENING DECISION

Based on the CCDFs, the inclusion of dynamic permeability with closure of the waste region, north-end, and hallways in BRAGFLO results in computed releases to the accessible environment that are essentially equivalent to the baseline case. In addition, dynamic permeability has an insignificant effect on waste room conditions relevant to releases during a drilling intrusion As a result, the baseline model is conservative in its treatment of closure and dynamic permeability can be eliminated from consideration in the baseline PA model.

S-6: DYNAMIC ALTERATION OF THE DRZ/TRANSITION ZONE
Summary Memo of Record

To: D.R. Anderson

From: P. Vaughn, M. Lord, R. MacKinnon

Subject: FEP Screening Issue S-6

STATEMENT OF SCREENING DECISION

FEP Screening Issue S-6 need not be included in future system-level performance assessment calculations.

STATEMENT OF SCREENING ISSUE

This screening effort evaluates the need for including dynamic alteration of the disturbed rock zone (DRZ) and transition zone (TZ) in future system-level performance assessment calculations. The DRZ and TZ will have dynamic (time-varying) porosity and permeability properties due to room consolidation, possible room expansion, and fracturing caused by high pressures. Previous performance assessment calculations modeled the DRZ and TZ with a constant porosity equal to those of the intact halite units and a constant high formation permeability. However, the DRZ and TZ may fracture in response to high, time-dependent gas generated pressures. There will be a dual effect from the formation alterations. With pressure build-up due to gas generation and creep closure within the waste, the increased porosity within the DRZ and transition zone may offer more fluid storage and resulting lower pressures. The increase in formation permeabilities may enhance gas and brine flow away from the DRZ and TZ. As a consequence, the constant properties used for the DRZ and TZ may not be conservative with respect to gas and brine outflow.

The impact of dynamic alterations of the DRZ/TZ on direct releases to the surface during a drilling intrusion into the repository is also considered. Direct releases to the surface may occur during drilling due to cuttings and spallings in the drilling fluid and brine circulation from the repository to the surface in the wellbore. These releases are controlled by the prevailing pressure, permeability, and saturation conditions in the disposal room at the time of intrusion. The effect of dynamic alterations of the DRZ/TZ on these conditions may be important and needs to be evaluated.

APPROACH

The DRZ and TZ will have dynamic (time-varying) porosity and permeability properties due to three processes: (1) room consolidation, (2) possible room expansion, and (3) fracturing caused by high pressures. The first two processes are addressed using reasoned arguments, while the third process is addressed using a sensitivity analysis. These approaches are summarized in this section.

<u>Time-Dependent Properties of the DRZ/TZ During Room Closure</u>

Observations to date indicate that the development of a dilational DRZ around room openings is time-dependent, i.e., both the geometric extent and amount of dilation within the DRZ increase with time, up to some limit. To the extent that dilation is significant, it would tend to allow increased brine storage between the boundary of the far-field domain and the room wall. That is, it would tend to decrease observed brine inflow into the room itself. At long times, however, the DRZ (with the probable exception of the anhydrites) will largely heal and its porosity (of the halites) will return to approximately the initial porosity under lithostatic loading. Therefore, assuming that fluid pressures within the repository are relatively low at the time of final structural closure, the process of structural healing of any halite DRZ could potentially release "additional" brine into the waste disposal room.

The present model implementation assigns increased permeabilities and fixed porosities (equal to the far-field porosity values) to the DRZ and TZ. Therefore, no "additional" brine storage in the DRZ is allowed. This approach of combining elevated permeabilities with no additional brine storage has the following impacts: a) brine volumes estimated to enter the room directly are essentially those crossing the DRZ/far-field boundary as a function of time (since enhanced DRZ storage is not allowed); b) prior to the time of effective structural closure, brine inflow volumes should be overestimated (since enhanced DRZ storage is not allowed); c) the amount of additional brine that flows into the repository during the DRZ healing period is bounded and included in the brine inflow calculations. (This is because enhanced DRZ storage is not allowed and brine which would actually be retained in the DRZ is discharged directly into the repository. As long as DRZ healing does not result in porosities less than intact levels, the current treatment bounds brine inflow.); and d) after the time of structural closure, estimated brine inflow volumes should be realistically estimated or slightly overestimated (because an elevated permeability of the DRZ is retained).

Effective room closure is expected to occur (on average) within approximately 100-400 years, i.e., very early in the 10000 year time frame of regulatory interest. Since: a) any impact of a time-dependent DRZ on fluid inflow is expected to occur very early in the regulatory timeframe; b) brine inflow volumes up to and through the time of room closure should be realistically captured by the present modeling implementation; and c) since no meaningful impact of any short-term increase in brine inflow rate during the process of final room closure can be identified, it can be concluded that it is not necessary to include numerical modeling of a time dependent DRZ at the repository horizon in long-term system-scale calculations during the room closure process.

Time-Dependent Properties of the DRZ/TZ During Room Expansion (Prior to Formation/Propagation of New Fractures)

Assuming that "final"room closure occurs while fluid pressures within the waste-emplacement rooms are still below lithostatic, and that far-field formation-propagation of fractures occurs only at pressures near the lithostatic load, there is the possibility of time-dependent DRZ/TZ properties at fluid pressures ranging from sub-lithostatic pressures to that required for the initiation of fracturing. Any dilational behavior within the DRZ/TZ over this pressure interval would be expressed in terms of increased permeability and local increases in porosity. The present modeling approach assumes steady-state maintenance of increased permeability, but does not include increases in porosity. The available limited experimental data base indicates approximately a four-fold increase in permeability of anhydrite interbeds at pressures below lithostatic, with extremely small increases in porosity. Due to its ability to creep structurally at rates exceeding the rate of volumetric response to internal pressurization, halite dilation over this pressure interval would not occur.

Therefore, the baseline modeling approach, which assigns increased permeability to the DRZ at all times, is conservative (overestimate fluid flow) regarding fluid flow through the DRZ over this pressure interval. Since time-dependent increases in porosity occur only in the anhydrite over this pressure interval, the baseline model is also conservative (underestimates storage) regarding potential brine and/or gas storage within the DRZ. Therefore, it can be concluded that inclusion of a time-dependent DRZ in system-scale performance calculations is not warranted for this time/pressure interval.

A model for treating the alteration of formation properties within the DRZ and TZ was implemented in BRAGFLO. This model is identical to the existing anhydrite interbed alteration model employed for the interbeds. In this model, formation porosity and permeability are dependent on brine pressure as described on page 5-6 of Section C. This treatment permits the representation of two important formation alteration effects. First, pressure build-up due to gas generation and creep closure within the waste will slightly increase porosity within the DRZ and TZ and offer additional fluid storage with resulting lower pressures. Second, the accompanying increase in formation permeability will enhance the flow of fluid away from the DRZ and TZ. Since an increase in porosity has a tendency to reduce outflow into the far field, parameter values are selected so that the DRZ/TZ alteration model greatly increases permeability while only modestly increasing porosity.

A series of BRAGFLO simulations were performed to determine if dynamic formation alteration of the DRZ and TZ have the potential to enhance contaminant migration to the accessible environment. Effects of all other FEP issues were disabled in the simulations. Two basic scenarios were considered in the screening analysis, undisturbed performance and disturbed performance. Both scenarios included a 1.0 degree formation dip downward to the south. Intrusion event E1 is considered in the disturbed scenario and consists of a borehole that penetrates the repository and pressurized brine in the underlying Castille Formation. Two variations of intrusion event E1 are examined, E1 Up-Dip and E1 Down-Dip. In the E1 Up-Dip event the intruded panel region is located on the up-dip (north) end of the repository (Figure 2 of Section B), whereas in the E1 Down-Dip event the intruded panel region is located on the down-dip (south) end of the repository (Figure 3 of Section B). These two E1 events permit evaluation of the possiblity of increased brine flow into the panel region due to higher brine saturations down-dip of the borehole and the potential for subsequent impacts on contaminant migration. To incorporate the effects of uncertainty in each case (E1 Up-Dip, E1 Down-Dip, and undisturbed), a Latin hypercube sample size of 20 was used resulting in a total of sixty simulations. To assess the sensitivity of system performance on formation alteration of the DRZ and TZ, conditional complementary cumulative distribution functions (CCDFs) of normalized contaminated brine releases to the Culebra via human intrusion and shaft system, as well as releases to the subsurface boundary of the accessible environment, were constructed and compared to the corresponding baseline model CCDFs. In the baseline model calculations, the effects of all FEP issues were disabled. These comparisons provide direct information about how the inclusion of formation alteration in the DRZ and TZ may influence repository performance. In addition, performance measures are examined for direct releases during drilling due to cuttings and spallings and brine circulation from the repository to the surface. Potential releases to the surface during drilling are strongly influenced by three drivers, brine pressures, brine saturations, and permeability in the waste disposal area. Spallings, cuttings, and brine releases tend to increase with an increase in each of these drivers. The exception to this trend is that at high brine saturations (or low gas saturations) brine releases tend to decrease because gas volumes become to small to maintain an appreciable gas drive (gas expansion).

RESULTS AND DISCUSSION

The DRZ and TZ are located near the repository as illustrated in Figure 1 of Section B. These zones provide enhanced permeability regions that tend to increase fluid mobility near the repository and potentially enhance flow between the disposal room, borehole, shaft, and marker beds. This increase in fluid mobility may result in increased releases to the accessible environment.

CCDFs for releases to the Culebra and subsurface boundary of the accessible environment for E1 Up-Dip, E1 Down-Dip, and undisturbed cases are provided in Figure 8 of Section B. Each figure compares CCDFs of normalized releases predicted by the baseline model and normalized releases predicted with formation alteration. Note that releases to the Culebra via the shaft and intrusion borehole are shown on the left side of the figure, whereas releases to the subsurface boundary of the accessible environment are presented on the right side of the figure. In each case, the curves are almost identical for most of their lengths. Note that any differences in releases are minor with predicted releases consistently higher for the baseline model. These results indicate that the DRZ and TZ are modeled adequately in the baseline model with a constant porosity equal to that of intact halite and a constant high permeability.

Performance measures for direct release during drilling, which include maximum, mean, medium, and minimum values of volume averaged brine pressures, brine saturations, porosity, and permeability in the waste region for undisturbed conditions at 100, 1000, and 10000 years, are given in Table 7 of Section B. Comparison of these table values with the baseline values given in Table 2 indicate that all metrics (drivers) are essentially equivalent between the two cases. Therefore, dynamic alteration of the DRZ/TZ has a negligible effect on waste room conditions relevant to releases due to direct brine releases, cuttings, and spalling.

BASIS FOR RECOMMENDED SCREENING DECISION

Based on the CCDFs, the inclusion of dynamic alteration of the DRZ/TZ in BRAGFLO results in computed releases to the accessible environment that are essentially equivalent to the baseline case. In addition, dynamic alteration of the DRZ/TZ has an insignificant effect on waste room conditions relevant to direct releases due to a drilling intrusion Therefore, dynamic alteration of the DRZ and TZ need not be included in system level PA calculations.

Section B - FIGURES AND TABULATED RESULTS

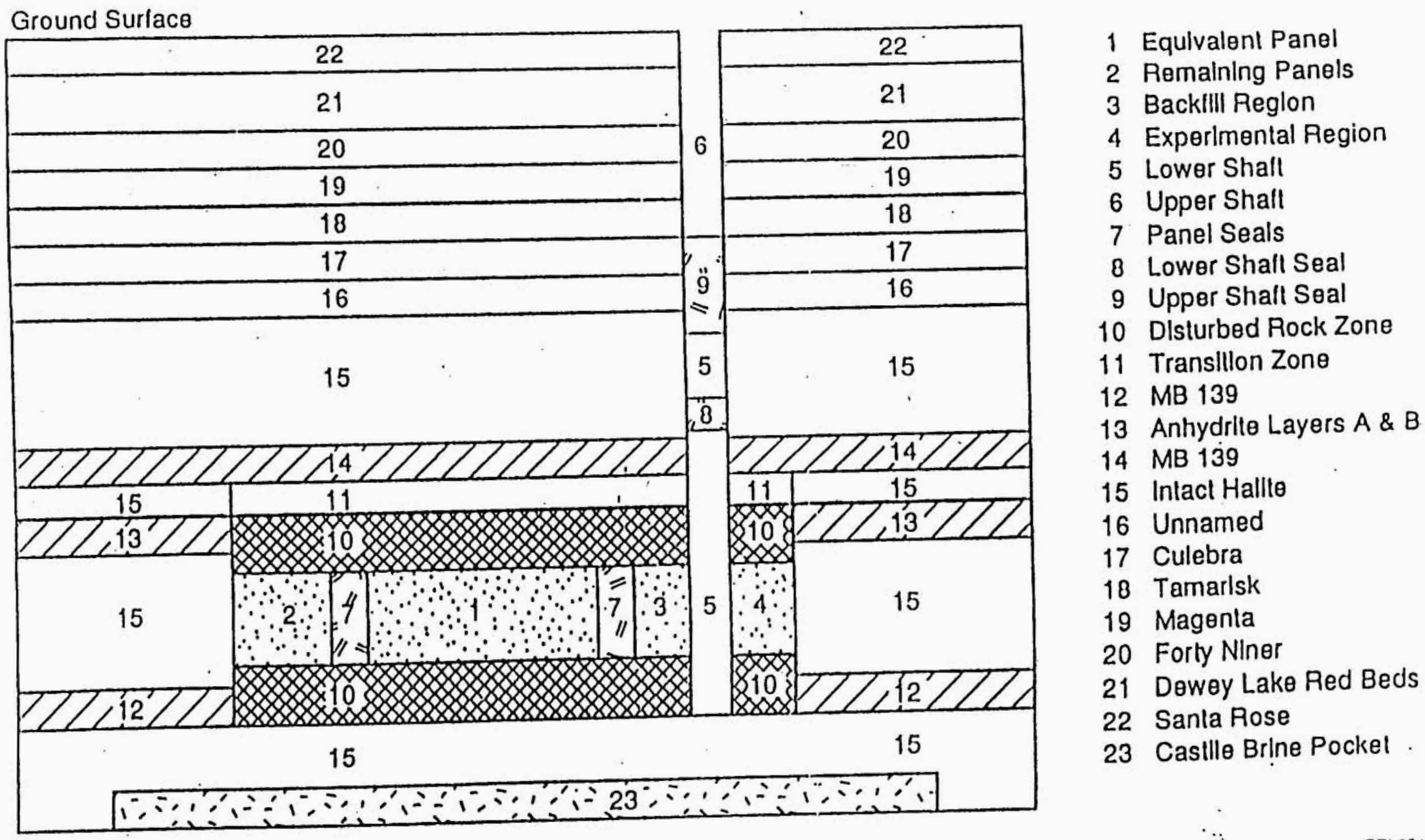


Figure 1. North-south vertical cross-section of model domain for the undisturbed scenario.

SWCF-A:1.1.6.3:PA:QA:TSK: DR2, DR3, DR6, DR7, & S6

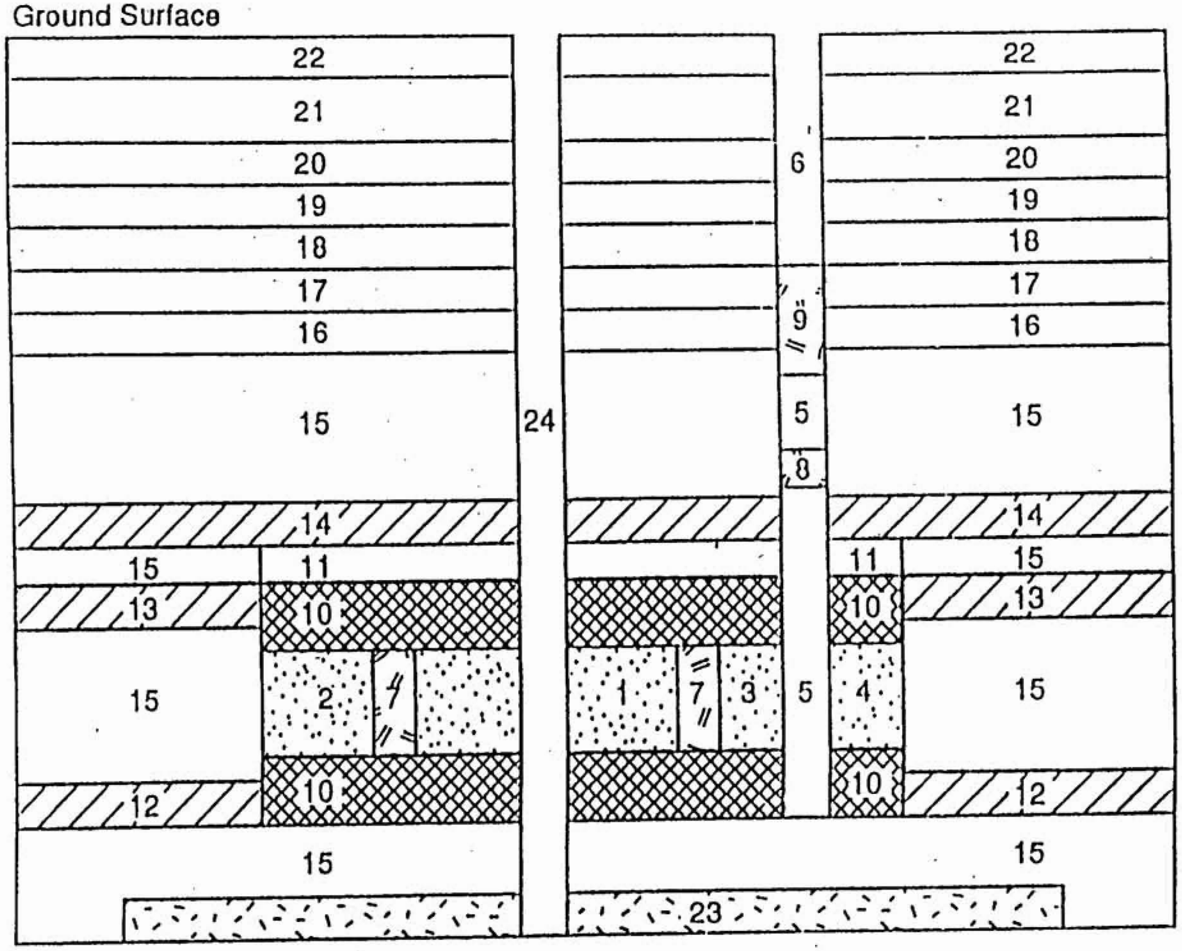
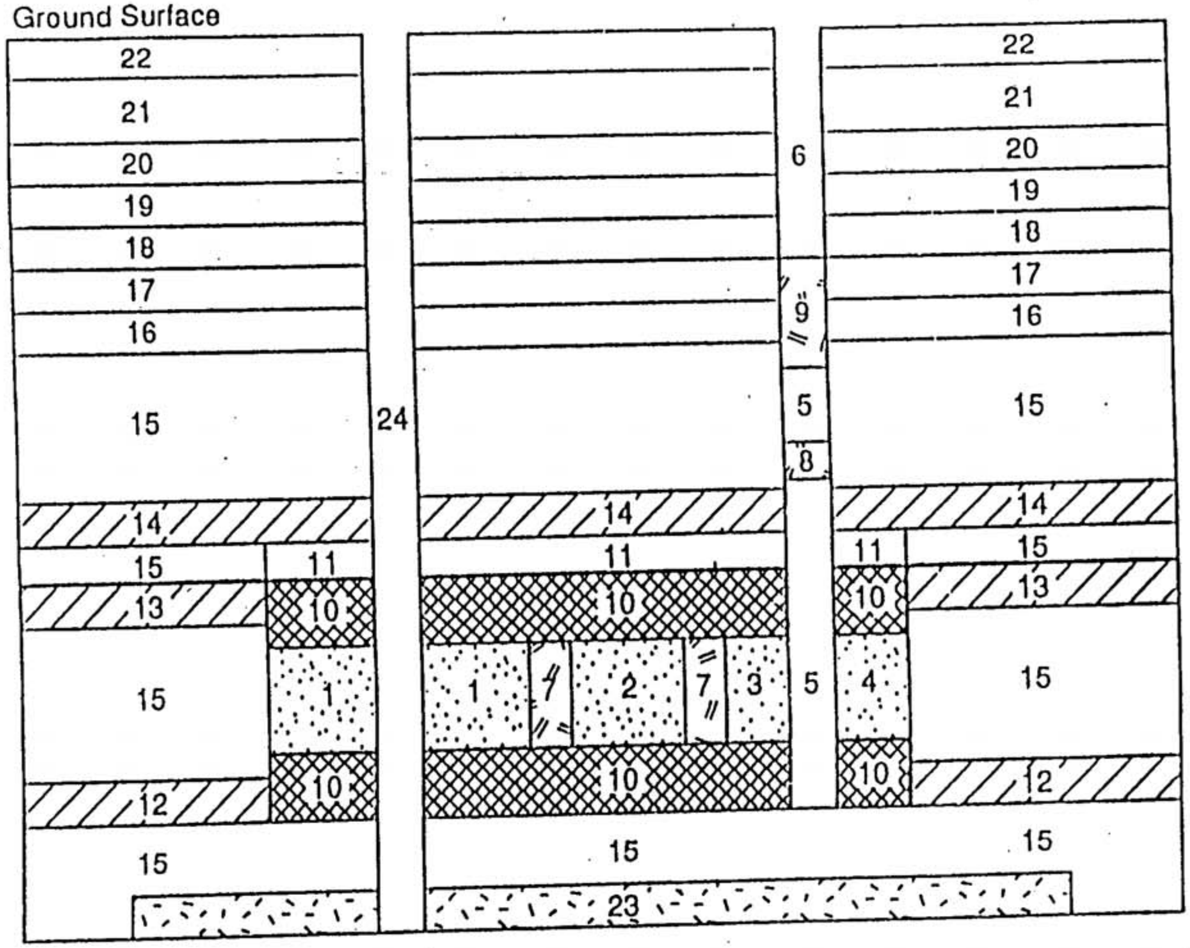


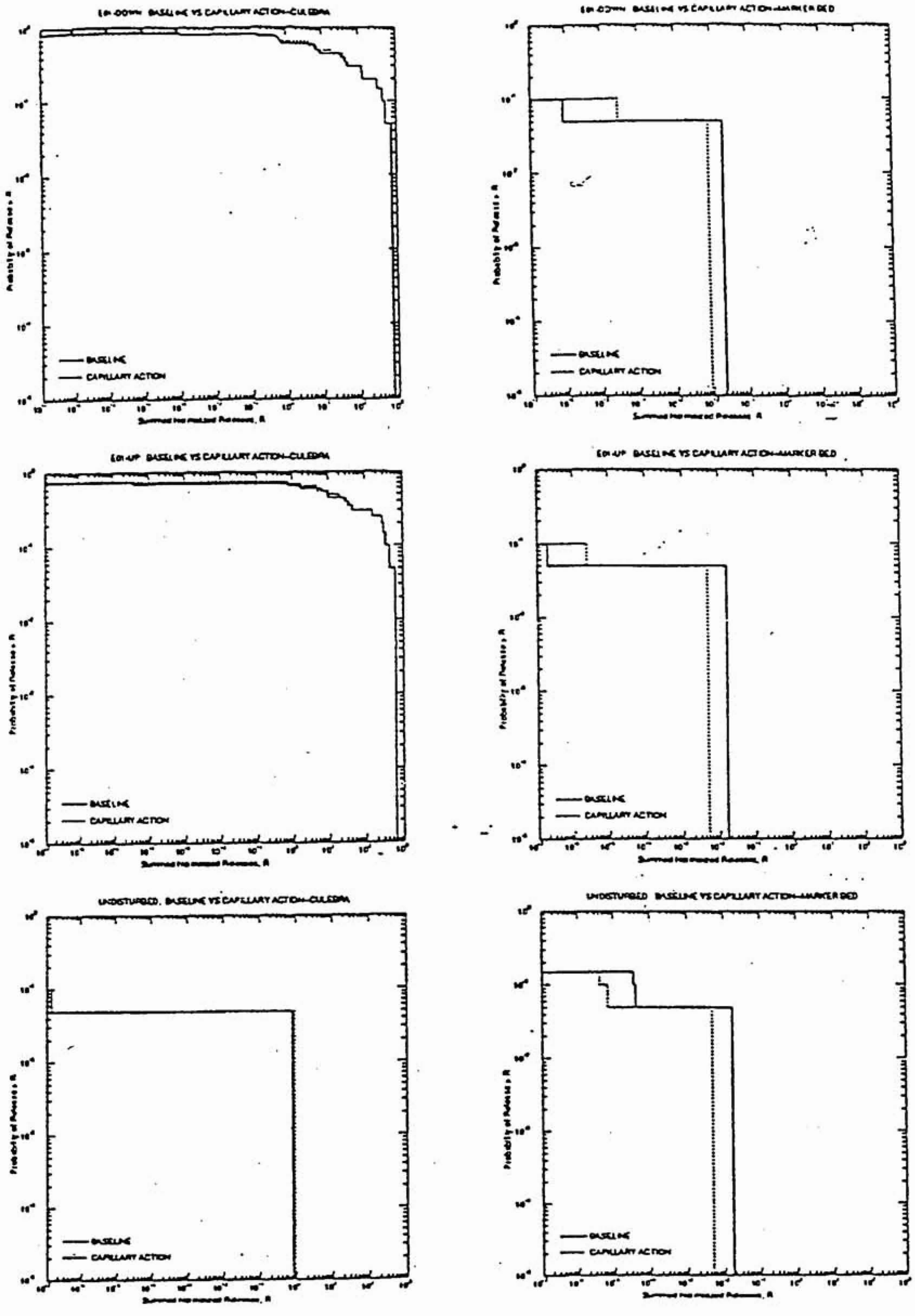
Figure 2. North-south vertical cross-section of model domain for the E01-Up Intrusion scenario



1 Equivalent Panel
2 Remaining Panels
3 Backfill Region
4 Experimental Region
5 Lower Shaft
6 Upper Shaft
7 Panel Seals
8 Lower Shaft Seal
9 Upper Shaft Seal
10 Disturbed Rock Zone
11 Transition Zone
12 MB 139
13 Anhydrite Layers A & B
14 MB 139
15 Intact Halite
16 Unnamed
17 Culebra
18 Tamarisk
19 Magenta
20 Forty Niner
21 Dewey Lake Red Beds
22 Santa Rose
23 Castile Brine Pocket
24 Borehole

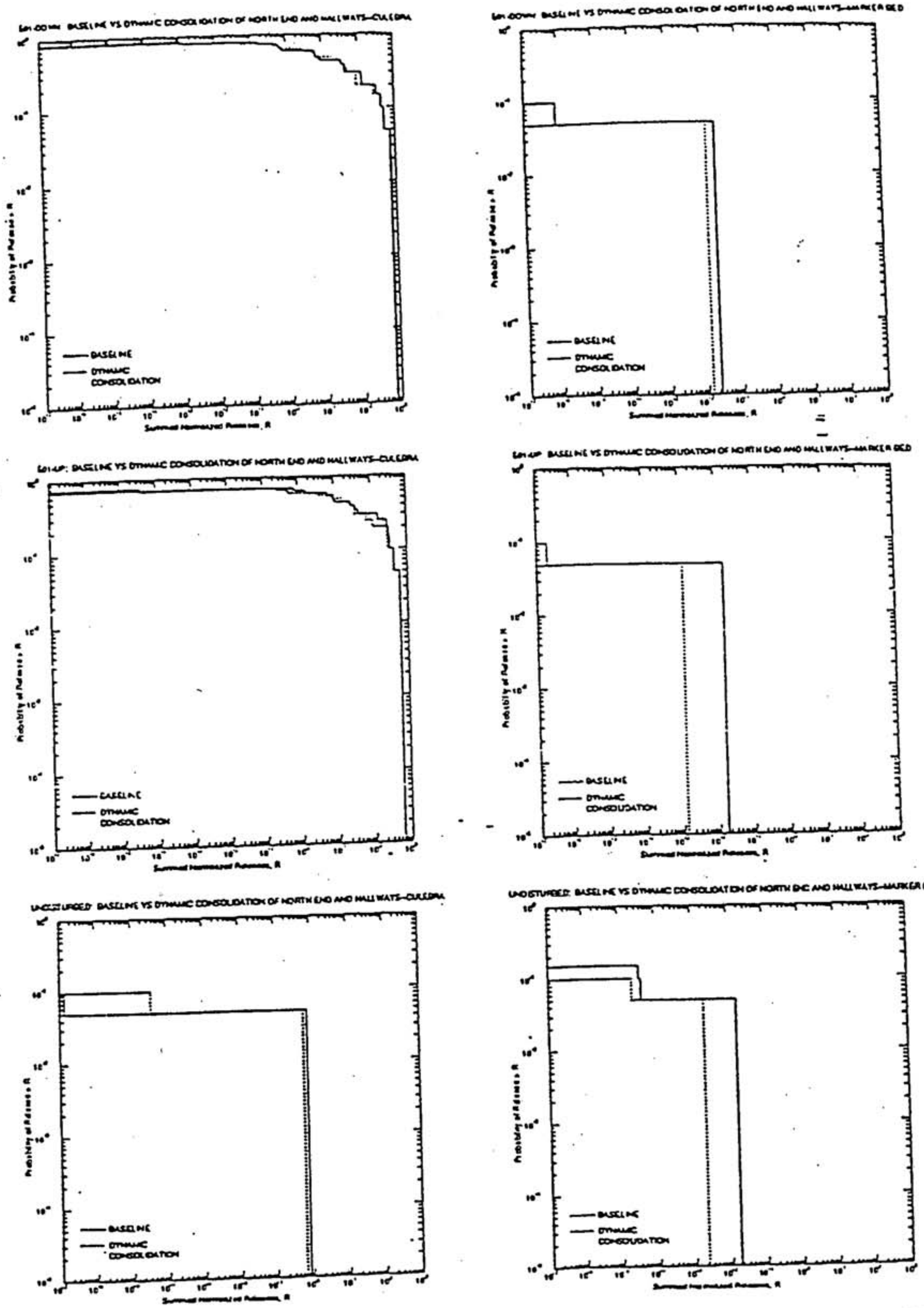
TRI-6342-4503-0

Figure 3. North-south vertical cross-section of model domain for the E01-Down intrusion scenario



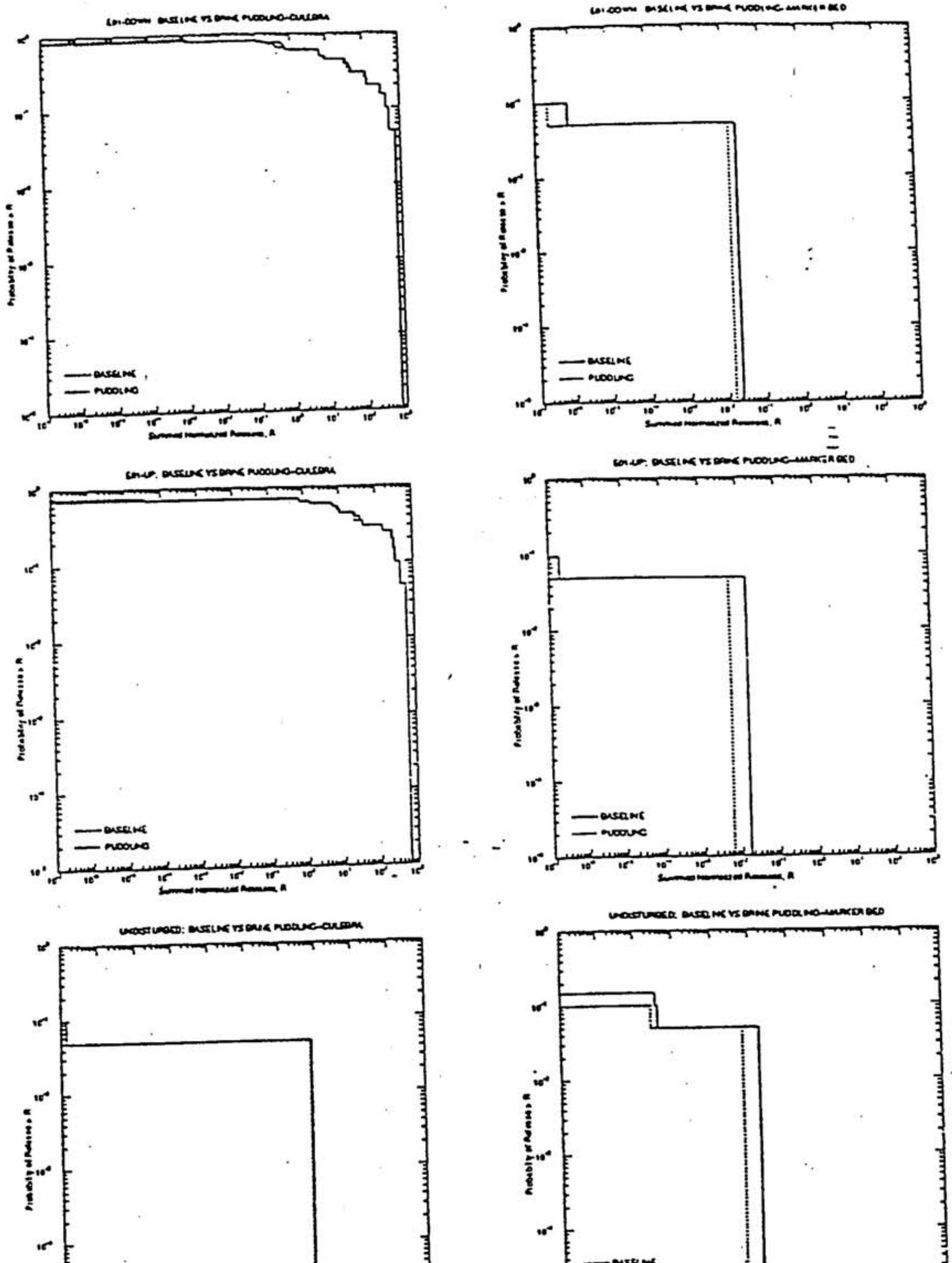
TRI-6342-4510-0

Figure 4. ~~Mean~~ CCDFs for releases to the Culebra and subsurface boundary of the accessible environment (~~E01 Down;~~ Baseline vs Capillary Action).



TRI-6342-4506-0

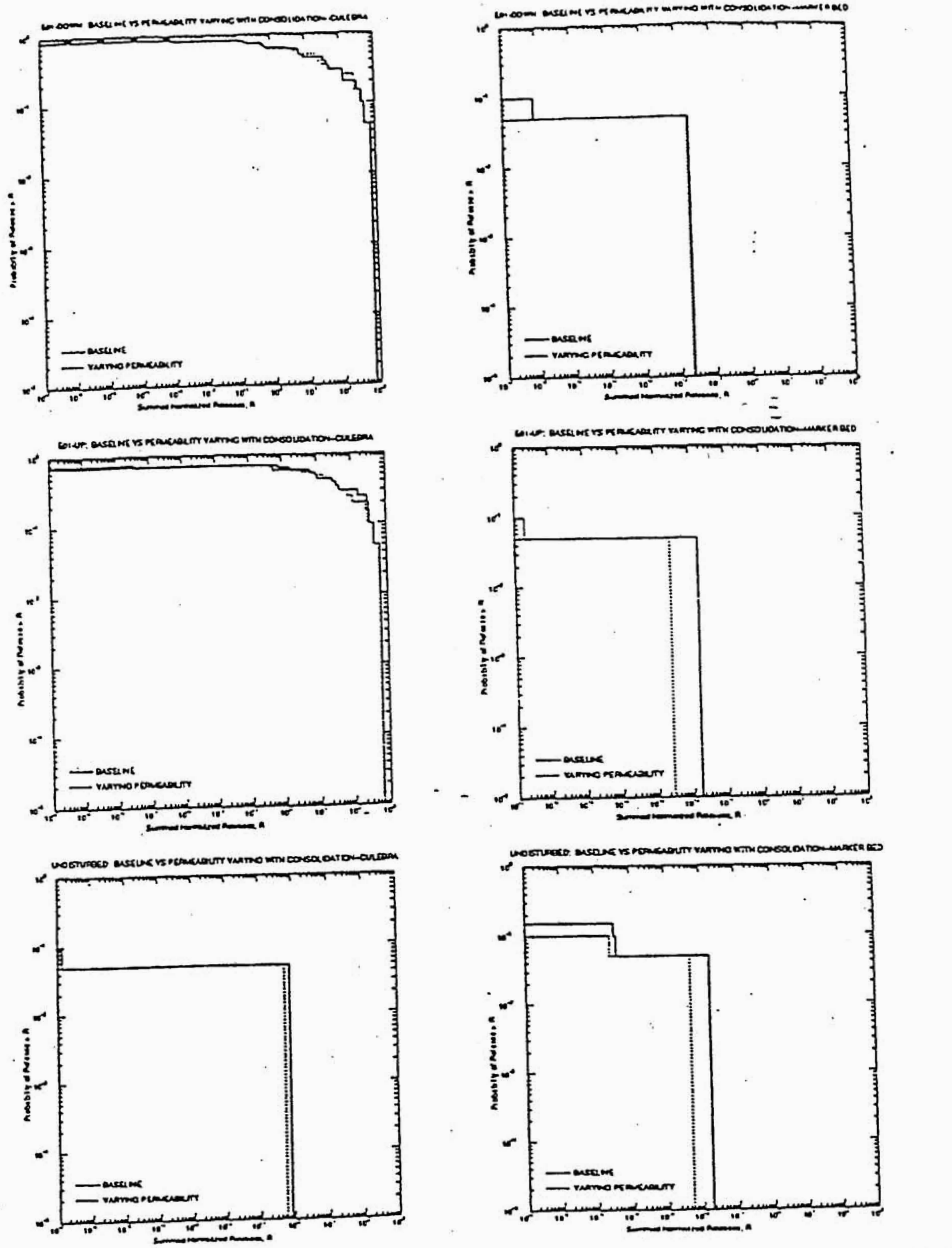
Figure 5. ~~Mean~~ CCDFs for releases to the Culebra and subsurface boundary of the accessible environment (~~E01 Down:~~ Baseline vs Dynamic Consolidation of North End and Hallways).



TRI-6342-4507-0

Figure 6. ~~Mean~~ CCDFs for releases to the Culebra and subsurface boundary of the accessible environment (~~E01-Down:~~ Baseline vs Brine Puddling).

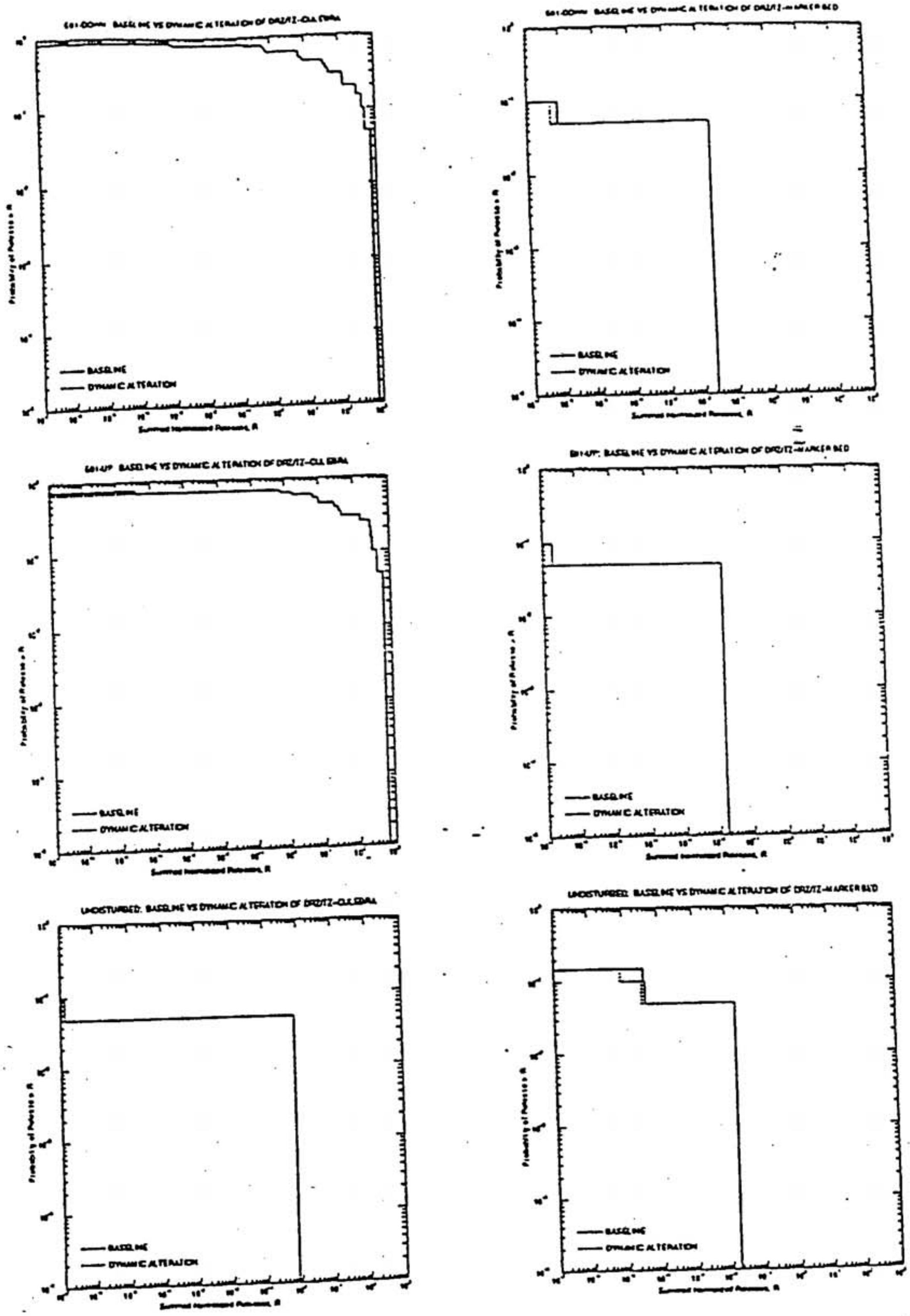
SWCF A1.1.6.3:PA:QA:TSK: DR2, DR3, DR6, DR7 & S6



TRI-6342-4509-0

Figure 7. ~~Mean~~ 9 CCDFs for releases to the Culebra and subsurface boundary of the accessible environment (~~E01-Down:~~ Baseline vs Permeability varying with Consolidation).

SWCF-A:1.1.6.3:PA:QA:TSK: DR2, DR3, DR6, DR7 and S6



TRI-6342-4505-0

Figure 8. ~~Mean~~ CCDFs for releases to the Culebra and subsurface boundary of the accessible environment (~~E01 Down:~~ Baseline vs Dynamic Alteration of DRZ/TZ).

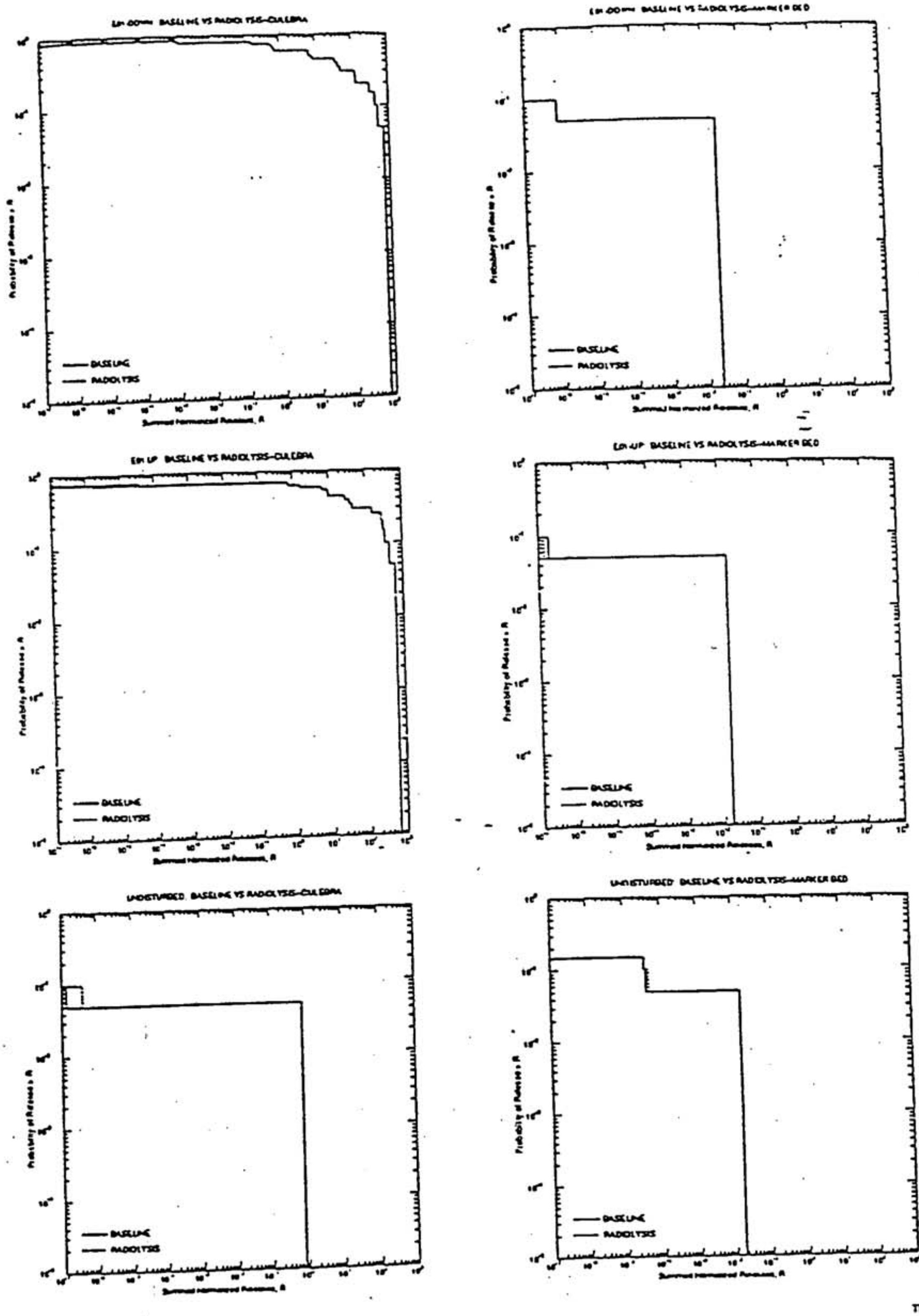


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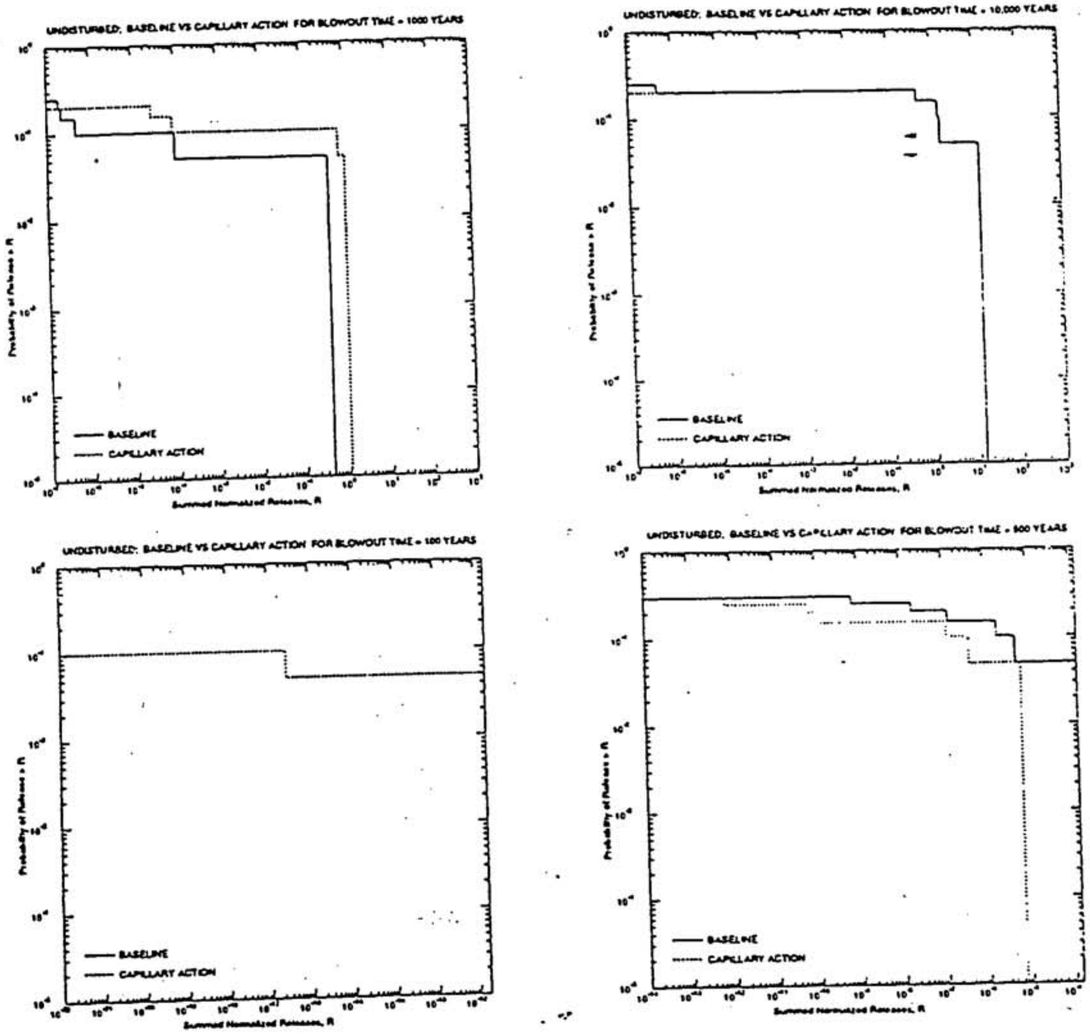
Figure 9. ~~Mean~~ CCDFs for releases to the Culebra and subsurface boundary of the accessible environment (~~E01 Down~~ Baseline vs Radiolysis).



TRI-6342-4515-0

Figure 10. CCDFs for releases due to Blowout (Baseline vs Capillary Action).

ARS
5ACF-A:1.1.B.3:PA:QA:TSK:DR2, DR3, DR6, DR7, and J6
Page B.10 a

Table 1. Sampled Parameters

ARS 5/14/96

Parameter (Variable Name) (Dimensions)	Material	Distribution	←— Actual Sampled Values. Range	Median
Log of x-direction permeability (PERMX_LOG) (log(~~m2~~) m^2 ARS 5/14/96)	Halite	Constructed	3.799883	-21.09494
	MB139	Constructed	5.529356	-18.78408
	Shaft_US1	Constructed	2.946171	-17.02151
	Borehole	Normal	2.636367	-12.49108
Porosity (POROSITY) (Dimensionless) ARS 5/14/96	Halite	Constructed	0.027027	0.010380
	MB139	Constructed	0.069465	0.018577
Log of specific storage (SP_S_LOG) (log(~~m-1~~) m^{-1} ARS 5/14/96)	Halite	Constructed	1.823131	-6.034230
	MB139	Constructed	1.890774	-5.992161
Relative Permeability Model (RELP_MOD) (Dimensionless)	Halite	Constructed	3.000000	4.000000
	Waste Area	Constructed	3.000000	4.000000
Residual Brine Saturation (SAT_RBRN) (Dimensionless)	Halite	Uniform	0.574155	0.302751
	MB139	Constructed	0.499165	0.194686
	Waste Area	Uniform	0.372923	0.199534
Residual Gas Saturation (SAT_RGAS) (Dimensionless)	Halite	Uniform	0.383115	0.199356
	MB139	Constructed	0.319945	0.164978
	Waste Area	Uniform	0.3884864	0.199738
Pore size distribution parameter (PORE_DIS) (Dimensionless)	Halite	Constructed	9.767002	0.726102
	MB139	Constructed	9.180162	0.922575
	Waste Area	Constructed	9.095209	0.769556
Threshold Pressure (PTHRESH) (~~MPa~~) (Pa)	Halite	Constructed	0.9643E+8	9036895.0
	MB139	Constructed	3.665728	-7.926188 (see memo page B20) MEK 5/23/96
Pressure (PRESSURE) (~~MPa~~) (Pa) ARS 5/14/96	MB139	Uniform	981014.0	0.1248E+8
Puddling Saturation (SAT_PUD) (Dimensionless)	Waste Area	Uniform	0.664240	0.439542
Wicking Saturation (SAT_WICK) (Dimensionless)	Waste Area	Uniform	0.928796	0.495629

ARS 5/14/96

Table 1 Cont'd

Microbial Stoichiometry (STOIMIC) (Dimensionless)	Waste Area	Uniform	1.529712	0.843751
Corrosion Stoichiometry (STOICOR) (Dimensionless)	Waste Area	Uniform	0.9517006	0.493922
Humid Corrosion Gas Generation Rate (GRATCORH) (mol/~~m2-s~~ m2)	Waste Area	Constructed	0.30988E-9	0.95958E-11
Inundated Corrosion Gas Generation Rate (GRATCORI) (mol/~~m2-s~~ m2) ARS 5/14/96	Waste Area	Constructed	0.591798E-6	0.119664E-7
Humid Microbial Gas Generation Rate (GRATMICH) (mol/kg-s)	Waste Areaa	Constructed	0.302275E-8	0.339431E-9
Inundated Microbial Gas Generation Rate (GRATMICI) (mol/kg-s)	Waste Area	Constructed	0.154756E-7	0.369955E-8
Initial Brine Saturation (SAT_IBRN) (dimensionless) ARS 5/14/96	Waste Area	Uniform	0.454750E-1	0.279499E-1
~~Fracture Pressure~~ Fraction of Plastics and rubber that are biodegradable (FRAC_PR)	Waste Area	Uniform	0.9603366	0.4893045
Passivation Switch (PASSIDX) (Dimensionless)	Waste Area	Constructed	1.0000000	0.50000000
Log (Solubility of Aqueous Radionuclides in Oxidation State III) (OXYSTAT3) (log (mol/L))	Waste Area	Constructed	8.477690	-6.582510
Log (Solubility of Aqueous Radionuclides in Oxidation State IV) (OXYSTAT4) (log (mol/L))	Waste Area	Constructed	4.731806	-6.976091

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Table 1 Cont'd

Log (Solubility of Aqueous Radionuclides in Oxidation State V) (OXYSTAT5) (log (mol/L))	Waste Area	Constructed	8.866982	-4.882648
Log (Solubility of Aqueous Radionuclides in Oxidation State VI) (OXYSTAT6) (log (mol/L))	Waste Area	Constructed	9.587173	-3.950130
Oxidation State Distribution Parameter (SOL1IDX) (DIMENSIONLESS)	Waste Area	Random	0.9747659	0.4977925
Oxidation State Distribution Parameter (SOL2IDX) ARS 5/14/96 (DIMENSIONLESS)	Waste Area	Random	0.9202215	0.5066518
Oxidation State Distribution Parameter (SOL3IDX) (DIMENSIONLESS)	Waste Area	Random	0.9844602	0.4970062
Oxidation State Distribution Parameter (SOL4IDX) (DIMENSIONLESS)	Waste Area	Random	0.9417638	0.5013523

NOTE: Actual parameter values are listed in the following file: [FEP.JEBEAN.BASELINE.LHS] SMPLHS_FEPS_Baseline.Out;2

ARS 5/14/96

MEF 5/12/96

Table 2. Performance Measures for ~~Blowout~~, Spalling, ~~and~~ Cuttings, and direct brine release (Baseline Model Results)

TIME = 0.100000E+03 years

	BRINE PRESSURE ~~(Mpa)~~ (Pa) ARS 5/16/96	BRINE SATURATION	POROSITY	PERMEABILITY (m^2)
MIN	0.646341E+06	0.164512E-00	0.129134E+00	0.558470E-11
MAX	0.781343E+07	0.328766E+00	0.300751E+00	0.558470E-11
MEAN	0.261626E+07	0.159652E+00	0.182226E+00	0.558470E-11
MED	0.197089E+07	0.175252E+00	0.163546E+00	0.558470E-11

TIME = 0.100000E+04 years

MIN	0.405960E+07	0.144595E-03	0.753411E-01	0.558470E-11
MAX	0.213275E+08	0.829489E+00	0.260317E+00	0.558470E-11
MEAN	0.993771E+07	0.223267E+00	0.114298E+00	0.558470E-11
MED	0.841570E+07	0.185228E+00	0.986526E-01	0.558470E-11

TIME = 0.100000E+05 years

MIN	0.596549E+07	0.162282E-03	0.831857E-01	0.558470E-11
MAX	0.177650E+08	0.891300E+00	0.259204E+00	0.558470E-11
MEAN	0.904791E+07	0.295925E+00	0.115752E+00	0.558470E-11
MED	0.686144E+07	0.224458E+00	0.106594E+00	0.558470E-11

ARS 5/16/96

ARS 5/12/96

Table 3. Performance Measures for ~~Blowout,~~ Spalling, ~~and~~ Cuttings and direct brine release (Capillary Action)

TIME = 0.100000E+03 years

	BRINE PRESSURE ~~(Mpa)~~ (Pa) ARS 5/16/96	BRINE SATURATION	POROSITY	PERMEABILITY (m^2)
MIN	0.674278E+06	0.158943E-06	0.129719E+00	0.558470E-11
MAX	0.948818E+07	0.281991E+00	0.300846E+00	0.558470E-11
MEAN	0.379715E+07	0.129274E+00	0.212469E+00	0.558470E-11
MED	0.342243E+07	0.120585E+00	0.206797E+00	0.558470E-11

TIME = 0.100000E+04 years

MIN	0.426707E+07	0.625236E-07	0.760762E-01	0.558470E-11
MAX	0.205834E+08	0.891288E+00	0.302533E+00	0.558470E-11
MEAN	0.101380E+08	0.214197E+00	0.134522E+00	0.558470E-11
MED	0.925910E+07	0.130116E+00	0.106835E+00	0.558470E-11

TIME = 0.100000E+05 years

MIN	0.597301E+07	0.211665E-05	0.832214E-01	0.558470E-11
MAX	0.174631E+08	0.891327E+00	0.301399E+00	0.558470E-11
MEAN	0.888775E+07	0.282265E+00	0.133485E+00	0.558470E-11
MED	0.684748E+07	0.208696E+00	0.106219E+00	0.558470E-11

ARS 5/12/96

ARS 5/16/96

Table 4. Performance Measures for ~~Blowout~~, Spalling, ~~and~~ Cuttings and direct brine releases (Dynamic Closure)

TIME = 0.100000E+03 years

	BRINE PRESSURE ~~(Mpa)~~ (Pa) MEC 5/23/96	BRINE SATURATION	POROSITY	PERMEABILITY (m^2)
MIN	0.483148E+06	0.142370E-01	0.125514E+00	0.558470E-11
MAX	0.593746E+07	0.370424E+00	0.285701E+00	0.558470E-11
MEAN	0.191471E+07	0.171554E+00	0.164694E+00	0.558470E-11
MED	0.128225E+07	0.195315E+00	0.144612E+00	0.558470E-11

TIME = 0.100000E+04 YEARS

MIN	0.410419E+07	0.266397E-05	0.755763E-01	0.558470E-11
MAX	0.205698E+08	0.824618E+00	0.237285E+00	0.558470E-11
MEAN	0.932229E+07	0.216348E+00	0.108083E+00	0.558470E-11
MED	0.770680E+07	0.183058E+00	0.987513E-01	0.558470E-11

TIME = 0.100000E+05 YEARS

MIN	0.600993E+07	0.472386E-04	0.833964E-01	0.558470E-11
MAX	0.178090E+08	0.823706E+00	0.236498E+00	0.558470E-11
MEAN	0.891833E+07	0.271736E+00	0.109159E+00	0.558470E-11
MED	0.681811E+07	0.224979E+00	0.933492E-01	0.558470E-11

ARS 5/16/96

5/16/96

Table 5. Performance Measures for ~~Blowout~~, Spalling, ~~and~~ Cuttings (Puddling) and direct brine releases KE

TIME = 0.100000E+03 years

	BRINE PRESSURE (~~MPa~~) Pa CE 5/16/96	BRINE SATURATION	POROSITY	PERMEABILITY (m^2)
MIN	0.647427E+06	0.164512E-01	0.129131E+00	0.558470E-11
MAX	0.781402E+07	0.353094E+00	0.300751E+00	0.558470E-11
MEAN	0.261685E+07	0.163848E+00	0.182283E+00	0.558470E-11
MED	0.197308E+07	0.175266E+00	0.163732E+00	0.558470E-11

TIME = 0.100000E+04 years

MIN	0.413829E+07	0.144595E-03	0.754796E-01	0.558470E-11
MAX	0.211521E+08	0.941654E+00	0.260262E+00	0.558470E-11
MEAN	0.999799E+07	0.288060E+00	0.113453E+00	0.558470E-11
MED	0.832081E+07	0.273739E+00	0.989002E-01	0.558470E-11

TIME = 0.100000E+05 years

MIN	0.594842E+07	0.162282E-03	0.831048E-01	0.558470E-11
MAX	0.177635E+08	0.941763E+00	0.259203E+00	0.558470E-11
MEAN	0.905020E+07	0.396616E+00	0.115048E+00	0.558470E-11
MED	0.686173E+07	0.332423E+00	0.106518E+00	0.558470E-11

ARS 5/14/96
and direct brine releases

Table 6. Performance Measures for ~~Blowout~~, Spalling, ~~and~~ Cuttings, and direct brine releases (Varying Permeability)

TIME = 0.100000E+03 years

	BRINE PRESSURE (~~Mpa~~) (Pa) MLL 5/23/96	BRINE SATURATION	POROSITY	PERMEABILITY (m^2)
MIN	0.483525E+06	0.140190E-01	0.125528E+00	0.465815E-12
MAX	0.590756E+07	0.370326E+00	0.284497E+00	0.558470E-11
MEAN	0.189846E+07	0.170618E+00	0.164211E+00	0.103486E-11
MED	0.128377E+07	0.195572E+00	0.144605E+00	0.632053E-12

TIME = 0.100000E+04 years

MIN	0.389321E+07	0.237545E-05	0.744877E-01	0.124021E-12
MAX	0.206316E+08	0.796048E+00	0.228743E+00	0.144193E-11
MEAN	0.926481E+07	0.212871E+00	0.108107E+00	0.355010E-12
MED	0.750772E+07	0.185112E+00	0.997611E-01	0.274877E-12

TIME = 0.100000E+05 years

MIN	0.601188E+07	0.286979E-04	0.834056E-01	0.169520E-12
MAX	0.178354E+08	0.823441E+00	0.227975E+00	0.144193E-11
MEAN	0.892445E+07	0.267615E+00	0.108708E+00	0.360363E-12
MED	0.680374E+07	0.209017E+00	0.933637E-01	0.229360E-12

ARS 5/16/96

and direct brine releases KE 5/16/94

Table 7. Performance Measures for ~~Blowout~~, Spalling, ~~and~~ Cuttings (DRZ/TZ Alteration)

TIME = 0.100000E+03 years

	BRINE PRESSURE ~~(Mpa)~~ (PA) 5/16/94 KE	BRINE SATURATION	POROSITY	PERMEABILITY (m^2)
MIN	0.646341E+06	0.164512E-01	0.129134E+00	0.558470E-11
MAX	0.781343E+07	0.328698E+00	0.300751E+00	0.558470E-11
MEAN	0.261676E+07	0.159636E+00	0.182240E+00	0.558470E-11
MED	0.197438E+07	0.175165E+00	0.163647E+00	0.558470E-11

TIME = 0.100000E+04 years

MIN	0.405960E+07	0.779378E-04	0.753411E-01	0.558470E-11
MAX	0.210439E+08	0.829489E+00	0.259995E+00	0.558470E-11
MEAN	0.990475E+07	0.223650E+00	0.114145E+00	0.558470E-11
MED	0.841570E+07	0.186801E+00	0.986526E-01	0.558470E-11

TIME = 0.100000E+05 years

MIN	0.596549E+07	0.161961E-03	0.831857E-01	0.558470E-11
MAX	0.168361E+08	0.891300E+00	0.258682E+00	0.558470E-11
MEAN	0.906478E+07	0.293348E+00	0.115669E+00	0.558470E-11
MED	0.686131E+07	0.224303E+00	0.106594E+00	0.558470E-11

KE 5/16/94

Date: 5/23/96

From: Michael Lord [signature]

Subject: Explanation of MB139 threshold pressure value.

A parameter PTHRESH was sampled with the following statistics:

MIN	MAX	RANGE	MEAN	MEDIAN	VARIANCE
-9.170817	-5.505089	3.665728	-7.708151	-7.926188	1.134222

The value PCT_A is correlated to PTHRESH by the relation

$$PCT\_A = 10^6 10^{PTHRESH}.$$

Threshold pressure is computed as

$$P_t = PCT\_A * k^{-0.346},$$

where k is formation permeability. The values given in Table 1 for MB139 PTHRESH references the parameter PTHRESH as described above and not the actual threshold pressure.

Section D - TECHNICAL REVIEW FORMS

and

Technical Review Comments

Section C - DESCRIPTION OF FEP MODELS

DESCRIPTION OF WICKING MODEL

The following relationship is used in BRAGFLO to determine effective corrosion and biodegradation rates from their respective inundated and humid component rates in the presence of wicking:

$$r = S_{b_{eff}} r_i + (1 - S_{b_{eff}}) r_h \quad if \quad S_{b_{eff}} > 0$$

$$r = 0 \, , \quad if \quad S_b = 0$$

with

$$S_{b_{eff}} = S_b + S_w \qquad S_{b_{eff}} \leq 1.0$$

where:

r = either the effective corrosion or biodegradation rate
r_i = either the inundated corrosion or biodegradation rate
r_h = either the humid corrosion or biodegradation rate
S_b = brine saturation in the waste disposal region
S_w = additional brine saturation that contacts solid reactants due to wicking
$S_{b\,eff}$ = effective brine saturation for gas generation reactions

The parameter S_w was sampled from a uniform distribution of range from 0.0 to 1.0. When S_w is set to zero the effect of wicking is absent (assumed in baseline calculations). The net effect of a positive value for S_w on the gas generation rate is to weight more heavily the inundated contribution. This is consistent with increased capillary action drawing brine in contact with more of the solid reactants.

DESCRIPTION OF PUDDLING MODEL

To activate puddling, a parameter representing the fraction of immobile brine is defined. This parameter was sampled uniformly between a value of 0.1 and 0.8.. Residual brine and gas saturations were sampled independently from a uniform distribution between the values of 0.0 and 0.4. The sampled values of residual brine saturation, residual gas saturation, and immobile brine fraction were combined to produce pseudo-residual saturations that were used in either the sampled Brooks/Corey or VanGenuchten/Parker models. The saturations were combined as follows:

$$S_{pbr} = S_p + (1 - S_p) S_{br}$$

$$S_{pgr} = (1 - S_p) S_{gr}$$

S_{pbr} = the pseudo-residual brine saturation
S_{pgr} = the pseudo-residual gas saturation
S_{br} = the true residual brine saturation
S_{gr} = the true residual gas saturation
S_p = the fraction of immobile brine (puddling parameter)

with the restriction that:

$$S_{pgr} = (1 - S_p) S_{gr} \quad if \quad (1 - S_{pgr} - S_{pbr} - 0.05) > 0$$

otherwise

$$S_{pbr} = 1 - S_{pbr} - 0.05$$

This restriction guarantees a saturation interval of at least 0.05 for which both fluids (brine and gas) will be mobile.

DESCRIPTION OF DYNAMIC PERMEABILITY MODEL

The following relationship was implemented in BRAGFLO for those simulations in which permeability was allowed to vary dynamically with porosity during repository consolidation:

$$k = a\phi^n$$

where

k = local permeability (m^2)
ϕ = local porosity based on current repository volume
$a = 1.0 \times 10^{-11}\ m^2$
$n = 4.6$

DESCRIPTION OF DRZ/TRZ ALTERATION MODEL

The BRAGFLO treatment of alteration of formation properties (permeability and porosity) with pressure within the marker beds has been documented in (Key, S. et al, SAND94-0381). The porosity dependence on pressure is given piecewise by the formula:

for $p<p_i$

$$\phi = \phi_0 \exp \left(C_i [p-p_o] \right)$$

for $p_i<p<p_a$

$$\phi = \phi_0 \exp \left\{ C_i (p-p_o) + \frac{(C_a-C_i)(p-p_i)^2}{2\ (p_a-p_i)} \right\}$$

for $p>p_a$

$$\phi = \phi_a$$

where

C = rock compressibility
ϕ = porosity
p = brine pressure

and subscripts

o = reference condition
I = fracture initiation condition
a = full fracture condition

BRAGFLO input determines pressures p_i and p_a, and the porosity at the fully altered conditions, ϕ_a From this information the fully altered compressibility, C_a, is determined by specifying the full fracture porosity and solving the above equation for C_a.

The BRAGFLO fracture treatment further allows for change in the material permeability. The often used parallel plate analogy for flow in fractured rock models the permeability by

$$\frac{k}{k_i}=[\frac{\phi}{\phi_i}]^n$$

where

k = permeability of altered material
k_i = permeability of intact material
ϕ = porosity of altered material
ϕ_i = porosity of intact material
n = an empirical parameter.

The exponent n is determined by specifying the permeability at the fully altered condition, k_a. Since the porosity is specified at this condition, the above expression determines the exponent n.

The permeability-porosity data for the DRZ/Transition zone alteration is:

$k_i = 10^{-15}\,m^2$ ϕ_i = sampled intact Halite value
$k_a = 10^{-9}\,m^2$ $\phi_a = \phi_i + 0.01$

This results in an exponent n value of 54.34274.

When DRZ/Transition zone alteration is not used

$k = 10^{-15}\,m^2$ ϕ_i = sampled intact Halite value.

The initiation pressure, p_i, and the full altered pressure, p_a, are specified on input as a certain pressure increment above initial brine pressure. The pressure increments assigned for the DRZ/Transition zone will have the same values as the pressure increments for the marker beds.

Section D - TECHNICAL REVIEW FORMS

and

Technical Review Comments

FEP Title: CAPILLARY ACTION (WICKING)

FEP ID: DR-2

Reviewer Instructions
Check "Yes" for each item reviewed and found acceptable.
Check "No" for each item reviewed and found not acceptable.

1. Are the calculations applicable, correct, and adequate?

(YES) NO NA (for reasoned argument FEP's)

Comments (attach pages as needed)

2. Are the screening arguments derived from the calculations or arguments applicable, correct, and adequate?

(YES) NO

Comments (attach pages as needed)

3. Is the record package documenting the screening effort, complete? Use Criteria found in Appendix D of the FEP Plan Version 5.1.

(YES) NO

Comments (attach pages as needed)

Does the record packages contain sufficient information for an independent person with equivalent technical background to understand the work, evaluate the technical quality of the work, continue unfinished work, and/or reproduce the work and its primary results.

(YES) NO

Comments (attach pages as needed)

Report your assessment along with deficiencies if any and, if appropriate, make recommendations for addressing the deficiencies (attach pages as needed).

Signature of technical reviewer(s) and lead staff member indicates that the package reviewed was complete, accurate, and acceptable.

Technical Reviewer(s) (attach pages as needed)

Name (Print)	Signature	Date
M.G. MARIETTA	M. G. Marietta	10/15/95
Name (Print)	Signature	Date

Lead Staff

Name (Print)	Signature	Date
P. Vaughn	Palmer Vaughn	10/17/95

Management Concurrence

Name (Print)	Signature	Date
Margaret Chu	[signature]	10/17/95

SCWF-A:1.1.6.3:PA:~~NQ~~ QA:TSK: DR-2 (FEP ID)

tt DM 5/14/96

FEP Title: DYNAMIC CLOSURE OF THE NORTH END AND HALLWAYS

FEP ID: DR-3

Reviewer Instructions
Check "Yes" for each item reviewed and found acceptable.
Check "No" for each item reviewed and found not acceptable.

1. Are the calculations applicable, correct, and adequate?

(YES) NO NA (for reasoned argument FEP's)

Comments (attach pages as needed)

2. Are the screening arguments derived from the calculations or arguments applicable, correct, and adequate?

(YES) NO

Comments (attach pages as needed)

3. Is the record package documenting the screening effort, complete? Use Criteria found in Appendix D of the FEP Plan Version 5.1.

(YES) NO

Comments (attach pages as needed)

Does the record packages contain sufficient information for an independent person with equivalent technical background to understand the work, evaluate the technical quality of the work, continue unfinished work, and/or reproduce the work and its primary results.

(YES) NO

Comments (attach pages as needed)

Report your assessment along with deficiencies if any and, if appropriate, make recommendations for addressing the deficiencies (attach pages as needed).

Signature of technical reviewer(s) and lead staff member indicates that the package reviewed was complete, accurate, and acceptable.

Technical Reviewer(s) (attach pages as needed)

Name (Print) M.G. MARIETTA — Signature M. G. Marietta — Date 10/15/95

Name (Print) — Signature — Date

Lead Staff

P. Vaughn
Name (Print) — Signature Palmer Vaughn — Date 10/17/95

Management Concurrence

Name (Print) Margaret Chu — Signature [signature] — Date 10/17/95

SCWF-A:1.1.6.3:PA:~~NQ~~ QA:TSK: DR-3 (FEP ID)

D3

5/14/96

FEP Title: BRINE PUDDLING IN THE REPOSITORY

FEP ID: DR-6

Reviewer Instructions
Check "Yes" for each item reviewed and found acceptable.
Check "No" for each item reviewed and found not acceptable.

1. Are the calculations applicable, correct, and adequate?
(YES) NO NA (for reasoned argument FEP's)
Comments (attach pages as needed)

2. Are the screening arguments derived from the calculations or arguments applicable, correct, and adequate?
(YES) NO
Comments (attach pages as needed)

3. Is the record package documenting the screening effort, complete? Use Criteria found in Appendix D of the FEP Plan Version 5.1.
(YES) NO
Comments (attach pages as needed)

Does the record packages contain sufficient information for an independent person with equivalent technical background to understand the work, evaluate the technical quality of the work, continue unfinished work, and/or reproduce the work and its primary results.
(YES) NO
Comments (attach pages as needed)

Report your assessment along with deficiencies if any and, if appropriate, make recommendations for addressing the deficiencies (attach pages as needed).

Signature of technical reviewer(s) and lead staff member indicates that the package reviewed was complete, accurate, and acceptable.

Technical Reviewer(s) (attach pages as needed)

Name (Print) M.G. MARIETTA Signature M. G. Marietta Date 10/15/95

Name (Print) Signature Date

Lead Staff
P. Vaughn
Name (Print) Signature Palmer Vaughn Date 10/17/95

Management Concurrence

Name (Print) Margaret Chu QA Signature [signature] Date 10/17/95

SCWF-A:1.1.6.3:PA:~~NQ~~:TSK: DR-6 (FEP ID)

D4 DM 5/14/96

FEP Title: PERMEABILITY VARYING WITH POROSITY IN CLOSURE REGIONS

FEP ID: DR-7

Reviewer Instructions
Check "Yes" for each item reviewed and found acceptable.
Check "No" for each item reviewed and found not acceptable.

1. Are the calculations applicable, correct, and adequate?

(YES) NO NA (for reasoned argument FEP's)

Comments (attach pages as needed)

2. Are the screening arguments derived from the calculations or arguments applicable, correct, and adequate?

(YES) NO

Comments (attach pages as needed)

3. Is the record package documenting the screening effort, complete? Use Criteria found in Appendix D of the FEP Plan Version 5.1.

(YES) NO

Comments (attach pages as needed)

Does the record packages contain sufficient information for an independent person with equivalent technical background to understand the work, evaluate the technical quality of the work, continue unfinished work, and/or reproduce the work and its primary results.

(YES) NO

Comments (attach pages as needed)

Report your assessment along with deficiencies if any and, if appropriate, make recommendations for addressing the deficiencies (attach pages as needed).

Signature of technical reviewer(s) and lead staff member indicates that the package reviewed was complete, accurate, and acceptable.

Technical Reviewer(s) (attach pages as needed)

Name (Print)	Signature	Date
M.G. MARIETTA	M. G. Marietta	10/15/95

Lead Staff

Name (Print)	Signature	Date
Palmer Vaughn	Palmer Vaughn	10/17/95

Management Concurrence

Name (Print)	Signature	Date
Margaret Chu	[signature]	10/17/95

SCWF-A:1.1.6.3:PA:~~NQ~~ QA:TSK: DR-7 (FEP ID)

DY

DM
5/14/96

FEP Title: DYNAMIC ALTERATION OF THE DRZ/TRANSITION ZONE

FEP ID: S-6

Reviewer Instructions
Check "Yes" for each item reviewed and found acceptable.
Check "No" for each item reviewed and found not acceptable.

1. Are the calculations applicable, correct, and adequate?

(YES) NO NA (for reasoned argument FEP's)

Comments (attach pages as needed)

2. Are the screening arguments derived from the calculations or arguments applicable, correct, and adequate?

(YES) NO

Comments (attach pages as needed)

3. Is the record package documenting the screening effort, complete? Use Criteria found in Appendix D of the FEP Plan Version 5.1.

(YES) NO

Comments (attach pages as needed)

Does the record packages contain sufficient information for an independent person with equivalent technical background to understand the work, evaluate the technical quality of the work, continue unfinished work, and/or reproduce the work and its primary results.

(YES) NO

Comments (attach pages as needed)

Report your assessment along with deficiencies if any and, if appropriate, make recommendations for addressing the deficiencies (attach pages as needed).

Signature of technical reviewer(s) and lead staff member indicates that the package reviewed was complete, accurate, and acceptable.

Technical Reviewer(s) (attach pages as needed)

Name (Print) M.G. MARIETTA Signature M. G. Marietta Date 10/15/95

Name (Print) Signature Date

Lead Staff

Name (Print) Michael Lord Signature Michael Lord Date 10/17/95

Palmer Vaughn Palmer Vaughn 10/17/95

Management Concurrence

Name (Print) Margaret Chu Signature [signature] Date 10/17/95

SCWF-A:1.1.6.3:PA:~~NQ~~ QA:TSK: S-6 (FEP ID)

DK DKM 5/14/96

FEP Technical Review Sheet

FEP Title: FEP Records Package SWCF-A:1.1.C.3:PA:QA:TSK:DR2, DR3, DR6, DR7, S6
FEP ID: DR2, DR3, DR6, DR7, S6
Documents Reviewed:

Reviewer Instructions
Check "Yes" for each item reviewed and found acceptable.
Check "No" for each item reviewed which requires further work. For NO answers, provide comments.

I. Technical Review
For Calculational Approach
1. Are the calculations applicable, correct, and adequate?
 (YES) ✓ NO NA (for reasoned argument FEPs)

For Reasoned Argument Approach
1. Are the arguments applicable, relevant, and adequate?
 YES NO

For Both Calculational and Reasoned Argument Approaches
2. Are the screening recommendations derived from the calculations or reasoned arguments applicable, correct, and adequate?

(YES) ✓ NO

3. Is the record package documenting the screening effort, complete?

(YES) ✓ NO

4. Are candidate parameter, called out in the screening recommendations and listed in Part A of *Conceptual Model/Parameter Reconciliation Form*, appropriate to the FEP screening issue.

YES NO (NA)

5. Does the record packages contain sufficient information for an independent person with equivalent technical background to understand the work, evaluate the technical quality of the work, continue unfinished work, and/or reproduce the work and its primary results.

(YES) ✓ NO

II. Approval Signatures

Signatures on this document indicate that all comments have been resolved.
Signature of technical reviewer(s) and lead staff member indicates that the package reviewed was complete, accurate, and acceptable.
Technical Reviewer(s) (attach pages as needed)

Daniel M. Stoetzel	[signature]	4/25/96
Name (Print)	Signature	Date

Lead Staff Approval
Lead Staff

Palmer Vaughn	[signature]	4/25/96
Name (Print)	Signature	Date

Signature of department manager indicates that the individuals who signed as preparers and reviewers were qualified to perform their tasks, and that the department manager approves of the work product.
Department Manager

Name (Print)	**Signature**	**Date**
D. R. Anderson	[signature]	4/29/96

SWCF-A:1.2.07.3:PA:QA:TSK:DR2, DR3, DR6, DR7, S6 DT

Sandia National Laboratories — WASTE ISOLATION PILOT PLANT

Document Review and Comment

Form Number: 430 Effective: 7/31/95

Procedure: QAP 6-3
Revision: 1
Page 1 of

This form may be used for test plans, procedures, reports, design packages, abstracts, and Technical Operating Procedures

Title: FEPs Record Package SWCA-A : 1.1.6.3 : PA : QA : TSK : DR2, DR3, DR6, DR7, S6

☐ Pre-Publication ☒ Post-Publication

Item No.	Ref. Loc.	Mandatory F	Comment (Reviewer's Comments)	Accept	Reject	Reasoning (Author/Designer's Response)	Accept (Reviewer's Response)	Reject
			General Comment: I think the approaches used in these FEP's are adequate for the purposes of of an overall Performance Assessment. Many key Geologic and disposal room parameters are sampled over wide ranges, and will dominate the results much more than some of the issues raised in these FEP's. →	✓		(brine pocket size, & pressures (for E1 scenarios), and Salado Marker bed permeability come to mind), as well as chemistry effects: solubility and gas generation.	✓	

Reviewed By: David M. Kessel Date: 4/25/96

Response Prepared By: Palmer Vaughn (Author/Designer Name) Date: 4/25/96

Response Concurrence: David M. Kessel (Reviewer Name) Date: 4/25/96

To Be Completed on First Page Only

Rev 3/10/96 SWCF File Code: SWCF-A:1.2.07.3:PA:QA:TSK:DR2, DR3, DR6, DR7, S6

Sept. 7, 1995 FEPS Screening Effort Review Meeting
Overview of Meeting - Discussion and Conclusions

I have reviewed the following document, '*Sept. 7, 1995 FEPS Screening Effort Review Meeting - Overview of Meeting, Discussion and Conclusions*'. As technical reviewer for FEPs DR2, DR3, DR6, DR7, S6 and DR4 I agree that these minutes capture the essence of the technical discussions raised during this set of meetings.

Signed: M. G. Marietta Print M. G. MARIETTA Date: 4/29/96
Mel Marietta - Technical Reviewer (6821)

This set of minutes was compiled, edited and reviewed by:

- Kathy Economy, ECODYNAMICS
- Shelly Strong, TRI
- Al Schenker, LATA

Overview of Technical Discussions and Conclusions

A meeting was held in the video-conference room at BDM (BDM/3435) on Sept. 7, 1995 to review the results of a set of Features, Events, and Processes (FEPs) screening efforts. The purpose of the review was to compare the incorporation of the effects of a FEP on the current WIPP baseline conceptual models. The comparison would help determine whether a FEP should be included or excluded in future WIPP conceptual models. The meeting started at approximately 8 a.m. and concluded at 10:30 a.m. This document captures those technical discussion relevant to the following FEPS:

DR-2: Capillary Action (Wicking) Within the Waste
DR-3: Dynamic Consolidation of the North End and Hallways
DR-6: Brine Puddling in the Repository Due to Heterogeneities
DR-7: Permeability Varying with Porosity in Closure Regions
S-6: Dynamic Alteration of the Disturbed Rock Zone and Transition Zone (DRZ/Transition Zones)

The following individuals attended this meeting. Their names and roles are as follows
Lead and support staff: Palmer Vaughn - 6749 (PV) served as lead investigator for the above FEPs. Two of seven support staff for this set of FEPs attended, they were Bob MacKinnon - 6749 (BM) Michael Lord 6749 (ML).
Technical reviewer: Mel Marietta - 6707 (MM)

WIPP Project Management: Les Shepherd - 6701(LS) participated via speaker phone from Carlsbad; Margaret Chu - 6705 (MC)

Manager and Coordinator Overseeing the FEP screening effort: Rip Anderson, 6749 (RA); Mert Fewell, 6749 (MF)

QA Support: Kathleen Byle, 6706 (KB); Mario Chavez 6706 (MC)

All other attendees were individuals who served as auxiliary support to this set of meetings (record minutes, 'runners', etc.) or were technical staff members who had an interest in how the FEP screeing issue is being resolved. These were: Jennifer Hoogerhius TechReps (JH), Molley Minahan - TechReps (MIM), Shelley Strong - TechReps (SS),Barry Butcher - 6748 (BB), Stephen Webb - 6115 (SW), Al Lappin - 6115 (AL)

Copies of DRAFT Record Packages (RPs) for FEPs DR2, DR3, DR6, DR7 and S6 had been given in advance to WIPP Management and the technical reviewer. Mel Marietta served as the technical reviewer for this review. Les Shepherd and Margaret Chu represented WIPP Project Management.

The meeting was opened by Rip Anderson.

Results of the FEP screening review for this meeting will followed the general format given below:

- submittal of a screening recommendation for management consideration
- present the basis for the FEP screening recommendation,
- open discussion between management, technical reviewers, and lead staff in order to confer and address issues relevant to the screening recommendation.

Review of FEP Records Packages:

FEPs DR-2, DR-3, DR-6, DR-7, and S-6 were part of one Records Package. Palmer Vaughn (PV) served as the lead investigator for this set of FEPs. Bob MacKinnon, contributer, presented the FEP screening issue, the screening approach, and the screening recommendation. Bob outlined the following set of screening steps common to this set of FEPs. (Note: the final documentation for the above FEP screening efforts are part of FEP records packages and have been placed in the SWCF.)

1. The effects of one FEP were considered singly.
2. All FEPs were compared to a baseline model set of calculations. In the baseline calculation the effects of all FEPs issues are turned 'off'.
3. Two basic scenarios were considered in the screening analysis; an undisturbed scenario and a disturbed scenario.
4. Both undisturbed and disturbed scenarios included a one degree formation dip, downward to the south.
5. The intrusion event, E1, is considered in the disturbed scenario and consisted of a borehole that penetrated the repository and pressurized brine in the underlying Castile.
6. Two variations of the intrusion event were examined—E1 updip (north) and E1 downdip (south). Modeling the affects of an E1 event penetrating either updip or downdip permitted evaluating the effects of potential increased brine flow, due to higher brine saturations, in the panel region, located downdip.
7. The effects of uncertainty were incorporated by using a Latin hypercube sampling (LHS) method. A sample size of 20 used for each case, resulting in a total of 60 simulations for each FEP issue.

The following captures discussions relevant to the basic approach used for above set of FEP screening efforts.

LS: What are the technical ramifications of using a sample size of 20 and have we had the opportunity to see what would happen if we increased the sample size for this set of FEPs?

BM: No. This is a limited sample size, using the 4/3 rule, given there were 41 uncertain parameters. The rationale for using this sample size was based on results of scoping and the DCCA calculations, which revealed outcomes were insensitive to these FEPs issues. Therefore, we believed a sample size of 20 was adequate. Additionally, because we considered Performance Measures [PM] for each FEP one at a time, that is holding all other parameters to the baseline values, we believed this sample size was reasonable.

MM: OK, but, I found no comment made in the FEP Summary Memos of Record (SMORs) defending your decision to use this sample size. I think you need to include that justification in the RP. Please add it.

I would say for the disturbed performance this is an adequate sample size, because the answer is so close to the baseline. For the undisturbed performance you are integrating in a lot of zero releases into the CCDF so I would say it is still OK to use such a small sample size.

FEP DR-2: Capillary Action (Wicking) Within the Waste

Presented by Bob MacKinnon (BM) with discussion following. Palmer Vaughn (PV) is lead investigator.

It was recommended this FEP be screened out of future calculations.

(Note: The original screening decision was reversed after this review meeting, i.e. it was recommended to screen this FEP in for future calculations. Documentation supporting this change in screening decision has been placed in the SWCF under the appropriate FEP file.)

BM summarized the FEP issue, screening approach, and results and discussion given in the FEP RP.

<u>Discussion</u>

BB: Did you plot gas generation histories for these?

BM: No. We did plot total moles of gas that hydrogen generated. We made a scatterplot of the 20 simulations of total moles of hydrogen generated for the particular FEP and the 20 vectors of the baseline case, and differences on the scatterplot are basically negligible.

MC: Is the bottom line that increased saturation, due to wicking, is negligible?

BB: If the total amount of brine is fixed, with gas parameters varied - then do you have faster generation of gas?

BM: We initially started out with higher brine saturation in the waste because of the wicking factor. So initially gas generation is at a higher rate than baseline case, but not much. This prevents less water to move into the facility. Then later on, gas generation drops down. Consequently initial higher pressures do not let as much water move into the repository . As a result you see releases are actually less, and overall, net releases are less to the subsurface boundary.

MF: Is this FEP model time intensive? And if not, why not just include this FEP in the final model?

BM: We screened out several of these FEPs that did not require much computational effort; we believed it would be more advantageous to take this approach bearing in mind that a much larger effort would be required when conducting the full set of CCA PA calculations. We believe keeping the model simple is advantageous.

PV: And given the results we saw in the CCDF there is no reason to screen it in.

MM: Yes, the screening decision should be made on the analysis right here. Not whether it is easy to implement in the code.

BM: A second set of PMs were concerned with the impact of this FEP on Blowout—SPALLINGS, and CUTTINGS. The bottom line is - if you compare baseline results to wicking results, wicking produces slightly higher maximum, medium, and minimum pressures in 100 years and higher medium pressure at 1000 yr. However, brine saturation, with exception of a maximum at 1000 yr, are consistently lower than the brine saturation value of .6 – which is an approximate value required for uncontrolled brine releases during blowout, based on Dan Stoelzel's preliminary blowout results.

BB: You show variable porosity, constant permeability, but CUTTINGS model uses a variable permeability. Is that included?

BM: These calculations only included results from BRAGFLO, NUTS, and PANEL. No results from the CUTTINGS model was used as input.

PV: I think we used a conservative permeability, high compared to CUTTINGS. The blowout model you are referring to is entrainment not blowout; blowout is DR-4, which deals with 2-phase flow of gas and brine during intrusion process.

BB: Gas pressure does influence CUTTINGS release; what you're saying is the total gas content doesn't change that much and therefore the CUTTINGS release is similar to baseline?

PV: Yes.

BM: On wicking relative to Blowout, the baseline case is sufficiently conservative with respect to releases - so in relation to releases both to Culebra and subsurface boundary in blowout, we think that this issue can be screened out.

BB: But you need stronger justification, because of gas. The issue here is are you creating more gas in the repository which is reflected by the pressure. In the conclusion I think you need to say that the pressures aren't substantially different, therefore the gas component can't be that much different either, the additional contribution to the pressure is the brine.

LS: Barry, so you are saying that you do not disagree with their conclusion, just they need to add additional rationale or justification in support of this recommendation.

BB: Yes.

FEP DR-3: Dynamic Consolidation of the North End and Hallways
Presented by Bob MacKinnon (BM) with Panel discussion following. Palmer Vaughn (PV) is lead investigator.

It was recommended this FEP be screened out of future calculations.

BM: PMs show insignificant differences between the baseline model and modeling this FEP.

LS: You say the impact of this FEP are insignificant. What does "insignificant" impact mean for this in FEPs?

MM: It depends on where the CCDF falls relative to the baseline. You will have to look at intermediate diagnostics, then you will need to look at some sensitivity analysis tables to get an idea of releases relative to other parameters. If you are dealing with an insignificant parameter to begin with a factor of 2 increase means nothing.

BB: So basically you are saying not to include this FEP in future calculations? No.

BM: Yes, that is correct.

BB: That makes sense. Because we know that the north end volume is only 10% of the repository. And our gas production uncertainties are probably as much of that, if not more. So for convenience it does not need to be included.

MM: In your conclusion you use the words "appear" to be conservative for you input values. Change that to "is" conservative. You should be more decisive, this values are conservative.

FEP DR-6: Brine Puddling in the Repository Due to Heterogeneities
Presented by Bob MacKinnon (BM) with Panel (P) discussion following. Palmer Vaughn (PV) is lead investigator.

It was recommended this FEP be screened out of future calculations.

BM: Baseline and puddling curves show minor differences. Based on CCDFs, puddling is not a significant factor. Therefore, we screened this issue out. The associated screening issue would be to coupled this FEP with the blowout model This FEP coupled with assumptions relevant to blowout model show minor PM differences.

BB: Implementing a puddling model, you know you would reduce releases. The issue is if you did have an adverse CCDF to start with, by including puddling, it would help reduce releases. Do you feel that maybe we need to include puddling to help us? So, can puddling be omitted or is it needed?

PV: No, because at this point the model is not well defined and it is non-conservative. Consequently, we do not believe we can use it to help us.

MM: Can you tell me how the puddling parameters are implemented within the mesh? Is it the same within the entire waste panel region or are they varied from cell to cell?

PV: It is uniform within the waste disposal region.

MM: So the heterogeneity issue is not fully modeled.

PV: No, but we sampled on the factor of .1 to .8, so brine below that sampled value was immobile. Whatever is sampled, is described by the two phase curves above that.

MM: So brine saturations were uniform throughout the waste region?

PV: Yes, but we spanned a range of 10-80% saturation from vector to vector, in order to cover the wide range of uncertainty.

BM: So Mel, are you uncomfortable with term "heterogeneities"?

MM: Yes, it doesn't seem to attack that issue. Additionally, I was curious, why is there absolutely no difference between CCDFs?

PV: There is a slight difference. But the baseline does result in higher releases in all cases. A puddle factor immobilizes a certain portion of the brine.

MM: When we were interpreting the SP results we gave more credit for the puddling factor in retarding the flow.

PV: The SP used a fixed value at 0.5. So we do have a number of realizations that are higher than that. A few lower, it was a sampled parameter in doing the FEP analysis.

FEP DR-7: Permeability Varying with Consolidation in Closure Regions

Presented by Bob MacKinnon (BM) with panel discussion following. Palmer Vaughn (PV) is lead investigator.

It was recommended this FEP be screened out of future calculations.

BM: The FEP and baseline CCDFs are close to one another. The baseline CCDF curve is above or to the right of the curve resulting in the variable permeability model. Variable permeability was not a significant factor. Brine saturations were only slightly higher that those baseline saturations at 100 yr. These values are low, below the 0.6 value. Therefore, this issue has been screened out.

BB: Does your screening process here examine what happens if you have a very high seal permeability and how permeability of the waste might alter flow up the seal rather than through the waste? Before this came up, we assumed low-seal permeability, and on that basis, we could be crude about what we assumed for waste permeability of the waste, and the result being the waste constitutes a short circuit.

PV: In this sampling, we used database from DCCA calculations that included some very high seal permeabilities, which are folded into the range of parameters used to do these FEPs screenings. Joe's seals design is significantly tighter than what was in the DCCA, but that has yet to be transmitted to us via an official memo. I expect the seal perms we will be using will be fairly tighter, but these calculations assume some very loose ones, like 10-14.

BB: Are you saying even for the loose ones, even though they are very different they are folded into the whole sampling process.

PV: The loose are folded into the results you are seeing today, so it de-amplifies them.

MM The concern is the DCCA value for seal parameters, 40% of the time in the sample, had seals loose enough so that the shaft seals behave like a borehole. The first intrusion that hits through the waste and the brine pocket generates an E1E2 type event. But they are forgetting now we are not modeling the perfect plug. So we do not have an E1E2 event like we did in the past.

PV: True, and the distribution we used here had 40% the leaky seals.

MM: Right. That should be incorporated in FEP screening calculations, which is the way you have sampled it.

AL: A similar background question, does the change in baseline from back-fill to no back-fill have any estimate on room permeabilities. As I remember it we never took credit for backfill in room permeabilities. If that is true than the change in baseline from backfill to no-backfill have any impact on room permeability?

BB: With no backfill, there are differences, but they are small. What no-backfill really implies is you just wait a little longer for closure and then waste compresses to about the same state. The only impact is it takes a little longer for the waste to compress to the same state, say 10 years.

PV: A reminder, when we talk about screening out variable permeability, we are talking about screening it out dynamically within the BRAGFLO model. The CUTTINGS model will still use the permeability vs porosity factor.

FEP S-6: Dynamic Alteration of the Disturbed Rock Zone and Transition Zone (DRZ/TRZ Zones)
Presented by Bob MacKinnon (BM) with panel discussion following. Palmer Vaughn (PV) is lead investigator.
It was recommended this FEP be screened out of future calculations.

BM: These CCDFs show baseline and DRZ alteration model are closer than the previous FEPs we described. It appears this effect is insignificant. We coupled this model with the blowout model. It is also apparent the PM showed FEP S-6 has insignificant impact on PMs. Therefore, we recommend this FEP be screened out of CCA calculations.

AL: Does the FEP cover the full range of issues. I do not disagree with the conclusion, but my concern is it is not clear we will get gas pressures above lithostatic and is it coupled with the far field anhydrites. The other point concerns brine inflow as the DRZ heals. I think we can say by assuming high perms and low porosities we are being conservative about how much brine is coming in the room. I think this can be argued away with a short reasoned argument but we need to document it somewhere.

PV: Even with dynamic alternation, we get gas pressures in excess of lithostatic, on occasion, because, 1, we have capped the re-expansion of the waste disposal region. We do not allow it to expand even though there is some indication that it may expand. And ,2, we generate gas at a faster rate than it can be dissipated even with the fracturing going on, because we assume there is no increase in porosity, rather, a negligible increase. So on occasion, at high gas generation rates, we still get high pressures.

BM: The increase in permeability in DRZ and TRZ is only temporary. When you see the pressure gets high delta P is large enough that you get fracturing. Then you see the pressure wave moving out to the far field, there it drops. Then the permeability goes back down. Consequently, you see no additional brine inflow. You see a little increase in brine outflow to the marker beds, but as that pressure pulse dissipates there is no difference.

PV: The DRZ starts at an elevated permeability at the onset. Then it is elevated more as pressure rises, as the pressure dissipates DRZ perms go back down to the original value. When the fracturing is occurring the pressure gradient is moving outward , so that part of it does not impact brine inflow.

MC: Is the DRZ zone always the same geometry?

PV: Yes. We are only talking about the DRZ surrounding the excavations other than the shaft. There is a DRZ associated with the shaft that Joe's group is looking at. We assume the same thickness, we assign a fixed dimension to it, then vary the permeability/porosity of that region.

MC: Do you expect it to grow as gas pressure goes up?

PV: We assigned a size that we feel is adequate. It extends up to Marker Bed 138 which is about 8-10 meters; it's a big zone.

RA: I think we need to have Al Lappin and Palmer Vaughn get together and formulated a "reasoned argument" addressing the items Al has brought up. These should be included in the final FEP RP going into the SWCF.

Additional Comments

MM: I have one more question regarding the CCDF picture relative to those FEPs modeling dip. The E1 updip virtually overlies the E1 downdip. What is the status of including dip?

PV: We are going to include dip. If you look carefully at the E1 downdip CCDF consistently results in higher release; so we may be able to only model one of those configurations which would be the E1 the downdip.

MM: Doing both comes at high computational cost.

PV: Yes. Downdip bounds the release, and they both are so similar anyway, I think we can justify just going with the downdip configuration.

MM: Yes, this is important because we are discussing accelerating the schedule.

Section E - SOFTWARE

SOFTWARE

The computer programs used in the FEPs screening analyses, along with their software abstracts, are listed below. Complete software abstracts are on file in the WIPP Records Center. These computer programs are classified as follows.

Pre-processors: GENMESH, MATSET, PRELHS, LHS, ICSET, PREBRAG, GENNET

Analysis codes: BRAGFLO, NUTS, PANEL

Post-processors: POSTLHS, ALGEBRACBD, POSTBRAG, SUMMARIZE, CCDFCALC, CCDFPLOT, BLOTCDB, SPLAT

A copy of the Grade X code is available in the Records Center. Other codes have been archived by Department 6351, Computational Support, on the following tapes: F95074, F95080, F95654, F95714, F95738, and F95081.

GENMESH: (Version 6.04Z0, Version Date: 01/27/1992)

This program constructs BRAGFLO's Cartesian, rectangular two-dimensional finite-difference grid. In addition to establishing mesh connectivity and node coordinates, the program sets material regions, geometry flags for node or element boundary conditions, and element attributes associated with the cell size (e.g. elevations of elements).

MATSET: (Version 8.0720, Version Date: 02/01/1994)

MATSET sets material names to specified regions in BRAGFLO's finite-difference grid (e.g., defined by GENMESH), sets material property values, and sets attribute values into computational data base files. Property and attribute values are obtained from the property Secondary Data Base (median values read from PROP.SDB).

PRELHS: (Version 2.02Z0, Version Date: 02/01/1995)

The PRELHS translator is used to extract parameter distribution data from the secondary data base file, PROP.SDB, and sets up the L_atin H_ypercube S_ampler (LHS) program input file.

LHS: (Version 2.31Z0, Version Date: 08/13/1993)

The purpose of the LHS program is to sample distributions of input parameters using Latin Hypercube Sampling. LHS permits correlations (restricted pairings) between parameters.

POSTLHS: (Version 4.05Z0, Version Date: 02/16/94)

The POSTLHS translator replicates PRECAMDAT Nv times where Nv is number of sample vectors generated by LHS and inserts one distinct sample vector of the varied parameters from the output of LHS into each replication of CAMDAT. Identical parameters previously inserted into PRECAMDAT by MATSET are overwritten by POSTLHS.

ICSET: (Version: 2.11Z0, Version Date: 07/07/1994)

Sets analysis array variables: history, global, nodal, and element variable values, at the first time step (NSTEP=1) in a cdb file. A cdb file was generated for each vector. Analysis array names and values are obtained from a user supplied input file.

ALGEBRACDB: (Version 2.31Z0, Version Date: 11/15/1994)

ALGEBRACDB generates additional data (or removes unnecessary data) in CAMDAT by manipulating data already stored. With ALGEBRACDB, an analyst can generate pertinent data external to a program module by combining data already stored in the CAMDAT rather than modifying the program module and, thereby, invoking a new quality assessment of the module.

PREBRAG: (Version 4.00Z0, Version Date: 01/16/1995)

PREBRAG creates an input file for the BRAGFLO code by translating data from CAMDAT.

BRAGFLO: (Version 3.50Z0, Version Date: 06/03/1995) and (Version 3.61Z0, Version Date: 06/22/1994)

Note: Two different versions were used during the screening analysis, both versions have been archived on FEP archive tapes.

BRAGFLO is the two-phase (brine and gas) finite-difference program used to examine fluid flow within the Waste Isolation Pilot Plant (WIPP) repository site and surrounding formations.

POSTBRAG: (Version 3.03Z0, Version Date: 06/22/1994)

POSTBRAG places BRAGFLO output into CAMDAT. BRAGFLO output includes global mass balances (global variables) and any of 48 user-specified element variable distributions, including fluid pressures, phase saturations, Darcy velocities of each fluid phase in each (x,y,z) direction, interblock fluid flow rates of each fluid phase in each direction, reactant concentrations, physical properties (e.g., porosity and viscosity of each phase), and phase mass balances.

SUMMARIZE: (Version 2.00Z0, Version Date: 02/08/1995)

SUMMARIZE is used to read specified variable values from multiple CAMDAT data bases (one for each vector). The data may be read from a single time or multiple times. Some simple processing (such as interpolation or integration) of the data may be done. The data is then written to an output file in a format that is specified.

NUTS: (Version 1.02Z0, Version Date: 08/27/1995)

NUTS is finite-difference program that calculates the movement of radionuclides within the Waste Isolation Pilot Plant (WIPP) repository site. NUTS can be used to simulate the decay of multiple radioactive components during transport in three dimensions through fracture and matrix continua. Single-porosity, dual porosity, and dual-permeability simulations can be performed.

POSTNUTS: (Version 1.00Z0, Version Date: 02/09/1995)

POSTNUTS formats NUTS output for CAMDAT. This postprocessor outputs radionuclide concentrations, radionuclide fluxes, and associated input variables which include flow velocities, fluid saturations, and porosities.

GENNET: (Version 2.03Z0, Version Date: 02/01/1994)

GENNET constructs simple one-, two-, or three-dimensional networks using two-node elements from a user input file. In addition to establishing the mesh connectivity and node coordinates, the program sets: material regions, geometry flags for node or element boundary conditions, and cross-sectional areas of elements. All information is then stored in a computational data base file, ".CDB file".

PANEL: (Version 3.50Z0, Version Date: 06/12/1995)

PANEL reads input properties from a CAMDAT file and computes the distribution of the nuclides in the panel (ie,in orginal waste form, in colloidal form, or in solution). Then, when the panel is breached and brine flow starts, it outputs the cumlative mass released of the nuclides and the cumlative flow of the brine.

BLOTCDB: (Version 1.33Z0, Version Date 01/19/95)

The plotting support module, BLOTCDB plots all intermediate and final results from all main modules. BLOTCDB directly reads CAMDAT and plots (1) the computational mesh with contoured analysis results, (2) grid distance versus any variable, and/or (3) any variable versus any other variable.

SPLAT: (Version C-1.00VV, Version Date 10/04/93)

SPLAT is a general curve plotting utility and is used to plot intermediate and final results.

CCDFCALC: (Version 4.27Z0, Version Date: 02/30/1995)

CCDFCALC is used to calculate integrated release from CAMDAT files to be plotted by CCDFPLOT.

For each sample set and scenario, CCDFCALC accesses the appropriate CAMDAT file and integrates to find cumulative releases for each radionuclide. The cumulative releases are written to a transfer file used by CCDFPLOT.

CCDFPLOT: (Version 4.19Z0, Version Date: 02/23/1995)

CCDFPLOT plots a complementary cumulative distribution function of total integrated releases.

Source Listings

Not applicable

Section F - CALCULATIONS

CALCULATIONS

List of Parameters Required, Including Units

See Table 1 in **Section B** - ***Figures and Tabulated Results*** for this information.

Rationale for Selection of Models used in Calculations

There are two primary reasons why the computer models BRAGFLO, NUTS, and PANEL are used in the screening analyses presented herein. First, these models are the only ones available with the capabilities to evaluate the complex processes (borehole intrusion, two-phase flow, contaminant transport, interbed alteration, waste room consolidation, gas generation due to microbial degradation and corrosion, and multiple material maps) associated with each FEP issue, in a probabilistic framework. Second, these models are the models to be used in the Performance Assessment of the Waste Isolation Pilot Plant. Note that the overall objective of the screening analyses is to determine which FEPs need to be included in these models for the final compliance calculations.

Assumptions

The conceptualization of the repository/Salado/shaft is the same as that described in chapter 6 of the Draft CFR 191 Compliance Certification Application (DCCA).

Names of Analysts

The following analysts contributed to the analysis of FEPs DR2, DR3, DR6, DR7, and S6:

J. Bean, J. Garner, M. Lord, R. MacKinnon, D. McArthur, and A. Shinta

Dates Analysis Conducted

Calculations and analysis of results were conducted between June 21 and August 31, 1995.

Instructions from Lead Staff Member

Screening analyses are to be performed in accordance with the Planning Memos of Record for FEPs DR2, DR3, DR6, DR7, and S6.

Diagram of Data Flow Between Computer Codes

A listing of programs used in the FEPs screening analysis, the order they were implemented, and the data they receive and produce is provided in the subsequent section "List of Input and Output Files".

Description of Scenarios

Two basic scenarios were considered in the screening analysis, undisturbed performance and disturbed performance. Both scenarios included a 1.0 degree formation dip downward to the south. Intrusion event E1 is considered in the disturbed scenario and consists of a borehole that penetrates the repository and pressurized brine in the underlying Castille Formation. Two variations of intrusion event E1 are examined, E1 Up-Dip and E1 Down-Dip. In the E1 Up-Dip event the intruded panel region is located on the up-dip (north) end of the repository, whereas in the E1 Down-Dip event the intruded panel region is located on the down-dip (south) end of the repository. These two E1 events permit evaluation of the possiblity of increased brine flow into the panel region due to higher brine saturations down-dip and the potential for subsequent impacts on contaminant migration.

An important objective of the screening analyses presented herein is to determine if any of the FEPs listed above have the potential to enhance contaminant migration to the accessible environment. The potential pathways of concern for groundwater flow and radionuclide transport in the undisturbed and disturbed systems are summarized below.

Potential contaminant migration pathways in the undisturbed system are:

- Head gradients between the waste-disposal panels and overlying strata may cause brine and radionuclide migration from the waste-disposal panels to the base of the shaft and upwards through the shaft to the Culebra and ground surface. Migration to the base of the shaft may occur directly through the panel seals and access drifts or through the DRZ and anhydrite interbeds (MB139, MB138, and interbeds A+B). Migration up the shaft occurs through the shaft-seal system. Radionuclide transport to the accessible environment may occur via lateral migration through the Culebra.

- Migration from the waste-disposal panels laterally through the anhydrite interbeds towards the accessible environment.

Flow along these pathways are driven by elevated gas pressures in the waste resulting from gas generation in the waste-disposal panels and by elevated (above hydrostatic) in-situ fluid pressures resulting from consolidation of the excavation and surrounding rock.

Potential migration pathways in the disturbed scenario are:

- Radionuclides may be brought to the ground surface during drilling as particulate material dissolved or entrained in drilling fluid due to cavings, cuttings, spallings, and blowout.

- Radionuclides that are dissolved in brine may reach the accessible environment following long-term ground-water transport up the borehole and shaft to the ground surface or laterally down a potentiometric gradient in the Culebra.
  Contaminants transported as VOCs in the brine and gas phase are also an important consideration in the undisturbed scenario. The project position on gas-phase RCRA concerns is currently being evaluated. The assumption made in the present set of screening analyses is that the VOC source term has an insignificant impact on fluid flow and can be excluded from detailed consideration in the FEPs screening process. In

addition, bounding calculations show that the VOC source term concentrations, when converted to soil concentrations, will not exceed RCRA soil-based limits for VOCs. If the project determines at a later time that an elevated gas-phase VOC source term is potentially important, the FEPs discussed herein may need to be reevaluated to assess their impact on gas-phase VOC transport. The assumption used for modeling heavy metal constituents is that their migration behavior is analogous to that of the long-lived radionuclides and therefore can be examined by direct comparison to the radionuclide results.

Performance Measures

Several key performance measures were used to evaluate the sensitivity of the primary migration pathways outlined above to each FEP, these measures include:

- Conditional complementary cumulative distribution functions (CCDFs) of normalized contaminated brine releases to the Culebra via human intrusion and shaft system as well as releases within the marker beds to the subsurface boundary of the accessible environment.
- Blowout related performance measures including volume averaged pressures and brine saturations in the waste disposal area at times 100, 1000, and 10000 years.

Model Geometry

Two geometries are used in the BRAGFLO screening calculations with three different sets of material properties, one set for undisturbed conditions and two sets for disturbed conditions. The geometries and material sets represent a three-dimensional system in a two-dimensional plane that cuts vertically through the repository. Side views of the geometry for the undisturbed, E1 Up-Dip, and E0 Down-Dip configurations and their respective material sets are given in Figures 1 - 3 in Section 1. The E1 Down-Dip geometry and material set is similar to the E1 Up-Dip configuration, except that the intruding borehole and waste panel locations are rotated 180 degrees about the centerline of the repository so that the intruded panel is on the down-dip side of the repository (to the left, south). Additional details on the model geometries are provided in the Draft Compliance Certification Application (DCCA), July Update, July 21,1995.

Boundary and Initial Conditions

Boundary and initial conditions in the undisturbed and disturbed scenarios are identical. Boundary conditions included no flow in the normal directions across all far-field boundaries except at the lateral boundaries of the Culebra and Magenta units, and at the ground surface. At the lateral boundaries of the Culebra an initial pressure of 0.852 MPa and a water saturation of 1.0 was held constant throughout the simulations. Similarly, the pressures and water saturations at the lateral boundaries of the Magenta were held fixed at 0.9 MPa and 1.0, respectively. At the ground surface, pressure was maintained at an atmospheric pressure of 1.01325 MPa. The water table was located at a depth of 59 meters below the ground surface.

As in the DCCA calculations, an initial simulation period and set of initial conditions were specified which account for the impact that the time period between excavation and sealing of the panels will have on fluid saturations and pressures in the formations surrounding the repository. This time period is modeled explicitly and is assumed to last 5 years beginning at time -5 years (the time of initial excavation). The initial conditions during this period are as follows.

- Except for the waste and excavated regions, the formations above the Salado, and the Castile formation, the pressure distribution at 5 yr before time zero is hydrostatic relative to the pore pressure of MB139. The brine pressure in MB139 is treated as an uncertain variable and is sampled from a range of 12 to 13 MPa.
- Pressure in the waste and excavated regions is set to atmospheric pressure at 5 yr before time zero.
- Except for the Culebra and Magenta units and the region above the water table, the pressure distribution in the Rustler formation at 5 yr before time zero is hydrostatic relative to the ground-water table.
- Water pressure in the Culebra at 5 yr before time zero is 0.852 MPa, and the far-field pressure is held at that value over the 10000 yr calculation.
- Water pressure in the Magenta at 5 yr before time zero is 0.90 MPa, and the far-field pressure is held at that value over the 10000 yr calculation.
- Water pressure in the region above the water table (upper 59 meter) is set to atmospheric pressure at 5 yr before time zero.
- Pressure in the Castile brine reservoir at 5 yr before time zero is 12.7 MPa.
- The initial brine saturation is 1.0 everyhere except in the waste and excavated regions (where brine saturation is 0.0), and in the region above the water table (where brine saturation is at residual equal to 0.20).
- Initial brine saturations within the disposal room, shaft, and experimental area are 0.028, 0.25, and 0.0.

Description of Calculations

During the initial conditions calculation, the permeability of the units overlying the Salado is set to zero to prevent water from flowing down the shaft during the waste emplacement period. In addition, the permeability of excavated regions is set to a high value (1.0×10^{-10} m^2) to represent cavities. Performance calculations begin at time zero (5 years after the initial calculation). At time zero, the pressure in the waste region is reset from its calculated value to atmospheric pressure. Brine saturations are reset within the disposal room, shaft, and experimental area to 0.028, 0.25, and 0.0, respectively. Initial brine saturation in the waste is treated as an uncertain variable and is reset to its sampled value, which ranges from 0.006 to 0.051 In all other excavated regions, the gas saturation is set to 1.0, and the pressure is reset to atmospheric pressure. Panel seals, backfill, and lower and upper shaft seals are also emplaced at time zero and these regions take on their corresponding permeabilities and porosities. Panel seals are assigned a high permeability of 1.0×10^{-12} m^2 to minimize their effectiveness. For the first 100 yrs, the upper shaft seal permeability is sampled from the seals permeability distribution curve and permeability of the lower seal is assumed to be 1.0×10^{-12} m^2. Calculations continue to time 100 yr, at which time the permeabilitites of the lower and upper shaft seals are reset so that the lower seal permeability is assigned sampled values from the upper seal permeability distribution and the upper seal permeability is set to 1.0×10^{-12} m^2. This treatment of seal permeabilities reflects that the short term component (upper seal) permeability increases with time and that the long-term component (lower seal) permeability decreases with time. In the undisturbed scenario, performance calculations continue unchanged to 10000 yr. In the human intrusion events, E1 Up-Dip and E1 Down-Dip, a borehole penetrates the repository and an underlying brine pocket at 1000 yr. Further details on property values of the various components can be found in Draft Compliance Certification Application, July Update, July 21, 1995.

BRAGFLO calculates the brine and gas flow fields in the disposal system. These flow fields are used in the computer code NUTS to estimate radionuclide releases to the accessible environment. NUTS uses the same model geometry as BRAGFLO and calculations are performed as follows. A tracer element is assumed to have an infinite inventory in each computational waste cell and a solubility of 1Kg/m^3. Tracer concentrations throughout the problem domain, exclusive of the waste region, are initially zero. Far-field boundary fluxes are maintained at zero. Decay and sorption processes are neglected. Using the brine flow velocities reported from BRAGFLO, NUTs calculates the transport of the tracer to the Culebra and subsurface boundary of the accessible environment. Since the tracer element has solubility of 1 Kg/m^3, each Kg of contaminated brine reaching these locations is equivalent to 1 m^3 of repository brine.

The volumes of contaminated brine calculated by NUTs are used directly by the computer code PANEL to estimate the amounts of the various radionuclides (dissolved and colloidal) that are released to the Culebra and subsurface boundary. These estimates are based on the conservative assumption that the volumes of contaminated brine passing these locations flows directly through the disposal room and is transported instantaneously to the Culebra and subsurface boundary. Radionuclide decay and inventory solubility limits are accounted for in PANEL.

Table 1 in Section 1 summarizes the uncertain variables that were sampled in the screening calculations. The range and median values of the actual sampling are listed. A Latin hypercube sample of size of 20 was used to incorporate the effects of uncertainty. This sample size was selected as the best compromise between providing sufficient data for screening purposes versus schedule and resource constraints.

List of Input and Output Files

The following directories and files have been archived on tape numbers F95881, F95882, F95883, F95884, F95885, F95886, F95074, F95080, F95054, F95714, F95738, F95081.

The programs used in the FEPs screening analysis are listed below in the order they were implemented. The input files listed under each program name are the files provided for program execution and the output files represent the resulting files. The directories where the various files reside are also noted.

The following symbolic notation is used to denote FEP files.

DRZ:	Screening Issue S6
WICK:	Screening Issue DR-2
VPC:	Screening Issue DR-7
MCS:	Screening Issue DR-3
PUD:	Screening Issue DR-6
Base:	Baseline Model

GENMESH:	Version 6.00Z0, Version Date 01/27/1992
Directory:	F2:[FEP.JEBEAN.BASELINE.GENMESH]
Input file:	GENMESH.INP
Output files:	GENMESH_1.CDB (UNDISTURBED AND E01_UP scenarios)
	GENMESH_2.CDB (E01_DOWN scenario)
MATSET:	Version 8.07Z0, Version Date 02/01/1994
Directory:	F2:[FEP.JEBEAN.BASELINE.MATSET]
Input files:	MATSET_NEW.INP
	GENMESH_1.CDB (UNDISTURBED AND E01_UP scenarios)
	GENMESH_2.CDB (E01_DOWN scenario)
Output files:	MATSET.CDB
	MATSET_DOWN.CDB
PRELHS:	Version 2.02Z0, Version Date 02/01/1995
Directory:	F2:[FEP.JEBEAN.BASELINE.LHS]
Input file:	PRELHS_FEPS_BASELINE.INP
Output file:	LHS_FEPS_BASELINE.INP
LHS:	Version 2.31Z0, Version Date 08/13/1993
Directory:	F2:[FEP.JEBEAN.BASELINE.LHS]
Input files:	LHS_FEPS_BASELINE.INP
Output file:	SMPLHS_FEPS_BASELINE.OUT (UNDISTURBED AND E01_UP scenarios)
	SMPLHS_FEPS_BASELINE_DOWN.OUT (E01_DOWN scenario)
POSTLHS:	Version 4.05Z0, Version Date 02/16/1994
Directory:	F2:[FEP.JEBEAN.BASELINE.LHS]
Input files:	POSTLHS.INP
	MATSET.CDB (UNDISTURBED AND E01_UP scenarios)
	MATSET_DOWN.CDB (E01_DOWN scenario)
	SMPLHS_FEPS_BASELINE.OUT (UNDISTURBED AND E01_UP scenarios)
	SMPLHS_FEPS_BASELINE_DOWN.OUT (E01_DOWN scenario)
Output files:	POSTLHS_FEPS_BASELINE_R0##.CDB
	POSTLHS_FEPS_BASELINE_DOWN_R0##.CDB

range from 01 to 20

ICSET: Version 2.11Z0, Version Date 07/07/1994

Directory: F2:[FEP.JEBEAN.BASELINE.ICSET]
Input file: ICSET.INP (UNDISTURBED AND E01_UP scenarios)
ICSET_DOWN.INP (E01_DOWN scenario)
POSTLHS_FEPS_BASELINE_R0##.CDB
POSTLHS_FEPS_BASELINE_DOWN_R0##.CDB
Output files: ICSET_R0##.CDB
ICSET_DOWN_R0##.CDB

range from 01 to 20

ALGEBRACDB: Version 2.31Z0, Version Date 11/15/1994

Directory: F2:[FEP.JEBEAN.BASELINE.ALGEBRA]
Input files: ALGEBRA_NEW.INP
ICSET_R0##.CDB
ICSET_DOWN_R0##.CDB
Output files: ALGEBRA_R0##.CDB
ALGEBRA_DOWN_R0##.CDB

range from 01 to 20

PREBRAG: Version 4.00Z0, Version Date 01/16/1995

Directory and Input files: F2:[FEP.JEBEAN.BASELINE.PREBRAG]
PREBRAG_UND.INP (UNDISTURBED scenario)
PREBRAG_E01.INP (E01_UP scenario)
PREBRAG_E01_DOWN.INP (E01_DOWN scenario)
Directories and Output files: F2:[FEP.JEBEAN.%%.BRAGFLO]B_FEP_&&_$$_R0##.INP

The symbols denote:
%% = BASELINE, DRZ, VPC, MCS, PUD, WICK
&& = BASE, DRZ, VPC, MCS, PUD, WICK
$$ = UNDIST, E01_UP, E01_DOWN
= 01, 02, ..., 20

BRAGFLO: File Name B1.EXE;56, see directory F2:[fep.dataexec.bragex]

Executable: U1:[JDSCHRE.BRAGFLO.FEP]B1.EXE
Input file: F2:[FEP.JEBEAN.%%]B_FEP_&&_$$_R0##.INP
Output file: F2:[FEP.%%.$$]B_FEP_&&_$$_R0##.BIN

The symbols denote:
%% = BASELINE, DRZ, VPC, MCS, PUD, WICK
&& = BASE, DRZ, VPC, MCS, PUD, WICK
$$ = UNDIST, E01_UP, E01_DOWN
= 01, 02, ..., 20

POSTBRAG: Version 3.03Z0, Version Date 06/22/1994

Directories and
Input files: F2:[FEP.JEBEAN.BASELINE.ALGEBRA]ALGEBRA_R0##.CDB
F2:[FEP.JEBEAN.BASELINE.ALGEBRA]ALGEBRA_DOWN_R0##.CDB
F2:[FEP.%%.$$]B_FEP_&&_$$_R0##.BIN

Directories and
Output files: F2:[FEP.%%.$$]B_FEP_&&_$$_R0##.CDB

The symbols denote:
%% = BASELINE, DRZ, VPC, MCS, PUD, WICK
&& = BASE, DRZ, VPC, MCS, PUD, WICK
$$ = UNDIST, E01_UP, E01_DOWN
= 01, 02, ..., 20

ALGEBRACDB: Version 2.31Z0, Version Date 11/15/1994

Directories and
Input files: F1:[FEP.%%.$$]POST_ALG_$$.INP
F2:[FEP.%%.$$]B_FEP_&&_$$_R0##.CDB

Directories and
Output files: F1:[FEP.%%.$$]B_FEP0J_&&_$$_R0##.CDB

The symbols denote:
%% = BASELINE, DRZ, VPC, MCS, PUD, WICK
&& = BASE, DRZ, VPC, MCS, PUD, RAD, WICK
$$ = UNDIST, E01_UP, E01_DOWN
J = 1 (BASELINE), 2 (DRZ), 3 (MCS), 4 (PUD), 6 (VPC), 7 (WICK)
= 01, 02, ..., 20

SUMMARIZE: Version 2.00Z0, Version Date 02/08/1995

Directories and
Input files: F1:[FEP.%%.$$]B_FEP0J_&&_$$_R0##.CDB
F1:[FEP.%%.$$]FEP0J_&&_$$.SMZ

Directories and
Output files: F1:[FEP.POSTPROC.$$]FEP0J_&&_VAR.TBL

The symbols denote:
%% = BASELINE, DRZ, VPC, MCS, PUD, WICK
&& = BASE, DRZ, VPC, MCS, PUD, WICK
$$ = UNDIST, E01_UP, E01_DOWN
J = 1 (BASELINE), 2 (DRZ), 3 (MCS), 4 (PUD), 6 (VPC), 7 (WICK)
= 01, 02, ..., 20

NUTS: Version: 1.02Z0, Version Date: 08/27/1995

Directory: F1:[FEP.AASHINT.SP.SIDEBAR.&&.$$]
Input Files: F2:[FEP.%%.$$] B_FEP_&&_$$_R0##.BIN
F2:[FEP.%%.$$] B_FEP_&&_$$_R0##.INP
E01SIDE.IN
UNDSIDE.IN
Output Files: NUTS_FEP_&&_$$_R0##.BIN

The symbols denote:

%% = BASELINE, DRZ, VPC, MCS, PUD, WICK
&& = BASE, DRZ, VPC, MCS, PUD, WICK
$$ = UND, E01_UP, E01_DOWN
= 01, 02, ..., 20

POSTNUTS: Version 1.00Zo, Version Date 02/09/1995

Directory: F1:[FEP.AASHINT.SP.SIDEBAR.&&.$$]
Input Files: F2:[FEP.%%.$$] NUTS_FEP_&&_$$_R0##.BIN
ALGEBRA_NEW_R0##.CDB
ALGEBRA_DOWN_R0##.CDB
ALGEBRA_R0##.CDB
E01SIDE.IN
UNDSIDE.IN
Output Files: NUTS_FEP_&&_$$_R0##.CDB

The symbols denote:

%% = BASELINE, DRZ, VPC, MCS, PUD, WICK
&& = BASE, DRZ, VPC, MCS, PUD, WICK
$$ = UND, E01_UP, E01_DOWN
= 01, 02, ..., 20

GENNET: Version 2.03Z0, Version Date 02/01/1994

Directory: F2:[FEP.GARNER]
Input file: GENNET_S00.INP
Output file: GENNET_S00.CDB

MATSET: Version 8.0720, Version Date 02/01/1994

Directory: F2:[FEP.GARNER]
Input file: MATSET_S00.INP
GENNET_S00.CDB
Output file: MATSET_S00.CDB

POSTLHS: Version 4.05Z0, Version Date 02/16/1994

Directory: F2:[FEP.GARNER]
Input files: POSTLHS_S00.INP
MATSET_S00.INP
SMPLHS_FEPS_BASELINE.OUT
Output: LHS_S00_SR0##.CDB

range from 01 to 20

PANEL: Version 3.50Z0, Version Date 06/12/1995

Directory: F2:[FEP.GARNER.&&.$$]
Input files: F2:[FEP.GARNER] LHS_S00_SR0##.CDB
F2:[FEP.GARNER.&&.BRAGFLO] NUTS_S00_01_020.CDB
F2:[FEP.GARNER.&&.BRAGFLO] NUTS_S00_01_020.CDB
F2:[FEP.GARNER.&&.BRAGFLO] NUTS_S00_01_020.CDB

Output Files: PANEL_S00_S_R0##.CDB
PANEL_S01_S_R0##.CDB
PANEL_S01D_S_R0##.CDB

&& = Base, DRZ, MCS, PUD, VPC, WICK
$$ = PANEL_CUL, PANEL_MB, Bragflo
range from 01 to 20

CCDFCALC: Version 4.27Z0, Version Date 02/30/1995

Directory: F2:[FEP.GARNER.&&.$$.CCDF]
Input files: CCDFCALC_E0.INP;
CCDFCALC_E1.INP;
CCDFCALC_E1D.INP;

Output files: PANOUT_E0.OUT
PANOUT_E1.OUT
PANOUT_E1D.OUT
PANOUT_E0.TRN
PANOUT_E1.TRN
PANOUT_E1D.TRN

&& = DRZ, MCS, PUD, VPC, WICK
$$ = BRAGFLO, PANEL_CUL, PANEL_MB

CCDFPLOT: Version 4.19Z0, Version Date 02/23/1995

Directory: F2:[FEP.GARNER]
Input files: CCDFPLOT_E1D.INP;
CCDFPLOT_E1.INP;
CCDFPLOT_E0.INP;
CCDFPLOT_MBE1D.INP;
CCDFPLOT_MBE1.INP;
CCDFPLOT_MBE0.INP;
Output files:
*.PST and renamed PLOT.##

SPLAT:

Directory: F1:[FEP.POSTPROC.$$]FEP0J_&&_$$.TBL
Input files: F1:[FEP.POSTPROC.UNDIST]BRNBM39C_SPLAT.CMD;5,
BRNMB38C_SPLAT.CMD:7, MXGASMOL_SPLAT.CMD;7

Output files: Output SPLAT files were not archived since these files were graphical representations of the archived *.TBL files.

BLOTCDB:

Directory: F1:[FEP.%%.$$]B_FEP0J_&&_$$_R0##.CDB
Input files:

Output files: Output BLOTCDB files were not archived since these files were generated interactively and are graphical representations of the archived *.CDB files.

The symbols denote:
%% = BASELINE, DRZ, VPC, MCS, PUD, WICK
&& = BASE, DRZ, BPC, MCS, PUD, WICK
$$ = UNDIST, E01_UP, E01_DOWN
J = 1 (BASELINE), 2 (DRZ), 3 (MCS), A4 (PUD), 6 (VPC), 7 (WICK)
= 01, 02, ...,20

The listing of directories and files used in the FEP screening analyses are given in Section 3. Plots, tables, and figure documenting results are presented in Section 1.

Section G - INPUT DATA SET

All material properties were obtained from the baseline database prop.sdb. The database file is in directory [dataexec.database]. The baseline data is the same data described in chapter 6 of the Draft 40 CFR 191 Compliance Certification Application (DCCA). Input data sets for the screening calculations were generated in step-wise fashion using GENMESH, MATSET, PRELHS, LHS, POSTLHS, ICSET, ALGEBRACDB, and PREBRAG. These codes are described in the foregoing SOFTWARE section. Corresponding input and output files are listed in a subsequent Input and Output section.

All data sets used in the FEPs calculations were based on the baseline data set. Differences between each FEP data set and the baseline data set were comprised only of those data required to invoke the particular FEP in the calculations.

Section H - DIRECTORIES and FILES USED in the FEPS SCREENING ANALYSIS

Directory F2:[FEP.DATAEXEC]

BRAGEX.DIR;1 DATABASE.DIR;1

Directory F2:[FEP.DATAEXEC.BRAGEX]

B1.EXE;56 BF2_BRAGFLO.EXE;1 BF2_BRAGFLO.FOR;1 BF2_PARAMS.INC;1
NUTSSP2F.EXE;11 NUTSSP2F.FOR;12

Directory F2:[FEP.DATAEXEC.DATABASE]

PROP.SDB;4

Directory F2:[FEP.INPUT]

B_FEP_BASELINE_E01_DOWN_R001.INP;1 B_FEP_BASELINE_E01_DOWN_R002.INP;1
B_FEP_BASELINE_E01_DOWN_R003.INP;1 B_FEP_BASELINE_E01_DOWN_R004.INP;1
B_FEP_BASELINE_E01_DOWN_R005.INP;1 B_FEP_BASELINE_E01_DOWN_R006.INP;1
B_FEP_BASELINE_E01_DOWN_R007.INP;1 B_FEP_BASELINE_E01_DOWN_R008.INP;1
B_FEP_BASELINE_E01_DOWN_R009.INP;1 B_FEP_BASELINE_E01_DOWN_R010.INP;1
B_FEP_BASELINE_E01_DOWN_R011.INP;1 B_FEP_BASELINE_E01_DOWN_R012.INP;1
B_FEP_BASELINE_E01_DOWN_R013.INP;1 B_FEP_BASELINE_E01_DOWN_R014.INP;1
B_FEP_BASELINE_E01_DOWN_R015.INP;1 B_FEP_BASELINE_E01_DOWN_R016.INP;1
B_FEP_BASELINE_E01_DOWN_R017.INP;1 B_FEP_BASELINE_E01_DOWN_R018.INP;1
B_FEP_BASELINE_E01_DOWN_R019.INP;1 B_FEP_BASELINE_E01_DOWN_R020.INP;1
B_FEP_BASE_E01_UP_R001.INP;1 B_FEP_BASE_E01_UP_R002.INP;1
B_FEP_BASE_E01_UP_R003.INP;1 B_FEP_BASE_E01_UP_R004.INP;1
B_FEP_BASE_E01_UP_R005.INP;2 B_FEP_BASE_E01_UP_R006.INP;1
B_FEP_BASE_E01_UP_R007.INP;2 B_FEP_BASE_E01_UP_R008.INP;1
B_FEP_BASE_E01_UP_R009.INP;1 B_FEP_BASE_E01_UP_R010.INP;1
B_FEP_BASE_E01_UP_R011.INP;1 B_FEP_BASE_E01_UP_R012.INP;1
B_FEP_BASE_E01_UP_R013.INP;1 B_FEP_BASE_E01_UP_R014.INP;1
B_FEP_BASE_E01_UP_R015.INP;1 B_FEP_BASE_E01_UP_R016.INP;1
B_FEP_BASE_E01_UP_R017.INP;1 B_FEP_BASE_E01_UP_R018.INP;1
B_FEP_BASE_E01_UP_R019.INP;1 B_FEP_BASE_E01_UP_R020.INP;1
B_FEP_BASE_UND_R001.INP;4 B_FEP_BASE_UND_R002.INP;2
B_FEP_BASE_UND_R003.INP;2 B_FEP_BASE_UND_R004.INP;2
B_FEP_BASE_UND_R005.INP;2 B_FEP_BASE_UND_R006.INP;2
B_FEP_BASE_UND_R007.INP;4 B_FEP_BASE_UND_R008.INP;2
B_FEP_BASE_UND_R009.INP;2 B_FEP_BASE_UND_R010.INP;2
B_FEP_BASE_UND_R011.INP;2 B_FEP_BASE_UND_R012.INP;2
B_FEP_BASE_UND_R013.INP;2 B_FEP_BASE_UND_R014.INP;2
B_FEP_BASE_UND_R015.INP;2 B_FEP_BASE_UND_R016.INP;2
B_FEP_BASE_UND_R017.INP;2 B_FEP_BASE_UND_R018.INP;2
B_FEP_BASE_UND_R019.INP;2 B_FEP_BASE_UND_R020.INP;2

B_FEP_DRZ_E01_DOWN_R001.INP;1
B_FEP_DRZ_E01_DOWN_R002.INP;1
B_FEP_DRZ_E01_DOWN_R003.INP;1
B_FEP_DRZ_E01_DOWN_R004.INP;1
B_FEP_DRZ_E01_DOWN_R005.INP;1
B_FEP_DRZ_E01_DOWN_R006.INP;1
B_FEP_DRZ_E01_DOWN_R007.INP;1
B_FEP_DRZ_E01_DOWN_R008.INP;1
B_FEP_DRZ_E01_DOWN_R009.INP;1
B_FEP_DRZ_E01_DOWN_R010.INP;1
B_FEP_DRZ_E01_DOWN_R011.INP;1
B_FEP_DRZ_E01_DOWN_R012.INP;1
B_FEP_DRZ_E01_DOWN_R013.INP;1
B_FEP_DRZ_E01_DOWN_R014.INP;1
B_FEP_DRZ_E01_DOWN_R015.INP;1
B_FEP_DRZ_E01_DOWN_R016.INP;1
B_FEP_DRZ_E01_DOWN_R017.INP;1
B_FEP_DRZ_E01_DOWN_R018.INP;1
B_FEP_DRZ_E01_DOWN_R019.INP;1
B_FEP_DRZ_E01_DOWN_R020.INP;1
B_FEP_DRZ_E01_UP_R001.INP;1
B_FEP_DRZ_E01_UP_R002.INP;1
B_FEP_DRZ_E01_UP_R003.INP;1
B_FEP_DRZ_E01_UP_R004.INP;1
B_FEP_DRZ_E01_UP_R005.INP;1
B_FEP_DRZ_E01_UP_R006.INP;1
B_FEP_DRZ_E01_UP_R007.INP;1
B_FEP_DRZ_E01_UP_R008.INP;1
B_FEP_DRZ_E01_UP_R009.INP;1
B_FEP_DRZ_E01_UP_R010.INP;1
B_FEP_DRZ_E01_UP_R011.INP;1
B_FEP_DRZ_E01_UP_R012.INP;1
B_FEP_DRZ_E01_UP_R013.INP;1
B_FEP_DRZ_E01_UP_R014.INP;1
B_FEP_DRZ_E01_UP_R015.INP;1
B_FEP_DRZ_E01_UP_R016.INP;1
B_FEP_DRZ_E01_UP_R017.INP;1
B_FEP_DRZ_E01_UP_R018.INP;1
B_FEP_DRZ_E01_UP_R019.INP;1
B_FEP_DRZ_E01_UP_R020.INP;1
B_FEP_DRZ_UND_R001.INP;1
B_FEP_DRZ_UND_R002.INP;1
B_FEP_DRZ_UND_R003.INP;1
B_FEP_DRZ_UND_R004.INP;1
B_FEP_DRZ_UND_R005.INP;1
B_FEP_DRZ_UND_R006.INP;1
B_FEP_DRZ_UND_R007.INP;1
B_FEP_DRZ_UND_R008.INP;1
B_FEP_DRZ_UND_R009.INP;1
B_FEP_DRZ_UND_R010.INP;1
B_FEP_DRZ_UND_R011.INP;1
B_FEP_DRZ_UND_R012.INP;1
B_FEP_DRZ_UND_R013.INP;1
B_FEP_DRZ_UND_R014.INP;1
B_FEP_DRZ_UND_R015.INP;1
B_FEP_DRZ_UND_R016.INP;1
B_FEP_DRZ_UND_R017.INP;1
B_FEP_DRZ_UND_R018.INP;1
B_FEP_DRZ_UND_R019.INP;1
B_FEP_DRZ_UND_R020.INP;1
B_FEP_MCS_E01_DOWN_R001.INP;1
B_FEP_MCS_E01_DOWN_R002.INP;1
B_FEP_MCS_E01_DOWN_R003.INP;1
B_FEP_MCS_E01_DOWN_R004.INP;1
B_FEP_MCS_E01_DOWN_R005.INP;1
B_FEP_MCS_E01_DOWN_R006.INP;1
B_FEP_MCS_E01_DOWN_R007.INP;1
B_FEP_MCS_E01_DOWN_R008.INP;1
B_FEP_MCS_E01_DOWN_R009.INP;1
B_FEP_MCS_E01_DOWN_R010.INP;1
B_FEP_MCS_E01_DOWN_R011.INP;1
B_FEP_MCS_E01_DOWN_R012.INP;1
B_FEP_MCS_E01_DOWN_R013.INP;1
B_FEP_MCS_E01_DOWN_R014.INP;1
B_FEP_MCS_E01_DOWN_R015.INP;1
B_FEP_MCS_E01_DOWN_R016.INP;1
B_FEP_MCS_E01_DOWN_R017.INP;1
B_FEP_MCS_E01_DOWN_R018.INP;1
B_FEP_MCS_E01_DOWN_R019.INP;1
B_FEP_MCS_E01_DOWN_R020.INP;1
B_FEP_MCS_E01_UP_R001.INP;1
B_FEP_MCS_E01_UP_R002.INP;1
B_FEP_MCS_E01_UP_R003.INP;1
B_FEP_MCS_E01_UP_R004.INP;1
B_FEP_MCS_E01_UP_R005.INP;1
B_FEP_MCS_E01_UP_R006.INP;1
B_FEP_MCS_E01_UP_R007.INP;1
B_FEP_MCS_E01_UP_R008.INP;1
B_FEP_MCS_E01_UP_R009.INP;1
B_FEP_MCS_E01_UP_R010.INP;1
B_FEP_MCS_E01_UP_R011.INP;1
B_FEP_MCS_E01_UP_R012.INP;1
B_FEP_MCS_E01_UP_R013.INP;1
B_FEP_MCS_E01_UP_R014.INP;1
B_FEP_MCS_E01_UP_R015.INP;1
B_FEP_MCS_E01_UP_R016.INP;1
B_FEP_MCS_E01_UP_R017.INP;1
B_FEP_MCS_E01_UP_R018.INP;1
B_FEP_MCS_E01_UP_R019.INP;1
B_FEP_MCS_E01_UP_R020.INP;1

B_FEP_MCS_UND_R001.INP;1
B_FEP_MCS_UND_R003.INP;1
B_FEP_MCS_UND_R005.INP;1
B_FEP_MCS_UND_R007.INP;1
B_FEP_MCS_UND_R009.INP;1
B_FEP_MCS_UND_R011.INP;1
B_FEP_MCS_UND_R013.INP;1
B_FEP_MCS_UND_R015.INP;1
B_FEP_MCS_UND_R017.INP;1
B_FEP_MCS_UND_R019.INP;1
B_FEP_PUD_E01_DOWN_R001.INP;1
B_FEP_PUD_E01_DOWN_R003.INP;1
B_FEP_PUD_E01_DOWN_R005.INP;1
B_FEP_PUD_E01_DOWN_R007.INP;1
B_FEP_PUD_E01_DOWN_R009.INP;1
B_FEP_PUD_E01_DOWN_R011.INP;1
B_FEP_PUD_E01_DOWN_R013.INP;1
B_FEP_PUD_E01_DOWN_R015.INP;1
B_FEP_PUD_E01_DOWN_R017.INP;1
B_FEP_PUD_E01_DOWN_R019.INP;1
B_FEP_PUD_E01_UP_R001.INP;1
B_FEP_PUD_E01_UP_R003.INP;1
B_FEP_PUD_E01_UP_R005.INP;2
B_FEP_PUD_E01_UP_R006.INP;1
B_FEP_PUD_E01_UP_R007.INP;1
B_FEP_PUD_E01_UP_R009.INP;1
B_FEP_PUD_E01_UP_R011.INP;1
B_FEP_PUD_E01_UP_R013.INP;1
B_FEP_PUD_E01_UP_R015.INP;1
B_FEP_PUD_E01_UP_R017.INP;1
B_FEP_PUD_E01_UP_R019.INP;1
B_FEP_PUD_UND_R001.INP;1
B_FEP_PUD_UND_R003.INP;1
B_FEP_PUD_UND_R005.INP;1
B_FEP_PUD_UND_R007.INP;2
B_FEP_PUD_UND_R008.INP;1
B_FEP_PUD_UND_R010.INP;1
B_FEP_PUD_UND_R012.INP;1
B_FEP_PUD_UND_R014.INP;1
B_FEP_PUD_UND_R016.INP;1
B_FEP_PUD_UND_R018.INP;1
B_FEP_PUD_UND_R020.INP;1
B_FEP_VPC_E01_DOWN_R002.INP;1
B_FEP_VPC_E01_DOWN_R004.INP;1
B_FEP_VPC_E01_DOWN_R006.INP;1
B_FEP_VPC_E01_DOWN_R008.INP;1
B_FEP_VPC_E01_DOWN_R010.INP;1
B_FEP_VPC_E01_DOWN_R012.INP;1

B_FEP_MCS_UND_R002.INP;1
B_FEP_MCS_UND_R004.INP;1
B_FEP_MCS_UND_R006.INP;1
B_FEP_MCS_UND_R008.INP;1
B_FEP_MCS_UND_R010.INP;1
B_FEP_MCS_UND_R012.INP;1
B_FEP_MCS_UND_R014.INP;1
B_FEP_MCS_UND_R016.INP;1
B_FEP_MCS_UND_R018.INP;1
B_FEP_MCS_UND_R020.INP;1
B_FEP_PUD_E01_DOWN_R002.INP;1
B_FEP_PUD_E01_DOWN_R004.INP;1
B_FEP_PUD_E01_DOWN_R006.INP;1
B_FEP_PUD_E01_DOWN_R008.INP;1
B_FEP_PUD_E01_DOWN_R010.INP;1
B_FEP_PUD_E01_DOWN_R012.INP;1
B_FEP_PUD_E01_DOWN_R014.INP;1
B_FEP_PUD_E01_DOWN_R016.INP;1
B_FEP_PUD_E01_DOWN_R018.INP;1
B_FEP_PUD_E01_DOWN_R020.INP;1
B_FEP_PUD_E01_UP_R002.INP;1
B_FEP_PUD_E01_UP_R004.INP;1
B_FEP_PUD_E01_UP_R005.INP;1
B_FEP_PUD_E01_UP_R007.INP;2
B_FEP_PUD_E01_UP_R008.INP;1
B_FEP_PUD_E01_UP_R010.INP;1
B_FEP_PUD_E01_UP_R012.INP;1
B_FEP_PUD_E01_UP_R014.INP;1
B_FEP_PUD_E01_UP_R016.INP;1
B_FEP_PUD_E01_UP_R018.INP;1
B_FEP_PUD_E01_UP_R020.INP;1
B_FEP_PUD_UND_R002.INP;1
B_FEP_PUD_UND_R004.INP;1
B_FEP_PUD_UND_R006.INP;1
B_FEP_PUD_UND_R007.INP;1
B_FEP_PUD_UND_R009.INP;1
B_FEP_PUD_UND_R011.INP;1
B_FEP_PUD_UND_R013.INP;1
B_FEP_PUD_UND_R015.INP;1
B_FEP_PUD_UND_R017.INP;1
B_FEP_PUD_UND_R019.INP;1
B_FEP_VPC_E01_DOWN_R001.INP;1
B_FEP_VPC_E01_DOWN_R003.INP;1
B_FEP_VPC_E01_DOWN_R005.INP;2
B_FEP_VPC_E01_DOWN_R007.INP;1
B_FEP_VPC_E01_DOWN_R009.INP;2
B_FEP_VPC_E01_DOWN_R011.INP;2
B_FEP_VPC_E01_DOWN_R013.INP;1

B_FEP_VPC_E01_DOWN_R014.INP;1
B_FEP_VPC_E01_DOWN_R015.INP;1
B_FEP_VPC_E01_DOWN_R016.INP;1
B_FEP_VPC_E01_DOWN_R017.INP;1
B_FEP_VPC_E01_DOWN_R018.INP;1
B_FEP_VPC_E01_DOWN_R019.INP;1
B_FEP_VPC_E01_DOWN_R020.INP;1
B_FEP_VPC_E01_UP_R001.INP;1
B_FEP_VPC_E01_UP_R002.INP;1
B_FEP_VPC_E01_UP_R003.INP;1
B_FEP_VPC_E01_UP_R004.INP;1
B_FEP_VPC_E01_UP_R005.INP;1
B_FEP_VPC_E01_UP_R006.INP;1
B_FEP_VPC_E01_UP_R007.INP;1
B_FEP_VPC_E01_UP_R008.INP;1
B_FEP_VPC_E01_UP_R009.INP;3
B_FEP_VPC_E01_UP_R010.INP;1
B_FEP_VPC_E01_UP_R011.INP;3
B_FEP_VPC_E01_UP_R012.INP;1
B_FEP_VPC_E01_UP_R013.INP;1
B_FEP_VPC_E01_UP_R014.INP;1
B_FEP_VPC_E01_UP_R015.INP;1
B_FEP_VPC_E01_UP_R016.INP;1
B_FEP_VPC_E01_UP_R017.INP;1
B_FEP_VPC_E01_UP_R018.INP;1
B_FEP_VPC_E01_UP_R019.INP;1
B_FEP_VPC_E01_UP_R020.INP;1
B_FEP_VPC_UND_R001.INP;1
B_FEP_VPC_UND_R002.INP;1
B_FEP_VPC_UND_R003.INP;1
B_FEP_VPC_UND_R004.INP;1
B_FEP_VPC_UND_R005.INP;1
B_FEP_VPC_UND_R006.INP;1
B_FEP_VPC_UND_R007.INP;1
B_FEP_VPC_UND_R008.INP;1
B_FEP_VPC_UND_R009.INP;2
B_FEP_VPC_UND_R010.INP;1
B_FEP_VPC_UND_R011.INP;2
B_FEP_VPC_UND_R012.INP;1
B_FEP_VPC_UND_R013.INP;1
B_FEP_VPC_UND_R014.INP;1
B_FEP_VPC_UND_R015.INP;1
B_FEP_VPC_UND_R016.INP;1
B_FEP_VPC_UND_R017.INP;1
B_FEP_VPC_UND_R018.INP;1
B_FEP_VPC_UND_R019.INP;1
B_FEP_VPC_UND_R020.INP;1
B_FEP_WICK_E01_DOWN_R001.INP;1
B_FEP_WICK_E01_DOWN_R002.INP;1
B_FEP_WICK_E01_DOWN_R003.INP;1
B_FEP_WICK_E01_DOWN_R004.INP;1
B_FEP_WICK_E01_DOWN_R005.INP;2
B_FEP_WICK_E01_DOWN_R006.INP;1
B_FEP_WICK_E01_DOWN_R007.INP;2
B_FEP_WICK_E01_DOWN_R008.INP;1
B_FEP_WICK_E01_DOWN_R009.INP;1
B_FEP_WICK_E01_DOWN_R010.INP;1
B_FEP_WICK_E01_DOWN_R011.INP;1
B_FEP_WICK_E01_DOWN_R012.INP;1
B_FEP_WICK_E01_DOWN_R013.INP;1
B_FEP_WICK_E01_DOWN_R014.INP;1
B_FEP_WICK_E01_DOWN_R015.INP;1
B_FEP_WICK_E01_DOWN_R016.INP;1
B_FEP_WICK_E01_DOWN_R017.INP;1
B_FEP_WICK_E01_DOWN_R018.INP;1
B_FEP_WICK_E01_DOWN_R019.INP;1
B_FEP_WICK_E01_DOWN_R020.INP;1
B_FEP_WICK_E01_UP_R001.INP;1
B_FEP_WICK_E01_UP_R002.INP;1
B_FEP_WICK_E01_UP_R003.INP;1
B_FEP_WICK_E01_UP_R004.INP;1
B_FEP_WICK_E01_UP_R005.INP;2
B_FEP_WICK_E01_UP_R006.INP;1
B_FEP_WICK_E01_UP_R007.INP;3
B_FEP_WICK_E01_UP_R008.INP;1
B_FEP_WICK_E01_UP_R009.INP;1
B_FEP_WICK_E01_UP_R010.INP;1
B_FEP_WICK_E01_UP_R011.INP;1
B_FEP_WICK_E01_UP_R012.INP;1
B_FEP_WICK_E01_UP_R013.INP;1
B_FEP_WICK_E01_UP_R014.INP;1
B_FEP_WICK_E01_UP_R015.INP;1
B_FEP_WICK_E01_UP_R016.INP;1
B_FEP_WICK_E01_UP_R017.INP;1
B_FEP_WICK_E01_UP_R018.INP;1
B_FEP_WICK_E01_UP_R019.INP;1

B_FEP_WICK_E01_UP_R020.INP;1 B_FEP_WICK_UND_R001.INP;1
B_FEP_WICK_UND_R002.INP;1 B_FEP_WICK_UND_R003.INP;1
B_FEP_WICK_UND_R004.INP;1 B_FEP_WICK_UND_R005.INP;1
B_FEP_WICK_UND_R006.INP;1 B_FEP_WICK_UND_R007.INP;4
B_FEP_WICK_UND_R008.INP;1 B_FEP_WICK_UND_R009.INP;1
B_FEP_WICK_UND_R010.INP;1 B_FEP_WICK_UND_R011.INP;1
B_FEP_WICK_UND_R012.INP;1 B_FEP_WICK_UND_R013.INP;1
B_FEP_WICK_UND_R014.INP;1 B_FEP_WICK_UND_R015.INP;1
B_FEP_WICK_UND_R016.INP;1 B_FEP_WICK_UND_R017.INP;1
B_FEP_WICK_UND_R018.INP;1 B_FEP_WICK_UND_R019.INP;1
B_FEP_WICK_UND_R020.INP;1

Directory F1:[FEP.BASELINE]

E01_DOWN.DIR;1 E01_UP.DIR;1 UNDIST.DIR;1

Directory F1:[FEP.BASELINE.UNDIST]

BLOT.CMD;36 BLOT.PST;5 BLOTMBR001.PST;1 BLOTMBR001A.PST;1
BLOTMBR002.PST;1 BLOTMBR002A.PST;1 BLOTMBR003.PST;1 BLOTMBR003A.PST;1
BLOTMBR004.PST;1 BLOTMBR004A.PST;1 BLOTMBR005.PST;1 BLOTMBR005A.PST;1
BLOTMBR006.PST;1 BLOTMBR007.PST;1 BLOTMBR008.PST;1 BLOTMBR009.PST;1
BLOTMBR010.PST;1 BLOTMBR011.PST;1 BLOTMBR012.PST;1 BLOTMBR013.PST;1
BLOTMBR014.PST;1 BLOTMBR015.PST;1 BLOTMBR016.PST;1 BLOTMBR017.PST;1
BLOTMBR018.PST;1 BLOTMBR019.PST;1 BLOTMBR020.PST;1
FEP01_BASE_UND.COM;2 FEP01_BASE_UND.SMZ;6
FEP01_BASE_UND1.SMZ;2 FEP01_BASE_UND10.SMZ;6
FEP01_BASE_UND11.SMZ;1 FEP01_BASE_UND12.SMZ;2
FEP01_BASE_UND1_BO.SMZ;2 FEP01_BASE_UND2.SMZ;1
FEP01_BASE_UND3.SMZ;4 FEP01_BASE_UND4.SMZ;2
FEP01_BASE_UND5.SMZ;2 FEP01_BASE_UND6.SMZ;2
FEP01_BASE_UND7.SMZ;2 FEP01_BASE_UND8.SMZ;2
FEP01_BASE_UND9.SMZ;2 FEP01_BASE_UND_BO.COM;2
FEP01_BASE_UND_GAS.COM;3 FEP01_BMGANABC_UND.TBL;1
FEP01_BMGMB38C_UND.TBL;2 FEP01_BMGMB39C_UND.TBL;1
FEP01_BRNANABC_UND.TBL;2 FEP01_BRNMB38C_UND.TBL;1
FEP01_BRNMB39C_UND.TBL;1 FEP01_BRNSHUPC_UND.TBL;1
FEP01_GASANABC_UND.TBL;1 FEP01_GASMB38C_UND.TBL;1
FEP01_GASMB39C_UND.TBL;1 FEP01_GASSHUPC_UND.TBL;6
FEP01_MXGASMOL_UND.TBL;2 GASSHUPC.TBL;8 MXSG_ANHABR.PST;1
PA_GAS_FEP_BASE_UND.COM;6 PA_GAS_FEP_BASE_UND_01.COM;2
POST_ALG_GAS.INP;5 POST_ALG_GAS_UND.INP;10 POST_ALG_UND.INP;2
POST_ALG_UND_BO.INP;2 READTBL.EXE;6 READTBL.OBJ;6
READ_SUM.FOR;65 READ_TBL.EXE;4 READ_TBL.FOR;12 READ_TBL.OBJ;4
SATGAS_ANHABR.PST;1 SPLOT.INP;9 SPLOTMB.INP;1 SPLOTMBR010.PST;1
SPLOTMB_MXGS.INP;1 SPLOTMB_SATGAS.INP;2
SPLOTMB_SATGAS_R003.PST;1 SPLOTMB_SATGAS_R005.PST;1
SPLOTMB_SATGAS_R006.PST;1 SPLOTMB_SATGAS_R007.PST;1
SPLOTMB_SATGAS_R009.PST;1 SPLOTMB_SATGAS_R011.PST;1
TEST.OUT;7 TEST1.SMZ;11

Directory F1:[FEP.BASELINE.E01_UP]

ALGEBRA_R001.CDB;1 ALGEBRA_R002.CDB;1 ALGEBRA_R003.CDB;1
ALGEBRA_R004.CDB;1
ALGEBRA_R005.CDB;1 ALGEBRA_R006.CDB;1 ALGEBRA_R007.CDB;1
ALGEBRA_R008.CDB;1
ALGEBRA_R009.CDB;1 ALGEBRA_R010.CDB;1 ALGEBRA_R011.CDB;1
ALGEBRA_R012.CDB;1
ALGEBRA_R013.CDB;1 ALGEBRA_R014.CDB;1 ALGEBRA_R015.CDB;1
ALGEBRA_R016.CDB;1
ALGEBRA_R017.CDB;1 ALGEBRA_R018.CDB;1 ALGEBRA_R019.CDB;1
ALGEBRA_R020.CDB;1
FEP01_BASE_E01_UP.COM;1 FEP01_BASE_E01_UP10.SMZ;2
FEP01_BASE_E01_UP11.SMZ;2 FEP01_BASE_E01_UP12.SMZ;2
FEP01_BASE_E01_UP13.SMZ;2 FEP01_BASE_E01_UP13.SMZ;1
FEP01_BASE_E01_UP14.SMZ;2 FEP01_BASE_E01_UP14.SMZ;1
FEP01_BASE_E01_UP2.SMZ;2 FEP01_BASE_E01_UP9.SMZ;2
FEP01_BRNANABC_E01_UP.TBL;1 FEP01_BRNBHUPC_E01_UP.TBL;1
FEP01_BRNMB38C_E01_UP.TBL;1 FEP01_BRNMB39C_E01_UP.TBL;1
FEP01_BRNSHUPC_E01_UP.TBL;1 FEP01_GASBHUPC_E01_UP.TBL;1
FEP01_MXGASMOL_E01_UP.TBL;1 POST_ALG_E01_UP.INP;1

Directory F1:[FEP.BASELINE.E01_DOWN]

ALGEBRA_DOWN_R001.CDB;1 ALGEBRA_DOWN_R002.CDB;1
ALGEBRA_DOWN_R003.CDB;1 ALGEBRA_DOWN_R004.CDB;1
ALGEBRA_DOWN_R005.CDB;1 ALGEBRA_DOWN_R006.CDB;1
ALGEBRA_DOWN_R007.CDB;1 ALGEBRA_DOWN_R008.CDB;1
ALGEBRA_DOWN_R009.CDB;1 ALGEBRA_DOWN_R010.CDB;1
ALGEBRA_DOWN_R011.CDB;1 ALGEBRA_DOWN_R012.CDB;1
ALGEBRA_DOWN_R013.CDB;1 ALGEBRA_DOWN_R014.CDB;1
ALGEBRA_DOWN_R015.CDB;1 ALGEBRA_DOWN_R016.CDB;1
ALGEBRA_DOWN_R017.CDB;1 ALGEBRA_DOWN_R018.CDB;1
ALGEBRA_DOWN_R019.CDB;1 ALGEBRA_DOWN_R020.CDB;1
BATCHCDB_10.COM;2 BATCHCDB_11_20.COM;6
BATCHCDB_19_20.COM;3 BATCHCDB_1_10.COM;6 BATCHCDB_8_10.COM;4
BATCHCDB_9_10.COM;3 FEP01_BASE_E01_DOWN.COM;2
FEP01_BASE_E01_DOWN.SMZ;1 FEP01_BASE_E01_DOWN10.SMZ;2
FEP01_BASE_E01_DOWN11.SMZ;2 FEP01_BASE_E01_DOWN12.SMZ;2
FEP01_BASE_E01_DOWN13.SMZ;2 FEP01_BASE_E01_DOWN14.SMZ;2
FEP01_BASE_E01_DOWN2.SMZ;2 FEP01_BASE_E01_DOWN9.SMZ;2
FEP01_BASE_E01_DOWN_10_20.COM;2 FEP01_BASE_E01_DOWN_19_20.COM;2
FEP01_BASE_E01_DOWN_8_20.COM;2 FEP01_BRNANABC_E01_DOWN.TBL;1
FEP01_BRNBHUPC_E01_DOWN.TBL;1 FEP01_BRNMB38C_E01_DOWN.TBL;1
FEP01_BRNMB39C_E01_DOWN.TBL;1 FEP01_BRNSHUPC_E01_DOWN.TBL;1
FEP01_GASBHUPC_E01_DOWN.TBL;1 FEP01_MXGASMOL_E01_DOWN.TBL;1
POST_ALG_E01_DOWN.INP;1

Directory F1:[FEP.DRZ.UNDIST]

BATCH1DU.COM;4 BATCH2DU.COM;2 BATCHCDB_5_10.COM;3
FEP02_BMGANABC_UND.TBL;1 FEP02_BMGMB38C_UND.TBL;1
FEP02_BMGMB39C_UND.TBL;1 FEP02_BRNANABC_UND.TBL;1
FEP02_BRNMB38C_UND.TBL;2 FEP02_BRNMB39C_UND.TBL;2
FEP02_BRNSHUPC_UND.TBL;1 FEP02_DRZ_UND.COM;2 FEP02_DRZ_UND.SMZ;6
FEP02_DRZ_UND10.SMZ;2 FEP02_DRZ_UND11.SMZ;3
FEP02_DRZ_UND12.SMZ;3 FEP02_DRZ_UND2.SMZ;3
FEP02_DRZ_UND3.SMZ;1 FEP02_DRZ_UND4.SMZ;6
FEP02_DRZ_UND5.SMZ;8 FEP02_DRZ_UND6.SMZ;2
FEP02_DRZ_UND7.SMZ;3 FEP02_DRZ_UND8.SMZ;2
FEP02_DRZ_UND9.SMZ;2 FEP02_DRZ_UND_GAS.COM;2
FEP02_DRZ_UND_GAS_08.COM;3 FEP02_GASANABC_UND.TBL;1
FEP02_GASMB38C_UND.TBL;2 FEP02_GASMB39C_UND.TBL;1
FEP02_GASSHUPC_UND.TBL;2 FEP02_MXGASMOL_UND.TBL;3
PA_GAS_FEP_DRZ_UND.COM;3 POST_ALG_GAS.INP;6
POST_ALG_GAS_UND.INP;10 POST_ALG_UND.INP;2 TEST1.SMZ;12

Directory F1:[FEP.DRZ.E01_UP]

BATCH1CDB.COM;4 BATCH2CDB.COM;4 B_FEP02_DRZ_E01_UP_R001.CDB;1
B_FEP02_DRZ_E01_UP_R002.CDB;1 B_FEP02_DRZ_E01_UP_R003.CDB;1
B_FEP02_DRZ_E01_UP_R004.CDB;1 B_FEP02_DRZ_E01_UP_R005.CDB;1
B_FEP02_DRZ_E01_UP_R006.CDB;1 B_FEP02_DRZ_E01_UP_R007.CDB;1
B_FEP02_DRZ_E01_UP_R008.CDB;1 B_FEP02_DRZ_E01_UP_R009.CDB;1
B_FEP02_DRZ_E01_UP_R010.CDB;1 B_FEP02_DRZ_E01_UP_R011.CDB;2
B_FEP02_DRZ_E01_UP_R012.CDB;1 B_FEP02_DRZ_E01_UP_R013.CDB;1
B_FEP02_DRZ_E01_UP_R014.CDB;1 B_FEP02_DRZ_E01_UP_R015.CDB;1
B_FEP02_DRZ_E01_UP_R016.CDB;1 B_FEP02_DRZ_E01_UP_R017.CDB;1
B_FEP02_DRZ_E01_UP_R018.CDB;1 B_FEP02_DRZ_E01_UP_R019.CDB;1
B_FEP02_DRZ_E01_UP_R020.CDB;1 FEP02_BRNANABC_E01_UP.TBL;1
FEP02_BRNBHUPC_E01_UP.TBL;1 FEP02_BRNMB38C_E01_UP.TBL;2
FEP02_BRNMB39C_E01_UP.TBL;2 FEP02_BRNSHUPC_E01_UP.TBL;1
FEP02_DRZ_E01_UP.COM;2 FEP02_DRZ_E01_UP10.SMZ;2
FEP02_DRZ_E01_UP11.SMZ;3 FEP02_DRZ_E01_UP12.SMZ;3
FEP02_DRZ_E01_UP13.SMZ;3 FEP02_DRZ_E01_UP14.SMZ;2
FEP02_DRZ_E01_UP2.SMZ;3 FEP02_DRZ_E01_UP9.SMZ;4
FEP02_DRZ_E01_UP_11_20.COM;2 FEP02_GASBHUPC_E01_UP.TBL;1
FEP02_MXGASMOL_E01_UP.TBL;2 FOR030.DAT;2
POST_ALG_E01_UP.INP;1

Directory F1:[FEP.DRZ.E01_DOWN]

BATCH2CDB.COM;3 BATCHCDB_11_20.COM;4 BATCHCDB_1_10.COM;5
BATCHCDB_8_10.COM;3 B_FEP02_DRZ_E01_DOWN_R001.CDB;1
B_FEP02_DRZ_E01_DOWN_R002.CDB;1 B_FEP02_DRZ_E01_DOWN_R003.CDB;1
B_FEP02_DRZ_E01_DOWN_R004.CDB;1 B_FEP02_DRZ_E01_DOWN_R005.CDB;1
B_FEP02_DRZ_E01_DOWN_R006.CDB;1 B_FEP02_DRZ_E01_DOWN_R007.CDB;1
B_FEP02_DRZ_E01_DOWN_R008.CDB;1 B_FEP02_DRZ_E01_DOWN_R009.CDB;1
B_FEP02_DRZ_E01_DOWN_R010.CDB;1 B_FEP02_DRZ_E01_DOWN_R011.CDB;1
B_FEP02_DRZ_E01_DOWN_R012.CDB;1 B_FEP02_DRZ_E01_DOWN_R013.CDB;1
B_FEP02_DRZ_E01_DOWN_R014.CDB;1 B_FEP02_DRZ_E01_DOWN_R015.CDB;1
B_FEP02_DRZ_E01_DOWN_R016.CDB;1 B_FEP02_DRZ_E01_DOWN_R017.CDB;1
B_FEP02_DRZ_E01_DOWN_R018.CDB;1 B_FEP02_DRZ_E01_DOWN_R019.CDB;1
B_FEP02_DRZ_E01_DOWN_R020.CDB;1 FEP02_BRNANABC_E01_DOWN.TBL;1
FEP02_BRNBHUPC_E01_DOWN.TBL;1 FEP02_BRNMB38C_E01_DOWN.TBL;2
FEP02_BRNMB39C_E01_DOWN.TBL;2 FEP02_BRNSHUPC_E01_DOWN.TBL;1
FEP02_DRZ_E01_DOWN.COM;2 FEP02_DRZ_E01_DOWN10.SMZ;2
FEP02_DRZ_E01_DOWN11.SMZ;3 FEP02_DRZ_E01_DOWN12.SMZ;3
FEP02_DRZ_E01_DOWN13.SMZ;3 FEP02_DRZ_E01_DOWN14.SMZ;3
FEP02_DRZ_E01_DOWN2.SMZ;3 FEP02_DRZ_E01_DOWN9.SMZ;2
FEP02_GASBHUPC_E01_DOWN.TBL;1 FEP02_MXGASMOL_E01_DOWN.TBL;2
POST_ALG_E01_DOWN.INP;1

Directory F1:[FEP.MCS.UNDIST]

BATCH1CDB.COM;4 BATCH2CDB.COM;3 B_FEP03_MCS_UND_R001.CDB;1
B_FEP03_MCS_UND_R002.CDB;1 B_FEP03_MCS_UND_R003.CDB;1
B_FEP03_MCS_UND_R004.CDB;1 B_FEP03_MCS_UND_R005.CDB;1
B_FEP03_MCS_UND_R006.CDB;1 B_FEP03_MCS_UND_R007.CDB;1
B_FEP03_MCS_UND_R008.CDB;1 B_FEP03_MCS_UND_R009.CDB;1
B_FEP03_MCS_UND_R010.CDB;1 B_FEP03_MCS_UND_R011.CDB;1
B_FEP03_MCS_UND_R012.CDB;1 B_FEP03_MCS_UND_R013.CDB;1
B_FEP03_MCS_UND_R014.CDB;1 B_FEP03_MCS_UND_R015.CDB;1
B_FEP03_MCS_UND_R016.CDB;1 B_FEP03_MCS_UND_R017.CDB;1
B_FEP03_MCS_UND_R018.CDB;1 B_FEP03_MCS_UND_R019.CDB;1
B_FEP03_MCS_UND_R020.CDB;1 FEP03_BMGANABC_UND.TBL;1
FEP03_BMGMB38C_UND.TBL;1 FEP03_BMGMB39C_UND.TBL;1
FEP03_BRNANABC_UND.TBL;1 FEP03_BRNMB38C_UND.TBL;1
FEP03_BRNMB39C_UND.TBL;1 FEP03_BRNSHUPC_UND.TBL;1
FEP03_GASANABC_UND.TBL;1 FEP03_GASMB38C_UND.TBL;1
FEP03_GASMB39C_UND.TBL;1 FEP03_GASSHUPC_UND.TBL;1
FEP03_MCS_UND.COM;5 FEP03_MCS_UND.SMZ;6 FEP03_MCS_UND10.SMZ;2
FEP03_MCS_UND11.SMZ;2 FEP03_MCS_UND12.SMZ;2
FEP03_MCS_UND2.LOG;1 FEP03_MCS_UND2.SMZ;3
FEP03_MCS_UND2_ERROR.LOG;1 FEP03_MCS_UND3.SMZ;3
FEP03_MCS_UND4.SMZ;3 FEP03_MCS_UND5.SMZ;2
FEP03_MCS_UND6.SMZ;2 FEP03_MCS_UND7.SMZ;2
FEP03_MCS_UND8.SMZ;2 FEP03_MCS_UND9.SMZ;2
FEP03_MXGASMOL_UND.TBL;3 GENMESH_1.CDB;1
PA_GAS_FEP_MCS_UND.COM;3 POST_ALG_GAS.INP;5 POST_ALG_UND.INP;2

Directory F1:[FEP.MCS.E01_UP]

ALGEBRA_R001.CDB;1 ALGEBRA_R002.CDB;1 ALGEBRA_R003.CDB;1
ALGEBRA_R004.CDB;1
ALGEBRA_R005.CDB;1 ALGEBRA_R006.CDB;1 ALGEBRA_R007.CDB;1
ALGEBRA_R008.CDB;1
ALGEBRA_R009.CDB;1 ALGEBRA_R010.CDB;1 ALGEBRA_R011.CDB;1
ALGEBRA_R012.CDB;1
ALGEBRA_R013.CDB;1 ALGEBRA_R014.CDB;1 ALGEBRA_R015.CDB;1
ALGEBRA_R016.CDB;1
ALGEBRA_R017.CDB;1 ALGEBRA_R018.CDB;1 ALGEBRA_R019.CDB;1
ALGEBRA_R020.CDB;1
B_FEP03_MCS_E01_UP_R001.CDB;1 B_FEP03_MCS_E01_UP_R002.CDB;1
B_FEP03_MCS_E01_UP_R003.CDB;1 B_FEP03_MCS_E01_UP_R004.CDB;1
B_FEP03_MCS_E01_UP_R005.CDB;1 B_FEP03_MCS_E01_UP_R006.CDB;1
B_FEP03_MCS_E01_UP_R007.CDB;1 B_FEP03_MCS_E01_UP_R008.CDB;1
B_FEP03_MCS_E01_UP_R009.CDB;1 B_FEP03_MCS_E01_UP_R010.CDB;1
B_FEP03_MCS_E01_UP_R011.CDB;1 B_FEP03_MCS_E01_UP_R012.CDB;1
B_FEP03_MCS_E01_UP_R013.CDB;1 B_FEP03_MCS_E01_UP_R014.CDB;1
B_FEP03_MCS_E01_UP_R015.CDB;1 B_FEP03_MCS_E01_UP_R016.CDB;1
B_FEP03_MCS_E01_UP_R017.CDB;1 B_FEP03_MCS_E01_UP_R018.CDB;1
B_FEP03_MCS_E01_UP_R019.CDB;1 B_FEP03_MCS_E01_UP_R020.CDB;1
FEP03_BRNANABC_E01_UP.TBL;1 FEP03_BRNBHUPC_E01_UP.TBL;1
FEP03_BRNMB38C_E01_UP.TBL;1 FEP03_BRNMB39C_E01_UP.TBL;1
FEP03_BRNSHUPC_E01_UP.TBL;1 FEP03_GASBHUPC_E01_UP.TBL;1
FEP03_MCS_E01_DOWN10.SMZ;1 FEP03_MCS_E01_DOWN11.SMZ;1
FEP03_MCS_E01_DOWN12.SMZ;1 FEP03_MCS_E01_DOWN13.SMZ;1
FEP03_MCS_E01_DOWN14.SMZ;1 FEP03_MCS_E01_UP.COM;3
FEP03_MCS_E01_UP.COM;2 FEP03_MCS_E01_UP.COM;1
FEP03_MCS_E01_UP.SMZ;1 FEP03_MCS_E01_UP10.SMZ;2
FEP03_MCS_E01_UP11.SMZ;2 FEP03_MCS_E01_UP12.SMZ;2
FEP03_MCS_E01_UP13.SMZ;4 FEP03_MCS_E01_UP13.SMZ;3
FEP03_MCS_E01_UP14.SMZ;2 FEP03_MCS_E01_UP2.SMZ;3
FEP03_MCS_E01_UP2.SMZ;2 FEP03_MCS_E01_UP9.SMZ;2
FEP03_MXGASMOL_E01_UP.TBL;2 FEP03_MXGASMOL_E01_UP.TBL;1
POST_ALG_E01_UP.INP;1

Directory F1:[FEP.MCS.E01_DOWN]

BATCHCDB_MCS_E01_DOWN_11_20.COM;4 BATCHCDB_MCS_E01_DOWN_1_10.COM;2
B_FEP03_MCS_E01_DOWN_R001.CDB;1 B_FEP03_MCS_E01_DOWN_R002.CDB;1
B_FEP03_MCS_E01_DOWN_R003.CDB;1 B_FEP03_MCS_E01_DOWN_R004.CDB;1
B_FEP03_MCS_E01_DOWN_R005.CDB;1 B_FEP03_MCS_E01_DOWN_R006.CDB;1
B_FEP03_MCS_E01_DOWN_R007.CDB;1 B_FEP03_MCS_E01_DOWN_R008.CDB;1
B_FEP03_MCS_E01_DOWN_R009.CDB;1 B_FEP03_MCS_E01_DOWN_R010.CDB;1
B_FEP03_MCS_E01_DOWN_R011.CDB;2 B_FEP03_MCS_E01_DOWN_R012.CDB;1
B_FEP03_MCS_E01_DOWN_R013.CDB;1 B_FEP03_MCS_E01_DOWN_R014.CDB;1
B_FEP03_MCS_E01_DOWN_R015.CDB;1 B_FEP03_MCS_E01_DOWN_R016.CDB;1
B_FEP03_MCS_E01_DOWN_R017.CDB;1 B_FEP03_MCS_E01_DOWN_R018.CDB;1
B_FEP03_MCS_E01_DOWN_R019.CDB;1 B_FEP03_MCS_E01_DOWN_R020.CDB;1
B_FEP_MCS_E01_DOWN_R001.CDB;2 B_FEP_MCS_E01_DOWN_R002.CDB;2
B_FEP_MCS_E01_DOWN_R003.CDB;2 B_FEP_MCS_E01_DOWN_R004.CDB;2
B_FEP_MCS_E01_DOWN_R005.CDB;2 B_FEP_MCS_E01_DOWN_R006.CDB;2
B_FEP_MCS_E01_DOWN_R007.CDB;2 B_FEP_MCS_E01_DOWN_R008.CDB;2
B_FEP_MCS_E01_DOWN_R009.CDB;2 B_FEP_MCS_E01_DOWN_R010.CDB;2
B_FEP_MCS_E01_DOWN_R011.CDB;5 B_FEP_MCS_E01_DOWN_R012.CDB;1
B_FEP_MCS_E01_DOWN_R013.CDB;1 B_FEP_MCS_E01_DOWN_R014.CDB;1
B_FEP_MCS_E01_DOWN_R015.CDB;1 B_FEP_MCS_E01_DOWN_R016.CDB;1
B_FEP_MCS_E01_DOWN_R017.CDB;1 B_FEP_MCS_E01_DOWN_R018.CDB;1
B_FEP_MCS_E01_DOWN_R019.CDB;1 B_FEP_MCS_E01_DOWN_R020.CDB;1
FEP03_BRNANABC_E01_DOWN.TBL;1 FEP03_BRNBHUPC_E01_DOWN.TBL;1
FEP03_BRNMB38C_E01_DOWN.TBL;1 FEP03_BRNMB39C_E01_DOWN.TBL;1
FEP03_BRNSHUPC_E01_DOWN.TBL;1 FEP03_GASBHUPC_E01_DOWN.TBL;1
FEP03_MCS_E01_DOWN.COM;2 FEP03_MCS_E01_DOWN10.SMZ;2
FEP03_MCS_E01_DOWN11.SMZ;2 FEP03_MCS_E01_DOWN12.SMZ;2
FEP03_MCS_E01_DOWN13.SMZ;2 FEP03_MCS_E01_DOWN14.SMZ;2
FEP03_MCS_E01_DOWN2.SMZ;3 FEP03_MCS_E01_DOWN9.SMZ;2
FEP03_MCS_E01_DOWN_11_20.COM;2 FEP03_MXGASMOL_E01_DOWN.TBL;2
POST_ALG_E01_DOWN.INP;1

Directory F1:[FEP.POSTPROC]

BMGANABC_ALL_UND.TBL;1 BMGMB38C_ALL_UND.TBL;3
BMGMB39C_ALL_UND.TBL;2 E01_DOWN.DIR;1 E01_UP.DIR;1
E01_UP_BOREHOLE.SMZ;9 FEP01_BASE_UND.SMZ;1
FEP02_DRZ_UND.SMZ;2 FEP03_MCS_UND.SMZ;2 FEP04_PUD_UND.SMZ;2
FEP05_RAD_UND.SMZ;2
FEP06_VPC_UND.SMZ;2 FEP07_WICK_UND.SMZ;2
FEP_BASE_E01_UP_BRNWSTC_001_010.SMZ;3 GASANABC_ALL_UND.TBL;1
GASMB38C_ALL_UND.TBL;3 GASMB39C_ALL_UND.TBL;3
GASSHUPC_ALL.TBL;2 GASSHUPC_ALL_UND.TBL;1 MXGASMOL_ALL.TBL;1
MXGASMOL_ALL_UND.TBL;2 POST_ALG_UND.INP;2 READ2_TBL.COM;5
READ3_TBL.COM;2 READ4_TBL.COM;2 READ5_TBL.COM;2 READ6_TBL.COM;2
READ7_TBL.COM;2 READ8_TBL.COM;2 READ9_TBL.COM;1 READ_TBL.COM;1
READ_TBL.EXE;1 READ_TBL.FOR;13 READ_TBL.OBJ;1 TEST1.SMZ;11
UNDIST.DIR;1

Directory F1:[FEP.POSTPROC.UNDIST]

BMGANABC_ALL_UND.TBL;1 BMGMB38C_ALL_UND.TBL;3
BMGMB39C_ALL_UND.TBL;2 BRNANABC_ALL_UND.TBL;1
BRNMB38C_ALL_UND.TBL;2 BRNMB38C_SPLAT.CMD;7
BRNMB38C_UND.PST;2 BRNMB38C_UNDIST.PST;1
BRNMB39C_ALL_UND.TBL;5 BRNMB39C_SPLAT.CMD;5
BRNMB39C_UND.PST;1 BRNSHUPC_ALL_UND.TBL;1
GASANABC_ALL_UND.TBL;1 GASMB38C_ALL_UND.TBL;2
GASMB39C_ALL_UND.TBL;3 GASSHUPC_ALL.TBL;2
GASSHUPC_ALL_UND.TBL;1 GRAPH.PST;3 MXGASMOL_ALL.TBL;1
MXGASMOL_ALL_UND.TBL;4 MXGASMOL_SPLAT.CMD;7
MXGASMOL_UND.PST;1 READ10_TBL.COM;2 READ11_TBL.COM;2 READ12_TBL.COM;2
READ2_TBL.COM;5 READ3_TBL.COM;2 READ4_TBL.COM;2 READ5_TBL.COM;2
READ6_TBL.COM;2 READ7_TBL.COM;2 READ8_TBL.COM;3 READ9_TBL.COM;1
READ_TBL.COM;1 READ_TBL.EXE;1

Directory F1:[FEP.POSTPROC.E01_UP]

BRNANABC_ALL_E01_UP.TBL;2 BRNBHUPC_ALL_E01_UP.TBL;5
BRNMB38C_ALL_E01_UP.TBL;3 BRNMB39C_ALL_E01_UP.TBL;3
BRNSHUPC_ALL_E01_UP.TBL;2 GASBHUPC_ALL_E01_UP.TBL;2
GRAPH.PST;1 MXGASMOL_ALL_E01_UP.TBL;3 READ10_TBL.COM;3
READ11_TBL.COM;3 READ12_TBL.COM;3 READ13_TBL.COM;2 READ14_TBL.COM;2
READ2_TBL.COM;6 READ3_TBL.COM;2 READ4_TBL.COM;2 READ5_TBL.COM;2
READ6_TBL.COM;2 READ7_TBL.COM;2 READ8_TBL.COM;3 READ9_TBL.COM;3
READ_TBL.COM;1 READ_TBL.EXE;1

Directory F1:[FEP.POSTPROC.E01_DOWN]

BRNANABC_ALL_E01_DOWN.TBL;1 BRNBHUPC_ALL_E01_DOWN.TBL;1
BRNMB38C_ALL_E01_DOWN.TBL;1 BRNMB39C_ALL_E01_DOWN.TBL;1
BRNSHUPC_ALL_E01_DOWN.TBL;1 GASBHUPC_ALL_E01_DOWN.TBL;1
MXGASMOL_ALL_E01_DOWN.TBL;1 READ10_TBL.COM;4 READ11_TBL.COM;4
READ12_TBL.COM;4 READ13_TBL.COM;3 READ14_TBL.COM;3 READ2_TBL.COM;7
READ3_TBL.COM;2 READ4_TBL.COM;2 READ5_TBL.COM;2 READ6_TBL.COM;2
READ7_TBL.COM;2 READ8_TBL.COM;3 READ9_TBL.COM;4 READ_TBL.COM;1
READ_TBL.EXE;1

Directory F1:[FEP.PUD]

E01_DOWN.DIR;1 E01_UP.DIR;1 UNDIST.DIR;1

Directory F1:[FEP.PUD.UNDIST]

BATCHP_7.COM;4 FEP04_BMGANABC_UND.TBL;1
FEP04_BMGMB38C_UND.TBL;1 FEP04_BMGMB39C_UND.TBL;1
FEP04_BRNANABC_UND.TBL;1 FEP04_BRNMB38C_UND.TBL;1
FEP04_BRNMB39C_UND.TBL;1 FEP04_BRNSHUPC_UND.TBL;1
FEP04_GASANABC_UND.TBL;1 FEP04_GASMB38C_UND.TBL;1
FEP04_GASMB39C_UND.TBL;1 FEP04_GASSHUPC_UND.TBL;1
FEP04_MXGASMOL_UND.TBL;3 FEP04_PUD_UND.SMZ;5
FEP04_PUD_UND10.SMZ;2 FEP04_PUD_UND11.SMZ;2
FEP04_PUD_UND12.SMZ;2 FEP04_PUD_UND2.SMZ;2
FEP04_PUD_UND3.SMZ;2 FEP04_PUD_UND4.SMZ;2
FEP04_PUD_UND5.SMZ;2 FEP04_PUD_UND6.SMZ;2
FEP04_PUD_UND7.SMZ;2 FEP04_PUD_UND8.SMZ;2
FEP04_PUD_UND9.SMZ;2 FEP04_PUD_UND_BO.COM;3
PA_GAS_FEP_PUD_UND.COM;2 PA_GAS_FEP_PUD_UND_8_20.COM;2
POST_ALG_GAS.INP;5 POST_ALG_UND.INP;2 POST_ALG_UND_BO.INP;3

Directory F1:[FEP.PUD.E01_UP]

B_FEP04_PUD_E01_UP_R001.CDB;1 B_FEP04_PUD_E01_UP_R002.CDB;1
B_FEP04_PUD_E01_UP_R003.CDB;1 B_FEP04_PUD_E01_UP_R004.CDB;1
B_FEP04_PUD_E01_UP_R005.CDB;1 B_FEP04_PUD_E01_UP_R006.CDB;1
B_FEP04_PUD_E01_UP_R007.CDB;1 B_FEP04_PUD_E01_UP_R008.CDB;1
B_FEP04_PUD_E01_UP_R009.CDB;1 B_FEP04_PUD_E01_UP_R010.CDB;1
B_FEP04_PUD_E01_UP_R011.CDB;1 B_FEP04_PUD_E01_UP_R012.CDB;1
B_FEP04_PUD_E01_UP_R013.CDB;1 B_FEP04_PUD_E01_UP_R014.CDB;1
B_FEP04_PUD_E01_UP_R015.CDB;1 B_FEP04_PUD_E01_UP_R016.CDB;1
B_FEP04_PUD_E01_UP_R017.CDB;1 B_FEP04_PUD_E01_UP_R018.CDB;1
B_FEP04_PUD_E01_UP_R019.CDB;1 B_FEP04_PUD_E01_UP_R020.CDB;1
FEP03_MCS_E01_UP.SMZ;1 FEP03_MCS_E01_UP9.SMZ;1
FEP04_BRNANABC_E01_UP.TBL;1 FEP04_BRNBHUPC_E01_UP.TBL;2
FEP04_BRNMB38C_E01_UP.TBL;1 FEP04_BRNMB39C_E01_UP.TBL;1
FEP04_BRNSHUPC_E01_UP.TBL;1 FEP04_GASBHUPC_E01_UP.TBL;1
FEP04_MXGASMOL_E01_UP.TBL;2 FEP04_PUD_E01_UP.COM;3
FEP04_PUD_E01_UP10.SMZ;2 FEP04_PUD_E01_UP11.SMZ;2
FEP04_PUD_E01_UP12.SMZ;2 FEP04_PUD_E01_UP13.SMZ;3
FEP04_PUD_E01_UP14.SMZ;2 FEP04_PUD_E01_UP2.SMZ;3
FEP04_PUD_E01_UP9.SMZ;1 POST_ALG_E01_UP.INP;1

Directory F1:[FEP.PUD.E01_DOWN]

FEP03_MCS_E01_DOWN10.SMZ;1 FEP03_MCS_E01_DOWN11.SMZ;1
FEP03_MCS_E01_DOWN12.SMZ;1 FEP03_MCS_E01_DOWN13.SMZ;1
FEP03_MCS_E01_DOWN14.SMZ;1 FEP03_MCS_E01_DOWN2.SMZ;1
FEP03_MCS_E01_DOWN9.SMZ;1 FEP04_BRNANABC_E01_DOWN.TBL;1
FEP04_BRNBHUPC_E01_DOWN.TBL;1 FEP04_BRNMB38C_E01_DOWN.TBL;1
FEP04_BRNMB39C_E01_DOWN.TBL;1 FEP04_BRNSHUPC_E01_DOWN.TBL;1
FEP04_GASBHUPC_E01_DOWN.TBL;1 FEP04_MXGASMOL_E01_DOWN.TBL;2
FEP04_PUD_E01_DOWN.COM;2 FEP04_PUD_E01_DOWN10.SMZ;2
FEP04_PUD_E01_DOWN11.SMZ;2 FEP04_PUD_E01_DOWN12.SMZ;2
FEP04_PUD_E01_DOWN13.SMZ;2 FEP04_PUD_E01_DOWN14.SMZ;2
FEP04_PUD_E01_DOWN2.SMZ;3 FEP04_PUD_E01_DOWN9.SMZ;2
POST_ALG_E01_DOWN.INP;1

Directory F1:[FEP.SCATTER]

E01_DOWN.DIR;1 E01_UP.DIR;1 GRAPH.PST;28 NOTES.TXT;2
POST_ALG_GAS_UND.INP;10 POST_ALG_UND.INP;2 TEST.CMD;15
TEST1.SMZ;11 UND.DIR;1

Directory F1:[FEP.SCATTER.UND]

BLOT.LOG;1 BLOT.PST;3 BLOT_SATGAS_RHS.INP;4
BLOT_SPLOT_NOTES.TXT;2 BMGANABC_ALL_UND.TBL;1
BMGANABC_SPLAT.CMD;3 BMGMB38C_ALL_UND.TBL;3
BMGMB38C_SPLAT.CMD;4 BMGMB39C_ALL_UND.TBL;2
BMGMB39C_SPLAT.CMD;3 BRNANABC_ALL_UND.TBL;1
BRNANABC_SPLAT.CMD;5 BRNANABC_SPLAT.TMP;5
BRNBHUPC_SPLAT.CMD;2 BRNMB38C_ALL_UND.TBL;1
BRNMB38C_SPLAT.CMD;3 BRNMB38C_SPLAT.TMP;4
BRNMB39C_ALL_UND.TBL;4 BRNMB39C_SPLAT.CMD;5
BRNSHUPC_ALL_UND.TBL;1 BRNSHUPC_SPLAT.CMD;4
FEP02_DRZ_UND.SMZ;2 GASANABC_ALL_UND.TBL;1
GASANABC_SPLAT.CMD;4 GASBHUPC_SPLAT.CMD;2
GASMB38C_ALL_UND.TBL;2 GASMB38C_SPLAT.CMD;5
GASMB39C_ALL_UND.TBL;3 GASMB39C_SPLAT.CMD;4
GASSHUPC_ALL_UND.TBL;2 GASSHUPC_SPLAT.CMD;16
GAS_FRONT.DIR;1 GRAPH.PST;20 GR_BRNANABC.PST;1 GR_BRNMB38C.PST;1
GR_BRNMB39C.PST;1 GR_GASANABC.PST;1 MAIL_NOTES.TXT;2
MXGASMOL_ALL_UND.TBL;2 MXGASMOL_SPLAT.CMD;7

Directory F1:[FEP.SCATTER.E01_UP]

BMGANABC_SPLAT.CMD;3 BMGMB38C_SPLAT.CMD;4
BMGMB39C_SPLAT.CMD;3 BRNANABC_ALL_E01_UP.TBL;2
BRNANABC_E01_UP.PST;1 BRNANABC_SPLAT.CMD;7
BRNANBC_E01_UP.PST;1 BRNBHUPC_ALL_E01_UP.TBL;5
BRNBHUPC_E01_UP.PST;1 BRNBHUPC_SPLAT.CMD;6
BRNMB38C_ALL_E01_UP.TBL;3 BRNMB38C_E01_UP.PST;4
BRNMB38C_SPLAT.CMD;6 BRNMB39C_ALL_E01_UP.TBL;3
BRNMB39C_E01_UP.PST;1 BRNMB39C_SPLAT.CMD;6
BRNSHUPC_ALL_E01_UP.TBL;2 BRNSHUPC_E01_UP.PST;1
BRNSHUPC_SPLAT.CMD;6 GASANABC_SPLAT.CMD;4
GASBHUPC_ALL_E01_UP.TBL;2 GASBHUPC_SPLAT.CMD;3
GASMB38C_SPLAT.CMD;5 GASMB39C_SPLAT.CMD;4
GASSBHUPC_E01_UP.PST;1 GASSHUPC_SPLAT.CMD;16
GRAPH.PST;7 MXGASMOL_ALL_E01_UP.TBL;3
MXGASMOL_E01_UP.PST;1 MXGASMOL_SPLAT.CMD;9

Directory F1:[FEP.SCATTER.E01_DOWN]

BMGANABC_SPLAT.CMD;3 BMGMB38C_SPLAT.CMD;4
BMGMB39C_SPLAT.CMD;3 BRNANABC_ALL_E01_DOWN.TBL;1
BRNANABC_E01_DOWN.PST;3 BRNANABC_SPLAT.CMD;8
BRNBHUPC_ALL_E01_DOWN.TBL;1 BRNBHUPC_E01_DOWN.PST;2
BRNBHUPC_SPLAT.CMD;7 BRNMB38C_ALL_E01_DOWN.TBL;1
BRNMB38C_E01_DOWN.PST;2 BRNMB38C_SPLAT.CMD;7
BRNMB39C_ALL_E01_DOWN.TBL;1 BRNMB39C_E01_DOWN.PST;2
BRNMB39C_SPLAT.CMD;7 BRNSHUPC_ALL_E01_DOWN.TBL;1
BRNSHUPC_E01_DOWN.PST;2 BRNSHUPC_SPLAT.CMD;7
GASANABC_SPLAT.CMD;4 GASBHUPC_ALL_E01_DOWN.TBL;1
GASBHUPC_E01_DOWN.PST;2 GASBHUPC_SPLAT.CMD;4
GASMB38C_SPLAT.CMD;5 GASMB39C_SPLAT.CMD;4
GASSHUPC_SPLAT.CMD;16 GRAPH.PST;1
MXGASMOL_ALL_E01_DOWN.TBL;1 MXGASMOL_E01_DOWN.PST;2
MXGASMOL_SPLAT.CMD;9

Directory F1:[FEP.VPC]

E01_DOWN.DIR;1 E01_UP.DIR;1 UNDIST.DIR;1

Directory F1:[FEP.VPC.UNDIST]

B_FEP06_VPC_UND_R001.CDB;1 B_FEP06_VPC_UND_R002.CDB;1
B_FEP06_VPC_UND_R003.CDB;1 B_FEP06_VPC_UND_R004.CDB;1
B_FEP06_VPC_UND_R005.CDB;1 B_FEP06_VPC_UND_R006.CDB;1
B_FEP06_VPC_UND_R007.CDB;1 B_FEP06_VPC_UND_R008.CDB;1
B_FEP06_VPC_UND_R009.CDB;1 B_FEP06_VPC_UND_R010.CDB;1
B_FEP06_VPC_UND_R011.CDB;1 B_FEP06_VPC_UND_R012.CDB;1
B_FEP06_VPC_UND_R013.CDB;1 B_FEP06_VPC_UND_R014.CDB;1
B_FEP06_VPC_UND_R015.CDB;1 B_FEP06_VPC_UND_R016.CDB;1
B_FEP06_VPC_UND_R017.CDB;1 B_FEP06_VPC_UND_R018.CDB;1
B_FEP06_VPC_UND_R019.CDB;1 B_FEP06_VPC_UND_R020.CDB;1
FEP06_BMGANABC_UND.TBL;1 FEP06_BMGMB38C_UND.TBL;1
FEP06_BMGMB39C_UND.TBL;1 FEP06_BRNANABC_UND.TBL;2
FEP06_BRNMB38C_UND.TBL;1 FEP06_BRNMB39C_UND.TBL;1
FEP06_BRNSHUPC_UND.TBL;1 FEP06_GASANABC_UND.TBL;1
FEP06_GASMB38C_UND.TBL;1 FEP06_GASMB39C_UND.TBL;1
FEP06_GASSHUPC_UND.TBL;1 FEP06_MXGASMOL_UND.TBL;2
FEP06_VPC_UND.COM;2 FEP06_VPC_UND.SMZ;6 FEP06_VPC_UND10.SMZ;2
FEP06_VPC_UND11.SMZ;3 FEP06_VPC_UND12.SMZ;2
FEP06_VPC_UND3.SMZ;2 FEP06_VPC_UND4.SMZ;2
FEP06_VPC_UND5.SMZ;2 FEP06_VPC_UND6.SMZ;2
FEP06_VPC_UND7.SMZ;2 FEP06_VPC_UND8.SMZ;2
FEP06_VPC_UND9.SMZ;2 FEP06_VPC_UND_BO.COM;2
PA_GAS_FEP_VPC_UND.COM;2 POST_ALG_GAS.INP;5 POST_ALG_UND.INP;2
POST_ALG_UND_BO.INP;3

Directory F1:[FEP.VPC.E01_UP]

B_FEP06_VPC_E01_UP_R001.CDB;1 B_FEP06_VPC_E01_UP_R002.CDB;1
B_FEP06_VPC_E01_UP_R003.CDB;1 B_FEP06_VPC_E01_UP_R004.CDB;1
B_FEP06_VPC_E01_UP_R005.CDB;1 B_FEP06_VPC_E01_UP_R006.CDB;1
B_FEP06_VPC_E01_UP_R007.CDB;1 B_FEP06_VPC_E01_UP_R008.CDB;1
B_FEP06_VPC_E01_UP_R009.CDB;1 B_FEP06_VPC_E01_UP_R010.CDB;1
B_FEP06_VPC_E01_UP_R011.CDB;1 B_FEP06_VPC_E01_UP_R012.CDB;1
B_FEP06_VPC_E01_UP_R013.CDB;1 B_FEP06_VPC_E01_UP_R014.CDB;1
B_FEP06_VPC_E01_UP_R015.CDB;1 B_FEP06_VPC_E01_UP_R016.CDB;1
B_FEP06_VPC_E01_UP_R017.CDB;1 B_FEP06_VPC_E01_UP_R018.CDB;1
B_FEP06_VPC_E01_UP_R019.CDB;1 B_FEP06_VPC_E01_UP_R020.CDB;1
FEP05_RAD_E01_UP10.SMZ;1 FEP05_RAD_E01_UP11.SMZ;1
FEP05_RAD_E01_UP12.SMZ;1 FEP05_RAD_E01_UP13.SMZ;1
FEP05_RAD_E01_UP14.SMZ;1 FEP05_RAD_E01_UP2.SMZ;1
FEP05_RAD_E01_UP9.SMZ;1 FEP06_BRNANABC_E01_UP.TBL;1
FEP06_BRNBHUPC_E01_UP.TBL;1 FEP06_BRNMB38C_E01_UP.TBL;1
FEP06_BRNMB39C_E01_UP.TBL;1 FEP06_BRNSHUPC_E01_UP.TBL;1
FEP06_GASBHUPC_E01_UP.TBL;1 FEP06_MXGASMOL_E01_UP.TBL;2

FEP06_PUD_E01_UP9.SMZ;1 FEP06_VPC_E01_UP.COM;2
FEP06_VPC_E01_UP10.SMZ;2 FEP06_VPC_E01_UP11.SMZ;2
FEP06_VPC_E01_UP12.SMZ;2 FEP06_VPC_E01_UP13.SMZ;2
FEP06_VPC_E01_UP14.SMZ;2 FEP06_VPC_E01_UP2.LOG;1
FEP06_VPC_E01_UP2.SMZ;3 FEP06_VPC_E01_UP2_ERROR.LOG;1
FEP06_VPC_E01_UP9.SMZ;1 GENMESH_1.CDB;1
POST_ALG_E01_UP.INP;1

Directory F1:[FEP.VPC.E01_DOWN]

BATCHCDB_VPC_E01_DOWN_11_20.COM;4 BATCHCDB_VPC_E01_DOWN_1_10.COM;2
B_FEP06_VPC_E01_DOWN_R001.CDB;1 B_FEP06_VPC_E01_DOWN_R002.CDB;1
B_FEP06_VPC_E01_DOWN_R003.CDB;1 B_FEP06_VPC_E01_DOWN_R004.CDB;1
B_FEP06_VPC_E01_DOWN_R005.CDB;1 B_FEP06_VPC_E01_DOWN_R006.CDB;1
B_FEP06_VPC_E01_DOWN_R007.CDB;1 B_FEP06_VPC_E01_DOWN_R008.CDB;1
B_FEP06_VPC_E01_DOWN_R009.CDB;1 B_FEP06_VPC_E01_DOWN_R010.CDB;1
B_FEP06_VPC_E01_DOWN_R011.CDB;1 B_FEP06_VPC_E01_DOWN_R012.CDB;1
B_FEP06_VPC_E01_DOWN_R013.CDB;1 B_FEP06_VPC_E01_DOWN_R014.CDB;1
B_FEP06_VPC_E01_DOWN_R015.CDB;1 B_FEP06_VPC_E01_DOWN_R016.CDB;1
B_FEP06_VPC_E01_DOWN_R017.CDB;1 B_FEP06_VPC_E01_DOWN_R018.CDB;1
B_FEP06_VPC_E01_DOWN_R019.CDB;1 B_FEP06_VPC_E01_DOWN_R020.CDB;1
FEP06_BRNANABC_E01_DOWN.TBL;1 FEP06_BRNBHUPC_E01_DOWN.TBL;2
FEP06_BRNMB38C_E01_DOWN.TBL;1 FEP06_BRNMB39C_E01_DOWN.TBL;1
FEP06_BRNSHUPC_E01_DOWN.TBL;1 FEP06_GASBHUPC_E01_DOWN.TBL;1
FEP06_MXGASMOL_E01_DOWN.TBL;2 FEP06_VPC_E01_DOWN.COM;2
FEP06_VPC_E01_DOWN10.SMZ;2 FEP06_VPC_E01_DOWN11.SMZ;2
FEP06_VPC_E01_DOWN12.SMZ;2 FEP06_VPC_E01_DOWN13.SMZ;3
FEP06_VPC_E01_DOWN14.SMZ;2 FEP06_VPC_E01_DOWN2.SMZ;3
FEP06_VPC_E01_DOWN9.SMZ;2 POST_ALG_E01_DOWN.INP;1

Directory F1:[FEP.WICK.UNDIST]

ALGEBRA_R001.CDB;1 ALGEBRA_R002.CDB;1 ALGEBRA_R003.CDB;1
ALGEBRA_R004.CDB;1
ALGEBRA_R005.CDB;1 ALGEBRA_R006.CDB;1 ALGEBRA_R007.CDB;1
ALGEBRA_R008.CDB;1
ALGEBRA_R009.CDB;1 ALGEBRA_R010.CDB;1 ALGEBRA_R011.CDB;1
ALGEBRA_R012.CDB;1
ALGEBRA_R013.CDB;1 ALGEBRA_R014.CDB;1 ALGEBRA_R015.CDB;1
ALGEBRA_R016.CDB;1
ALGEBRA_R017.CDB;1 ALGEBRA_R018.CDB;1 ALGEBRA_R019.CDB;1
ALGEBRA_R020.CDB;1

BATCHCDB_11_20.COM;7 BATCHCDB_1_10.COM;9
B_FEP07_WICK_UND_R001.CDB;1 B_FEP07_WICK_UND_R002.CDB;1
B_FEP07_WICK_UND_R003.CDB;1 B_FEP07_WICK_UND_R004.CDB;1
B_FEP07_WICK_UND_R005.CDB;1 B_FEP07_WICK_UND_R006.CDB;1
B_FEP07_WICK_UND_R007.CDB;1 B_FEP07_WICK_UND_R008.CDB;1
B_FEP07_WICK_UND_R009.CDB;1 B_FEP07_WICK_UND_R010.CDB;1
B_FEP07_WICK_UND_R011.CDB;1 B_FEP07_WICK_UND_R012.CDB;1
B_FEP07_WICK_UND_R013.CDB;1 B_FEP07_WICK_UND_R014.CDB;1
B_FEP07_WICK_UND_R015.CDB;1 B_FEP07_WICK_UND_R016.CDB;1
B_FEP07_WICK_UND_R017.CDB;1 B_FEP07_WICK_UND_R018.CDB;1
B_FEP07_WICK_UND_R019.CDB;1 B_FEP07_WICK_UND_R020.CDB;1
FEP07_BMGANABC_UND.TBL;1 FEP07_BMGMB38C_UND.TBL;1
FEP07_BMGMB39C_UND.TBL;1 FEP07_BRNANABC_UND.TBL;1
FEP07_BRNMB38C_UND.TBL;1 FEP07_BRNMB39C_UND.TBL;1
FEP07_BRNSHUPC_UND.TBL;1 FEP07_GASANABC_UND.TBL;1
FEP07_GASMB38C_UND.TBL;1 FEP07_GASMB39C_UND.TBL;1
FEP07_GASSHUPC_UND.TBL;1 FEP07_MXGASMOL_UND.TBL;2
FEP07_WICK_UND.COM;2 FEP07_WICK_UND.SMZ;6
FEP07_WICK_UND10.SMZ;2 FEP07_WICK_UND11.SMZ;2
FEP07_WICK_UND12.SMZ;2 FEP07_WICK_UND3.SMZ;2
FEP07_WICK_UND4.SMZ;2 FEP07_WICK_UND5.SMZ;2
FEP07_WICK_UND6.SMZ;2 FEP07_WICK_UND7.SMZ;2
FEP07_WICK_UND8.SMZ;2 FEP07_WICK_UND9.SMZ;2
FEP07_WICK_UND_BO.COM;2 PA_GAS_FEP_WICK_UND.COM;2
POST_ALG_GAS.INP;5 POST_ALG_UND.INP;2 POST_ALG_UND_BO.INP;3

Directory F1:[FEP.WICK.E01_UP]

ALGEBRA_R001.CDB;1 ALGEBRA_R002.CDB;1 ALGEBRA_R003.CDB;1
ALGEBRA_R004.CDB;1
ALGEBRA_R005.CDB;1 ALGEBRA_R006.CDB;1 ALGEBRA_R007.CDB;1
ALGEBRA_R008.CDB;1
ALGEBRA_R009.CDB;1 ALGEBRA_R010.CDB;1 ALGEBRA_R011.CDB;1
ALGEBRA_R012.CDB;1
ALGEBRA_R013.CDB;1 ALGEBRA_R014.CDB;1 ALGEBRA_R015.CDB;1
ALGEBRA_R016.CDB;1
ALGEBRA_R017.CDB;1 ALGEBRA_R018.CDB;1 ALGEBRA_R019.CDB;1
ALGEBRA_R020.CDB;1
BATCHCDB_WICK_E01_UP_11_20.COM;2 BATCHCDB_WICK_E01_UP_1_10.COM;3
B_FEP07_WICK_E01_UP_R001.CDB;1 B_FEP07_WICK_E01_UP_R002.CDB;1
B_FEP07_WICK_E01_UP_R003.CDB;1 B_FEP07_WICK_E01_UP_R004.CDB;1
B_FEP07_WICK_E01_UP_R005.CDB;1 B_FEP07_WICK_E01_UP_R006.CDB;1
B_FEP07_WICK_E01_UP_R007.CDB;1 B_FEP07_WICK_E01_UP_R008.CDB;1
B_FEP07_WICK_E01_UP_R009.CDB;1 B_FEP07_WICK_E01_UP_R010.CDB;1
B_FEP07_WICK_E01_UP_R011.CDB;1 B_FEP07_WICK_E01_UP_R012.CDB;1
B_FEP07_WICK_E01_UP_R013.CDB;1 B_FEP07_WICK_E01_UP_R014.CDB;1
B_FEP07_WICK_E01_UP_R015.CDB;1 B_FEP07_WICK_E01_UP_R016.CDB;1
B_FEP07_WICK_E01_UP_R017.CDB;1 B_FEP07_WICK_E01_UP_R018.CDB;1
B_FEP07_WICK_E01_UP_R019.CDB;1 B_FEP07_WICK_E01_UP_R020.CDB;1

FEP07_BRNANABC_E01_UP.TBL;1 FEP07_BRNBHUPC_E01_UP.TBL;2
FEP07_BRNMB38C_E01_UP.TBL;1 FEP07_BRNMB39C_E01_UP.TBL;1
FEP07_BRNSHUPC_E01_UP.TBL;1 FEP07_GASBHUPC_E01_UP.TBL;1
FEP07_MXGASMOL_E01_UP.TBL;2 FEP07_WICK_E01_UP.COM;2
FEP07_WICK_E01_UP10.SMZ;2 FEP07_WICK_E01_UP11.SMZ;2
FEP07_WICK_E01_UP12.SMZ;2 FEP07_WICK_E01_UP13.SMZ;3
FEP07_WICK_E01_UP14.SMZ;2 FEP07_WICK_E01_UP2.SMZ;3
FEP07_WICK_E01_UP9.SMZ;2 POST_ALG_E01_UP.INP;1

Directory F1:[FEP.WICK.E01_DOWN]

ALGEBRA_DOWN_R001.CDB;1 ALGEBRA_DOWN_R002.CDB;1
ALGEBRA_DOWN_R003.CDB;1 ALGEBRA_DOWN_R004.CDB;1
ALGEBRA_DOWN_R005.CDB;1 ALGEBRA_DOWN_R006.CDB;1
ALGEBRA_DOWN_R007.CDB;1 ALGEBRA_DOWN_R008.CDB;1
ALGEBRA_DOWN_R009.CDB;1 ALGEBRA_DOWN_R010.CDB;1
ALGEBRA_DOWN_R011.CDB;1 ALGEBRA_DOWN_R012.CDB;1
ALGEBRA_DOWN_R013.CDB;1 ALGEBRA_DOWN_R014.CDB;1
ALGEBRA_DOWN_R015.CDB;1 ALGEBRA_DOWN_R016.CDB;1
ALGEBRA_DOWN_R017.CDB;1 ALGEBRA_DOWN_R018.CDB;1
ALGEBRA_DOWN_R019.CDB;1 ALGEBRA_DOWN_R020.CDB;1
BATCHCDB_WICK_E01_DOWN_11_20.COM;3 BATCHCDB_WICK_E01_DOWN_1_10.COM;3
B_FEP07_WICK_E01_DOWN_R001.CDB;1 B_FEP07_WICK_E01_DOWN_R002.CDB;1
B_FEP07_WICK_E01_DOWN_R003.CDB;1 B_FEP07_WICK_E01_DOWN_R004.CDB;1
B_FEP07_WICK_E01_DOWN_R005.CDB;1 B_FEP07_WICK_E01_DOWN_R006.CDB;1
B_FEP07_WICK_E01_DOWN_R007.CDB;1 B_FEP07_WICK_E01_DOWN_R008.CDB;1
B_FEP07_WICK_E01_DOWN_R009.CDB;1 B_FEP07_WICK_E01_DOWN_R010.CDB;1
B_FEP07_WICK_E01_DOWN_R011.CDB;1 B_FEP07_WICK_E01_DOWN_R012.CDB;1
B_FEP07_WICK_E01_DOWN_R013.CDB;1 B_FEP07_WICK_E01_DOWN_R014.CDB;1
B_FEP07_WICK_E01_DOWN_R015.CDB;1 B_FEP07_WICK_E01_DOWN_R016.CDB;1
B_FEP07_WICK_E01_DOWN_R017.CDB;1 B_FEP07_WICK_E01_DOWN_R018.CDB;1
B_FEP07_WICK_E01_DOWN_R019.CDB;1 B_FEP07_WICK_E01_DOWN_R020.CDB;1
FEP07_BRNANABC_E01_DOWN.TBL;1 FEP07_BRNBHUPC_E01_DOWN.TBL;2
FEP07_BRNMB38C_E01_DOWN.TBL;1 FEP07_BRNMB39C_E01_DOWN.TBL;1
FEP07_BRNSHUPC_E01_DOWN.TBL;1 FEP07_GASBHUPC_E01_DOWN.TBL;1
FEP07_MXGASMOL_E01_DOWN.TBL;2 FEP07_WICK_E01_DOWN.COM;2
FEP07_WICK_E01_DOWN10.SMZ;2 FEP07_WICK_E01_DOWN11.SMZ;2
FEP07_WICK_E01_DOWN12.SMZ;2 FEP07_WICK_E01_DOWN13.SMZ;3
FEP07_WICK_E01_DOWN14.SMZ;2 FEP07_WICK_E01_DOWN2.SMZ;3
FEP07_WICK_E01_DOWN9.SMZ;2 POST_ALG_E01_DOWN.INP;1

Directory F1:[FEP.DMS_BLOWOUT.BO_ALGEBRA]

ALGEBRA.COM;3	ALGEBRA.COM;2	ALGEBRA.DBG;80	ALGEBRA.DBG;79
ALGEBRA.DBG;78	ALGEBRA.DBG;77	ALGEBRA.DBG;76	ALGEBRA.DBG;75
ALGEBRA.DBG;74	ALGEBRA.DBG;73	ALGEBRA.DBG;72	ALGEBRA.DBG;71
ALGEBRA.DBG;70	ALGEBRA.DBG;69	ALGEBRA.DBG;68	ALGEBRA.DBG;67
ALGEBRA.DBG;66	ALGEBRA.DBG;65	ALGEBRA.DBG;64	ALGEBRA.DBG;63
ALGEBRA.DBG;62	ALGEBRA.DBG;61	ALGEBRA.DBG;60	ALGEBRA.DBG;59
ALGEBRA.DBG;58	ALGEBRA.DBG;57	ALGEBRA.DBG;56	ALGEBRA.DBG;55
ALGEBRA.DBG;54	ALGEBRA.DBG;53	ALGEBRA.DBG;52	ALGEBRA.DBG;51
ALGEBRA.DBG;50	ALGEBRA.DBG;49	ALGEBRA.DBG;48	ALGEBRA.DBG;47
ALGEBRA.DBG;46	ALGEBRA.DBG;45	ALGEBRA.DBG;44	ALGEBRA.DBG;43
ALGEBRA.DBG;42	ALGEBRA.DBG;41	ALGEBRA.DBG;40	ALGEBRA.DBG;39
ALGEBRA.DBG;38	ALGEBRA.DBG;37	ALGEBRA.DBG;36	ALGEBRA.DBG;35
ALGEBRA.DBG;34	ALGEBRA.DBG;33	ALGEBRA.DBG;32	ALGEBRA.DBG;31
ALGEBRA.DBG;30	ALGEBRA.DBG;29	ALGEBRA.DBG;28	ALGEBRA.DBG;27
ALGEBRA.DBG;26	ALGEBRA.DBG;25	ALGEBRA.DBG;24	ALGEBRA.DBG;23
ALGEBRA.DBG;22	ALGEBRA.DBG;21	ALGEBRA.DBG;20	ALGEBRA.DBG;19
ALGEBRA.DBG;18	ALGEBRA.DBG;17	ALGEBRA.DBG;16	ALGEBRA.DBG;15
ALGEBRA.DBG;14	ALGEBRA.DBG;13	ALGEBRA.DBG;12	ALGEBRA.DBG;11
ALGEBRA.DBG;10	ALGEBRA.DBG;9	ALGEBRA.DBG;8	ALGEBRA.DBG;7
ALGEBRA.DBG;6	ALGEBRA.DBG;5	ALGEBRA.DBG;4	ALGEBRA.DBG;3
ALGEBRA.DBG;2	ALGEBRA.DBG;1	ALGEBRA_BO.COM;2	

ALGEBRA_BO_FEP01_T00100_R001.CDB;1	ALGEBRA_BO_FEP01_T00100_R001.INP;1
ALGEBRA_BO_FEP01_T00100_R002.CDB;1	ALGEBRA_BO_FEP01_T00100_R002.INP;1
ALGEBRA_BO_FEP01_T00100_R003.CDB;1	ALGEBRA_BO_FEP01_T00100_R003.INP;1
ALGEBRA_BO_FEP01_T00100_R004.CDB;1	ALGEBRA_BO_FEP01_T00100_R004.INP;1
ALGEBRA_BO_FEP01_T00100_R005.CDB;1	ALGEBRA_BO_FEP01_T00100_R005.INP;1
ALGEBRA_BO_FEP01_T00100_R006.CDB;1	ALGEBRA_BO_FEP01_T00100_R006.INP;1
ALGEBRA_BO_FEP01_T00100_R007.CDB;1	ALGEBRA_BO_FEP01_T00100_R007.INP;1
ALGEBRA_BO_FEP01_T00100_R008.CDB;1	ALGEBRA_BO_FEP01_T00100_R008.INP;1
ALGEBRA_BO_FEP01_T00100_R009.CDB;1	ALGEBRA_BO_FEP01_T00100_R009.INP;1
ALGEBRA_BO_FEP01_T00100_R010.CDB;1	ALGEBRA_BO_FEP01_T00100_R010.INP;1
ALGEBRA_BO_FEP01_T00100_R011.CDB;1	ALGEBRA_BO_FEP01_T00100_R011.INP;1
ALGEBRA_BO_FEP01_T00100_R012.CDB;1	ALGEBRA_BO_FEP01_T00100_R012.INP;1
ALGEBRA_BO_FEP01_T00100_R013.CDB;1	ALGEBRA_BO_FEP01_T00100_R013.INP;1
ALGEBRA_BO_FEP01_T00100_R014.CDB;1	ALGEBRA_BO_FEP01_T00100_R014.INP;1
ALGEBRA_BO_FEP01_T00100_R015.CDB;1	ALGEBRA_BO_FEP01_T00100_R015.INP;1
ALGEBRA_BO_FEP01_T00100_R016.CDB;1	ALGEBRA_BO_FEP01_T00100_R016.INP;1
ALGEBRA_BO_FEP01_T00100_R017.CDB;1	ALGEBRA_BO_FEP01_T00100_R017.INP;1
ALGEBRA_BO_FEP01_T00100_R018.CDB;1	ALGEBRA_BO_FEP01_T00100_R018.INP;1
ALGEBRA_BO_FEP01_T00100_R019.CDB;1	ALGEBRA_BO_FEP01_T00100_R019.INP;1
ALGEBRA_BO_FEP01_T00100_R020.CDB;1	ALGEBRA_BO_FEP01_T00100_R020.INP;1
ALGEBRA_BO_FEP01_T00500_R001.CDB;1	ALGEBRA_BO_FEP01_T00500_R001.INP;1
ALGEBRA_BO_FEP01_T00500_R002.CDB;1	ALGEBRA_BO_FEP01_T00500_R002.INP;1

ALGEBRA_BO_FEP01_T00500_R003.CDB;1	ALGEBRA_BO_FEP01_T00500_R003.INP;1
ALGEBRA_BO_FEP01_T00500_R004.CDB;1	ALGEBRA_BO_FEP01_T00500_R004.INP;1
ALGEBRA_BO_FEP01_T00500_R005.CDB;1	ALGEBRA_BO_FEP01_T00500_R005.INP;1
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ALGEBRA_BO_FEP07_T00500_R018.CDB;1	ALGEBRA_BO_FEP07_T00500_R018.INP;1
ALGEBRA_BO_FEP07_T00500_R019.CDB;1	ALGEBRA_BO_FEP07_T00500_R019.INP;1
ALGEBRA_BO_FEP07_T00500_R020.CDB;1	ALGEBRA_BO_FEP07_T00500_R020.INP;1
ALGEBRA_BO_FEP07_T01000_R001.CDB;1	ALGEBRA_BO_FEP07_T01000_R001.INP;1
ALGEBRA_BO_FEP07_T01000_R002.CDB;1	ALGEBRA_BO_FEP07_T01000_R002.INP;1
ALGEBRA_BO_FEP07_T01000_R003.CDB;1	ALGEBRA_BO_FEP07_T01000_R003.INP;1
ALGEBRA_BO_FEP07_T01000_R004.CDB;1	ALGEBRA_BO_FEP07_T01000_R004.INP;1

ALGEBRA_BO_FEP07_T01000_R005.CDB;1 ALGEBRA_BO_FEP07_T01000_R005.INP;1
ALGEBRA_BO_FEP07_T01000_R006.CDB;1 ALGEBRA_BO_FEP07_T01000_R006.INP;1
ALGEBRA_BO_FEP07_T01000_R007.CDB;1 ALGEBRA_BO_FEP07_T01000_R007.INP;1
ALGEBRA_BO_FEP07_T01000_R008.CDB;1 ALGEBRA_BO_FEP07_T01000_R008.INP;1
ALGEBRA_BO_FEP07_T01000_R009.CDB;1 ALGEBRA_BO_FEP07_T01000_R009.INP;1
ALGEBRA_BO_FEP07_T01000_R010.CDB;1 ALGEBRA_BO_FEP07_T01000_R010.INP;1
ALGEBRA_BO_FEP07_T01000_R011.CDB;1 ALGEBRA_BO_FEP07_T01000_R011.INP;1
ALGEBRA_BO_FEP07_T01000_R012.CDB;1 ALGEBRA_BO_FEP07_T01000_R012.INP;1
ALGEBRA_BO_FEP07_T01000_R013.CDB;1 ALGEBRA_BO_FEP07_T01000_R013.INP;1
ALGEBRA_BO_FEP07_T01000_R014.CDB;1 ALGEBRA_BO_FEP07_T01000_R014.INP;1
ALGEBRA_BO_FEP07_T01000_R015.CDB;1 ALGEBRA_BO_FEP07_T01000_R015.INP;1
ALGEBRA_BO_FEP07_T01000_R016.CDB;1 ALGEBRA_BO_FEP07_T01000_R016.INP;1
ALGEBRA_BO_FEP07_T01000_R017.CDB;1 ALGEBRA_BO_FEP07_T01000_R017.INP;1
ALGEBRA_BO_FEP07_T01000_R018.CDB;1 ALGEBRA_BO_FEP07_T01000_R018.INP;1
ALGEBRA_BO_FEP07_T01000_R019.CDB;1 ALGEBRA_BO_FEP07_T01000_R019.INP;1
ALGEBRA_BO_FEP07_T01000_R020.CDB;1 ALGEBRA_BO_FEP07_T01000_R020.INP;1
ALGEBRA_BO_FEP07_T10000_R001.CDB;1 ALGEBRA_BO_FEP07_T10000_R001.INP;1
ALGEBRA_BO_FEP07_T10000_R002.CDB;1 ALGEBRA_BO_FEP07_T10000_R002.INP;1
ALGEBRA_BO_FEP07_T10000_R003.CDB;1 ALGEBRA_BO_FEP07_T10000_R003.INP;1
ALGEBRA_BO_FEP07_T10000_R004.CDB;1 ALGEBRA_BO_FEP07_T10000_R004.INP;1
ALGEBRA_BO_FEP07_T10000_R005.CDB;1 ALGEBRA_BO_FEP07_T10000_R005.INP;1
ALGEBRA_BO_FEP07_T10000_R006.CDB;1 ALGEBRA_BO_FEP07_T10000_R006.INP;1
ALGEBRA_BO_FEP07_T10000_R007.CDB;1 ALGEBRA_BO_FEP07_T10000_R007.INP;1
ALGEBRA_BO_FEP07_T10000_R008.CDB;1 ALGEBRA_BO_FEP07_T10000_R008.INP;1
ALGEBRA_BO_FEP07_T10000_R009.CDB;1 ALGEBRA_BO_FEP07_T10000_R009.INP;1
ALGEBRA_BO_FEP07_T10000_R010.CDB;1 ALGEBRA_BO_FEP07_T10000_R010.INP;1
ALGEBRA_BO_FEP07_T10000_R011.CDB;1 ALGEBRA_BO_FEP07_T10000_R011.INP;1
ALGEBRA_BO_FEP07_T10000_R012.CDB;1 ALGEBRA_BO_FEP07_T10000_R012.INP;1
ALGEBRA_BO_FEP07_T10000_R013.CDB;1 ALGEBRA_BO_FEP07_T10000_R013.INP;1
ALGEBRA_BO_FEP07_T10000_R014.CDB;1 ALGEBRA_BO_FEP07_T10000_R014.INP;1
ALGEBRA_BO_FEP07_T10000_R015.CDB;1 ALGEBRA_BO_FEP07_T10000_R015.INP;1
ALGEBRA_BO_FEP07_T10000_R016.CDB;1 ALGEBRA_BO_FEP07_T10000_R016.INP;1
ALGEBRA_BO_FEP07_T10000_R017.CDB;1 ALGEBRA_BO_FEP07_T10000_R017.INP;1
ALGEBRA_BO_FEP07_T10000_R018.CDB;1 ALGEBRA_BO_FEP07_T10000_R018.INP;1
ALGEBRA_BO_FEP07_T10000_R019.CDB;1 ALGEBRA_BO_FEP07_T10000_R019.INP;1
ALGEBRA_BO_FEP07_T10000_R020.CDB;1 ALGEBRA_BO_FEP07_T10000_R020.INP;1
ALGEBRA_RAD.COM;1 BLOT.PST;1 BLOWOUT_SUMM_ALG_BASE.EXE;1
BLOWOUT_SUMM_ALG_BASE.FOR;1 BLOWOUT_SUMM_ALG_BASE.OBJ;1
BLOWOUT_SUMM_ALG_RAD.EXE;1 BLOWOUT_SUMM_ALG_RAD.FOR;1
BLOWOUT_SUMM_ALG_RAD.OBJ;1 BLOWOUT_SUMM_ALG_WICK.EXE;1
BLOWOUT_SUMM_ALG_WICK.FOR;1 BLOWOUT_SUMM_ALG_WICK.OBJ;1
DIRLIST.LIS;1 GROPE.LIS;2 GROPE.LIS;1 MACRO.MAC;2

Directory F1:[FEP.DMS_BLOWOUT.BO_RELATE]

DIRLIST.LIS;1 MACRO_BASE.MAC;5 MACRO_BASE.MAC;4 MACRO_WICK.MAC;5
MACRO_WICK.MAC;4 MACRO_WICK.MAC;3 MACRO_WICK.MAC;2 RELATE.INP;4
RELATE_BASE.COM;6 RELATE_BO_FEP01_T00100_R001.CDB;1
RELATE_BO_FEP01_T00100_R002.CDB;1 RELATE_BO_FEP01_T00100_R003.CDB;1
RELATE_BO_FEP01_T00100_R004.CDB;1 RELATE_BO_FEP01_T00100_R005.CDB;1
RELATE_BO_FEP01_T00100_R006.CDB;1 RELATE_BO_FEP01_T00100_R007.CDB;1
RELATE_BO_FEP01_T00100_R008.CDB;1 RELATE_BO_FEP01_T00100_R009.CDB;1
RELATE_BO_FEP01_T00100_R010.CDB;1 RELATE_BO_FEP01_T00100_R011.CDB;1
RELATE_BO_FEP01_T00100_R012.CDB;1 RELATE_BO_FEP01_T00100_R013.CDB;1
RELATE_BO_FEP01_T00100_R014.CDB;1 RELATE_BO_FEP01_T00100_R015.CDB;1
RELATE_BO_FEP01_T00100_R016.CDB;1 RELATE_BO_FEP01_T00100_R017.CDB;1
RELATE_BO_FEP01_T00100_R018.CDB;1 RELATE_BO_FEP01_T00100_R019.CDB;1
RELATE_BO_FEP01_T00100_R020.CDB;1 RELATE_BO_FEP01_T00500_R001.CDB;1
RELATE_BO_FEP01_T00500_R002.CDB;1 RELATE_BO_FEP01_T00500_R003.CDB;1
RELATE_BO_FEP01_T00500_R004.CDB;1 RELATE_BO_FEP01_T00500_R005.CDB;1
RELATE_BO_FEP01_T00500_R006.CDB;1 RELATE_BO_FEP01_T00500_R007.CDB;1
RELATE_BO_FEP01_T00500_R008.CDB;1 RELATE_BO_FEP01_T00500_R009.CDB;1
RELATE_BO_FEP01_T00500_R010.CDB;1 RELATE_BO_FEP01_T00500_R011.CDB;1
RELATE_BO_FEP01_T00500_R012.CDB;1 RELATE_BO_FEP01_T00500_R013.CDB;1
RELATE_BO_FEP01_T00500_R014.CDB;1 RELATE_BO_FEP01_T00500_R015.CDB;1
RELATE_BO_FEP01_T00500_R016.CDB;1 RELATE_BO_FEP01_T00500_R017.CDB;1
RELATE_BO_FEP01_T00500_R018.CDB;1 RELATE_BO_FEP01_T00500_R019.CDB;1
RELATE_BO_FEP01_T00500_R020.CDB;1 RELATE_BO_FEP01_T01000_R001.CDB;1
RELATE_BO_FEP01_T01000_R002.CDB;1 RELATE_BO_FEP01_T01000_R003.CDB;1
RELATE_BO_FEP01_T01000_R004.CDB;1 RELATE_BO_FEP01_T01000_R005.CDB;1
RELATE_BO_FEP01_T01000_R006.CDB;1 RELATE_BO_FEP01_T01000_R007.CDB;1
RELATE_BO_FEP01_T01000_R008.CDB;1 RELATE_BO_FEP01_T01000_R009.CDB;1
RELATE_BO_FEP01_T01000_R010.CDB;1 RELATE_BO_FEP01_T01000_R011.CDB;1
RELATE_BO_FEP01_T01000_R012.CDB;1 RELATE_BO_FEP01_T01000_R013.CDB;1
RELATE_BO_FEP01_T01000_R014.CDB;1 RELATE_BO_FEP01_T01000_R015.CDB;1
RELATE_BO_FEP01_T01000_R016.CDB;1 RELATE_BO_FEP01_T01000_R017.CDB;1
RELATE_BO_FEP01_T01000_R018.CDB;1 RELATE_BO_FEP01_T01000_R019.CDB;1
RELATE_BO_FEP01_T01000_R020.CDB;1 RELATE_BO_FEP01_T10000_R001.CDB;1
RELATE_BO_FEP01_T10000_R002.CDB;1 RELATE_BO_FEP01_T10000_R003.CDB;1
RELATE_BO_FEP01_T10000_R004.CDB;1 RELATE_BO_FEP01_T10000_R005.CDB;1
RELATE_BO_FEP01_T10000_R006.CDB;1 RELATE_BO_FEP01_T10000_R007.CDB;1
RELATE_BO_FEP01_T10000_R008.CDB;1 RELATE_BO_FEP01_T10000_R009.CDB;1
RELATE_BO_FEP01_T10000_R010.CDB;1 RELATE_BO_FEP01_T10000_R011.CDB;1
RELATE_BO_FEP01_T10000_R012.CDB;1 RELATE_BO_FEP01_T10000_R013.CDB;1
RELATE_BO_FEP01_T10000_R014.CDB;1 RELATE_BO_FEP01_T10000_R015.CDB;1
RELATE_BO_FEP01_T10000_R016.CDB;1 RELATE_BO_FEP01_T10000_R017.CDB;1
RELATE_BO_FEP01_T10000_R018.CDB;1 RELATE_BO_FEP01_T10000_R019.CDB;1
RELATE_BO_FEP01_T10000_R020.CDB;1 RELATE_BO_FEP05_T00100_R001.CDB;1
RELATE_BO_FEP05_T00100_R002.CDB;1 RELATE_BO_FEP05_T00100_R003.CDB;1

RELATE_BO_FEP05_T00100_R004.CDB;1 RELATE_BO_FEP05_T00100_R005.CDB;1
RELATE_BO_FEP05_T00100_R006.CDB;1 RELATE_BO_FEP05_T00100_R007.CDB;1
RELATE_BO_FEP05_T00100_R008.CDB;1 RELATE_BO_FEP05_T00100_R009.CDB;1
RELATE_BO_FEP05_T00100_R010.CDB;1 RELATE_BO_FEP05_T00100_R011.CDB;1
RELATE_BO_FEP05_T00100_R012.CDB;1 RELATE_BO_FEP05_T00100_R013.CDB;1
RELATE_BO_FEP05_T00100_R014.CDB;1 RELATE_BO_FEP05_T00100_R015.CDB;1
RELATE_BO_FEP05_T00100_R016.CDB;1 RELATE_BO_FEP05_T00100_R017.CDB;1
RELATE_BO_FEP05_T00100_R018.CDB;1 RELATE_BO_FEP05_T00100_R019.CDB;1
RELATE_BO_FEP05_T00100_R020.CDB;1 RELATE_BO_FEP05_T00500_R001.CDB;1
RELATE_BO_FEP05_T00500_R002.CDB;1 RELATE_BO_FEP05_T00500_R003.CDB;1
RELATE_BO_FEP05_T00500_R004.CDB;1 RELATE_BO_FEP05_T00500_R005.CDB;1
RELATE_BO_FEP05_T00500_R006.CDB;1 RELATE_BO_FEP05_T00500_R007.CDB;1
RELATE_BO_FEP05_T00500_R008.CDB;1 RELATE_BO_FEP05_T00500_R009.CDB;1
RELATE_BO_FEP05_T00500_R010.CDB;1 RELATE_BO_FEP05_T00500_R011.CDB;1
RELATE_BO_FEP05_T00500_R012.CDB;1 RELATE_BO_FEP05_T00500_R013.CDB;1
RELATE_BO_FEP05_T00500_R014.CDB;1 RELATE_BO_FEP05_T00500_R015.CDB;1
RELATE_BO_FEP05_T00500_R016.CDB;1 RELATE_BO_FEP05_T00500_R017.CDB;1
RELATE_BO_FEP05_T00500_R018.CDB;1 RELATE_BO_FEP05_T00500_R019.CDB;1
RELATE_BO_FEP05_T00500_R020.CDB;1 RELATE_BO_FEP05_T01000_R001.CDB;1
RELATE_BO_FEP05_T01000_R002.CDB;1 RELATE_BO_FEP05_T01000_R003.CDB;1
RELATE_BO_FEP05_T01000_R004.CDB;1 RELATE_BO_FEP05_T01000_R005.CDB;1
RELATE_BO_FEP05_T01000_R006.CDB;1 RELATE_BO_FEP05_T01000_R007.CDB;1
RELATE_BO_FEP05_T01000_R008.CDB;1 RELATE_BO_FEP05_T01000_R009.CDB;1
RELATE_BO_FEP05_T01000_R010.CDB;1 RELATE_BO_FEP05_T01000_R011.CDB;1
RELATE_BO_FEP05_T01000_R012.CDB;1 RELATE_BO_FEP05_T01000_R013.CDB;1
RELATE_BO_FEP05_T01000_R014.CDB;1 RELATE_BO_FEP05_T01000_R015.CDB;1
RELATE_BO_FEP05_T01000_R016.CDB;1 RELATE_BO_FEP05_T01000_R017.CDB;1
RELATE_BO_FEP05_T01000_R018.CDB;1 RELATE_BO_FEP05_T01000_R019.CDB;1
RELATE_BO_FEP05_T01000_R020.CDB;1 RELATE_BO_FEP05_T10000_R001.CDB;1
RELATE_BO_FEP05_T10000_R002.CDB;1 RELATE_BO_FEP05_T10000_R003.CDB;1
RELATE_BO_FEP05_T10000_R004.CDB;1 RELATE_BO_FEP05_T10000_R005.CDB;1
RELATE_BO_FEP05_T10000_R006.CDB;1 RELATE_BO_FEP05_T10000_R007.CDB;1
RELATE_BO_FEP05_T10000_R008.CDB;1 RELATE_BO_FEP05_T10000_R009.CDB;1
RELATE_BO_FEP05_T10000_R010.CDB;1 RELATE_BO_FEP05_T10000_R011.CDB;1
RELATE_BO_FEP05_T10000_R012.CDB;1 RELATE_BO_FEP05_T10000_R013.CDB;1
RELATE_BO_FEP05_T10000_R014.CDB;1 RELATE_BO_FEP05_T10000_R015.CDB;1
RELATE_BO_FEP05_T10000_R016.CDB;1 RELATE_BO_FEP05_T10000_R017.CDB;1
RELATE_BO_FEP05_T10000_R018.CDB;1 RELATE_BO_FEP05_T10000_R019.CDB;1
RELATE_BO_FEP05_T10000_R020.CDB;1 RELATE_BO_FEP07_T00100_R001.CDB;1
RELATE_BO_FEP07_T00100_R002.CDB;1 RELATE_BO_FEP07_T00100_R003.CDB;1
RELATE_BO_FEP07_T00100_R004.CDB;1 RELATE_BO_FEP07_T00100_R005.CDB;1
RELATE_BO_FEP07_T00100_R006.CDB;1 RELATE_BO_FEP07_T00100_R007.CDB;1
RELATE_BO_FEP07_T00100_R008.CDB;1 RELATE_BO_FEP07_T00100_R009.CDB;1
RELATE_BO_FEP07_T00100_R010.CDB;1 RELATE_BO_FEP07_T00100_R011.CDB;1
RELATE_BO_FEP07_T00100_R012.CDB;1 RELATE_BO_FEP07_T00100_R013.CDB;1
RELATE_BO_FEP07_T00100_R014.CDB;1 RELATE_BO_FEP07_T00100_R015.CDB;1

RELATE_BO_FEP07_T00100_R016.CDB;1 RELATE_BO_FEP07_T00100_R017.CDB;1
RELATE_BO_FEP07_T00100_R018.CDB;1 RELATE_BO_FEP07_T00100_R019.CDB;1
RELATE_BO_FEP07_T00100_R020.CDB;1 RELATE_BO_FEP07_T00500_R001.CDB;1
RELATE_BO_FEP07_T00500_R002.CDB;1 RELATE_BO_FEP07_T00500_R003.CDB;1
RELATE_BO_FEP07_T00500_R004.CDB;1 RELATE_BO_FEP07_T00500_R005.CDB;1
RELATE_BO_FEP07_T00500_R006.CDB;1 RELATE_BO_FEP07_T00500_R007.CDB;1
RELATE_BO_FEP07_T00500_R008.CDB;1 RELATE_BO_FEP07_T00500_R009.CDB;1
RELATE_BO_FEP07_T00500_R010.CDB;1 RELATE_BO_FEP07_T00500_R011.CDB;1
RELATE_BO_FEP07_T00500_R012.CDB;1 RELATE_BO_FEP07_T00500_R013.CDB;1
RELATE_BO_FEP07_T00500_R014.CDB;1 RELATE_BO_FEP07_T00500_R015.CDB;1
RELATE_BO_FEP07_T00500_R016.CDB;1 RELATE_BO_FEP07_T00500_R017.CDB;1
RELATE_BO_FEP07_T00500_R018.CDB;1 RELATE_BO_FEP07_T00500_R019.CDB;1
RELATE_BO_FEP07_T00500_R020.CDB;1 RELATE_BO_FEP07_T01000_R001.CDB;1
RELATE_BO_FEP07_T01000_R002.CDB;1 RELATE_BO_FEP07_T01000_R003.CDB;1
RELATE_BO_FEP07_T01000_R004.CDB;1 RELATE_BO_FEP07_T01000_R005.CDB;1
RELATE_BO_FEP07_T01000_R006.CDB;1 RELATE_BO_FEP07_T01000_R007.CDB;1
RELATE_BO_FEP07_T01000_R008.CDB;1 RELATE_BO_FEP07_T01000_R009.CDB;1
RELATE_BO_FEP07_T01000_R010.CDB;1 RELATE_BO_FEP07_T01000_R011.CDB;1
RELATE_BO_FEP07_T01000_R012.CDB;1 RELATE_BO_FEP07_T01000_R013.CDB;1
RELATE_BO_FEP07_T01000_R014.CDB;1 RELATE_BO_FEP07_T01000_R015.CDB;1
RELATE_BO_FEP07_T01000_R016.CDB;1 RELATE_BO_FEP07_T01000_R017.CDB;1
RELATE_BO_FEP07_T01000_R018.CDB;1 RELATE_BO_FEP07_T01000_R019.CDB;1
RELATE_BO_FEP07_T01000_R020.CDB;1 RELATE_BO_FEP07_T10000_R001.CDB;1
RELATE_BO_FEP07_T10000_R002.CDB;1 RELATE_BO_FEP07_T10000_R003.CDB;1
RELATE_BO_FEP07_T10000_R004.CDB;1 RELATE_BO_FEP07_T10000_R005.CDB;1
RELATE_BO_FEP07_T10000_R006.CDB;1 RELATE_BO_FEP07_T10000_R007.CDB;1
RELATE_BO_FEP07_T10000_R008.CDB;1 RELATE_BO_FEP07_T10000_R009.CDB;1
RELATE_BO_FEP07_T10000_R010.CDB;1 RELATE_BO_FEP07_T10000_R011.CDB;1
RELATE_BO_FEP07_T10000_R012.CDB;1 RELATE_BO_FEP07_T10000_R013.CDB;1
RELATE_BO_FEP07_T10000_R014.CDB;1 RELATE_BO_FEP07_T10000_R015.CDB;1
RELATE_BO_FEP07_T10000_R016.CDB;1 RELATE_BO_FEP07_T10000_R017.CDB;1
RELATE_BO_FEP07_T10000_R018.CDB;1 RELATE_BO_FEP07_T10000_R019.CDB;1
RELATE_BO_FEP07_T10000_R020.CDB;1 RELATE_RAD.COM;1 RELATE_WICK.COM;2

Directory F1:[FEP.DMS_BLOWOUT.BO_ICSET]

DIRLIST.LIS;2 DIRLIST.LIS;1 ICSET.COM;1 ICSET_BASE.COM;2
ICSET_BO_FEP01_T00100_R001.CDB;1 ICSET_BO_FEP01_T00100_R002.CDB;1
ICSET_BO_FEP01_T00100_R003.CDB;1 ICSET_BO_FEP01_T00100_R004.CDB;1
ICSET_BO_FEP01_T00100_R005.CDB;1 ICSET_BO_FEP01_T00100_R006.CDB;1
ICSET_BO_FEP01_T00100_R007.CDB;1 ICSET_BO_FEP01_T00100_R008.CDB;1
ICSET_BO_FEP01_T00100_R009.CDB;1 ICSET_BO_FEP01_T00100_R010.CDB;1
ICSET_BO_FEP01_T00100_R011.CDB;1 ICSET_BO_FEP01_T00100_R012.CDB;1
ICSET_BO_FEP01_T00100_R013.CDB;1 ICSET_BO_FEP01_T00100_R014.CDB;1
ICSET_BO_FEP01_T00100_R015.CDB;1 ICSET_BO_FEP01_T00100_R016.CDB;1

ICSET_BO_FEP01_T00100_R017.CDB;1
ICSET_BO_FEP01_T00100_R018.CDB;1
ICSET_BO_FEP01_T00100_R019.CDB;1
ICSET_BO_FEP01_T00100_R020.CDB;1
ICSET_BO_FEP01_T00500_R001.CDB;1
ICSET_BO_FEP01_T00500_R002.CDB;1
ICSET_BO_FEP01_T00500_R003.CDB;1
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ICSET_BO_FEP01_T00500_R005.CDB;1
ICSET_BO_FEP01_T00500_R006.CDB;1
ICSET_BO_FEP01_T00500_R007.CDB;1
ICSET_BO_FEP01_T00500_R008.CDB;1
ICSET_BO_FEP01_T00500_R009.CDB;1
ICSET_BO_FEP01_T00500_R010.CDB;1
ICSET_BO_FEP01_T00500_R011.CDB;1
ICSET_BO_FEP01_T00500_R012.CDB;1
ICSET_BO_FEP01_T00500_R013.CDB;1
ICSET_BO_FEP01_T00500_R014.CDB;1
ICSET_BO_FEP01_T00500_R015.CDB;1
ICSET_BO_FEP01_T00500_R016.CDB;1
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ICSET_BO_FEP07_T10000_R020.CDB;1
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MACRO_WICK.MAC;2

Directory F1:[FEP.DMS_BLOWOUT.BO_PREBRAG]

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BRAGFLO_BO_FEP05_T10000_R019.INP;1
BRAGFLO_BO_FEP05_T10000_R020.INP;1
BRAGFLO_BO_FEP07_T00100_R001.INP;1
BRAGFLO_BO_FEP07_T00100_R002.INP;1
BRAGFLO_BO_FEP07_T00100_R003.INP;1
BRAGFLO_BO_FEP07_T00100_R004.INP;1
BRAGFLO_BO_FEP07_T00100_R005.INP;1
BRAGFLO_BO_FEP07_T00100_R006.INP;1
BRAGFLO_BO_FEP07_T00100_R007.INP;1
BRAGFLO_BO_FEP07_T00100_R008.INP;1
BRAGFLO_BO_FEP07_T00100_R009.INP;1
BRAGFLO_BO_FEP07_T00100_R010.INP;1
BRAGFLO_BO_FEP07_T00100_R011.INP;1
BRAGFLO_BO_FEP07_T00100_R012.INP;1
BRAGFLO_BO_FEP07_T00100_R013.INP;1
BRAGFLO_BO_FEP07_T00100_R014.INP;1
BRAGFLO_BO_FEP07_T00100_R015.INP;1
BRAGFLO_BO_FEP07_T00100_R016.INP;1
BRAGFLO_BO_FEP07_T00100_R017.INP;1
BRAGFLO_BO_FEP07_T00100_R018.INP;1
BRAGFLO_BO_FEP07_T00100_R019.INP;1
BRAGFLO_BO_FEP07_T00100_R020.INP;1
BRAGFLO_BO_FEP07_T00500_R001.INP;1
BRAGFLO_BO_FEP07_T00500_R002.INP;1
BRAGFLO_BO_FEP07_T00500_R003.INP;1
BRAGFLO_BO_FEP07_T00500_R004.INP;1
BRAGFLO_BO_FEP07_T00500_R005.INP;1
BRAGFLO_BO_FEP07_T00500_R006.INP;1
BRAGFLO_BO_FEP07_T00500_R007.INP;1
BRAGFLO_BO_FEP07_T00500_R008.INP;1
BRAGFLO_BO_FEP07_T00500_R009.INP;1
BRAGFLO_BO_FEP07_T00500_R010.INP;1
BRAGFLO_BO_FEP07_T00500_R011.INP;1
BRAGFLO_BO_FEP07_T00500_R012.INP;1
BRAGFLO_BO_FEP07_T00500_R013.INP;1
BRAGFLO_BO_FEP07_T00500_R014.INP;1
BRAGFLO_BO_FEP07_T00500_R015.INP;1
BRAGFLO_BO_FEP07_T00500_R016.INP;1
BRAGFLO_BO_FEP07_T00500_R017.INP;1
BRAGFLO_BO_FEP07_T00500_R018.INP;1
BRAGFLO_BO_FEP07_T00500_R019.INP;1
BRAGFLO_BO_FEP07_T00500_R020.INP;1
BRAGFLO_BO_FEP07_T01000_R001.INP;1
BRAGFLO_BO_FEP07_T01000_R002.INP;1
BRAGFLO_BO_FEP07_T01000_R003.INP;1
BRAGFLO_BO_FEP07_T01000_R004.INP;1
BRAGFLO_BO_FEP07_T01000_R005.INP;1
BRAGFLO_BO_FEP07_T01000_R006.INP;1
BRAGFLO_BO_FEP07_T01000_R007.INP;1
BRAGFLO_BO_FEP07_T01000_R008.INP;1
BRAGFLO_BO_FEP07_T01000_R009.INP;1
BRAGFLO_BO_FEP07_T01000_R010.INP;1
BRAGFLO_BO_FEP07_T01000_R011.INP;1
BRAGFLO_BO_FEP07_T01000_R012.INP;1
BRAGFLO_BO_FEP07_T01000_R013.INP;1
BRAGFLO_BO_FEP07_T01000_R014.INP;1
BRAGFLO_BO_FEP07_T01000_R015.INP;1
BRAGFLO_BO_FEP07_T01000_R016.INP;1
BRAGFLO_BO_FEP07_T01000_R017.INP;1
BRAGFLO_BO_FEP07_T01000_R018.INP;1
BRAGFLO_BO_FEP07_T01000_R019.INP;1
BRAGFLO_BO_FEP07_T01000_R020.INP;1
BRAGFLO_BO_FEP07_T10000_R001.INP;1
BRAGFLO_BO_FEP07_T10000_R002.INP;1
BRAGFLO_BO_FEP07_T10000_R003.INP;1
BRAGFLO_BO_FEP07_T10000_R004.INP;1

BRAGFLO_BO_FEP07_T10000_R005.INP;1 BRAGFLO_BO_FEP07_T10000_R006.INP;1
BRAGFLO_BO_FEP07_T10000_R007.INP;1 BRAGFLO_BO_FEP07_T10000_R008.INP;1
BRAGFLO_BO_FEP07_T10000_R009.INP;1 BRAGFLO_BO_FEP07_T10000_R010.INP;1
BRAGFLO_BO_FEP07_T10000_R011.INP;1 BRAGFLO_BO_FEP07_T10000_R012.INP;1
BRAGFLO_BO_FEP07_T10000_R013.INP;1 BRAGFLO_BO_FEP07_T10000_R014.INP;1
BRAGFLO_BO_FEP07_T10000_R015.INP;1 BRAGFLO_BO_FEP07_T10000_R016.INP;1
BRAGFLO_BO_FEP07_T10000_R017.INP;1 BRAGFLO_BO_FEP07_T10000_R018.INP;1
BRAGFLO_BO_FEP07_T10000_R019.INP;1 BRAGFLO_BO_FEP07_T10000_R020.INP;1
DIRLIST.LIS;1 DMS.COM;1 MACRO_BASE.MAC;6 MACRO_WICK.MAC;3
PREBRAG.EXE;56 PREBRAG_BASE.COM;2 PREBRAG_DMS.INP;2 PREBRAG_RAD.COM;1
PREBRAG_SYMBOL_NOTES.TXT;4 PREBRAG_WICK.COM;2

Directory F1:[FEP.DMS_BLOWOUT.BO_PREBRAG]

BRAGFLO_BO_FEP01_T00100_R001.INP;1 BRAGFLO_BO_FEP01_T00100_R002.INP;1
BRAGFLO_BO_FEP01_T00100_R003.INP;1 BRAGFLO_BO_FEP01_T00100_R004.INP;1
BRAGFLO_BO_FEP01_T00100_R005.INP;1 BRAGFLO_BO_FEP01_T00100_R006.INP;1
BRAGFLO_BO_FEP01_T00100_R007.INP;1 BRAGFLO_BO_FEP01_T00100_R008.INP;1
BRAGFLO_BO_FEP01_T00100_R009.INP;1 BRAGFLO_BO_FEP01_T00100_R010.INP;1
BRAGFLO_BO_FEP01_T00100_R011.INP;1 BRAGFLO_BO_FEP01_T00100_R012.INP;1
BRAGFLO_BO_FEP01_T00100_R013.INP;1 BRAGFLO_BO_FEP01_T00100_R014.INP;1
BRAGFLO_BO_FEP01_T00100_R015.INP;1 BRAGFLO_BO_FEP01_T00100_R016.INP;1
BRAGFLO_BO_FEP01_T00100_R017.INP;1 BRAGFLO_BO_FEP01_T00100_R018.INP;1
BRAGFLO_BO_FEP01_T00100_R019.INP;1 BRAGFLO_BO_FEP01_T00100_R020.INP;1
BRAGFLO_BO_FEP01_T00500_R001.INP;1 BRAGFLO_BO_FEP01_T00500_R002.INP;1
BRAGFLO_BO_FEP01_T00500_R003.INP;1 BRAGFLO_BO_FEP01_T00500_R004.INP;1
BRAGFLO_BO_FEP01_T00500_R005.INP;1 BRAGFLO_BO_FEP01_T00500_R006.INP;1
BRAGFLO_BO_FEP01_T00500_R007.INP;1 BRAGFLO_BO_FEP01_T00500_R008.INP;1
BRAGFLO_BO_FEP01_T00500_R009.INP;1 BRAGFLO_BO_FEP01_T00500_R010.INP;1
BRAGFLO_BO_FEP01_T00500_R011.INP;1 BRAGFLO_BO_FEP01_T00500_R012.INP;1
BRAGFLO_BO_FEP01_T00500_R013.INP;1 BRAGFLO_BO_FEP01_T00500_R014.INP;1
BRAGFLO_BO_FEP01_T00500_R015.INP;1 BRAGFLO_BO_FEP01_T00500_R016.INP;1
BRAGFLO_BO_FEP01_T00500_R017.INP;1 BRAGFLO_BO_FEP01_T00500_R018.INP;1
BRAGFLO_BO_FEP01_T00500_R019.INP;1 BRAGFLO_BO_FEP01_T00500_R020.INP;1
BRAGFLO_BO_FEP01_T01000_R001.INP;1 BRAGFLO_BO_FEP01_T01000_R002.INP;1
BRAGFLO_BO_FEP01_T01000_R003.INP;1 BRAGFLO_BO_FEP01_T01000_R004.INP;1
BRAGFLO_BO_FEP01_T01000_R005.INP;1 BRAGFLO_BO_FEP01_T01000_R006.INP;1
BRAGFLO_BO_FEP01_T01000_R007.INP;1 BRAGFLO_BO_FEP01_T01000_R008.INP;1
BRAGFLO_BO_FEP01_T01000_R009.INP;1 BRAGFLO_BO_FEP01_T01000_R010.INP;1
BRAGFLO_BO_FEP01_T01000_R011.INP;1 BRAGFLO_BO_FEP01_T01000_R012.INP;1
BRAGFLO_BO_FEP01_T01000_R013.INP;1 BRAGFLO_BO_FEP01_T01000_R014.INP;1
BRAGFLO_BO_FEP01_T01000_R015.INP;1 BRAGFLO_BO_FEP01_T01000_R016.INP;1
BRAGFLO_BO_FEP01_T01000_R017.INP;1 BRAGFLO_BO_FEP01_T01000_R018.INP;1
BRAGFLO_BO_FEP01_T01000_R019.INP;1 BRAGFLO_BO_FEP01_T01000_R020.INP;1

BRAGFLO_BO_FEP01_T10000_R001.INP;1 BRAGFLO_BO_FEP01_T10000_R002.INP;1
BRAGFLO_BO_FEP01_T10000_R003.INP;1 BRAGFLO_BO_FEP01_T10000_R004.INP;1
BRAGFLO_BO_FEP01_T10000_R005.INP;1 BRAGFLO_BO_FEP01_T10000_R006.INP;1
BRAGFLO_BO_FEP01_T10000_R007.INP;1 BRAGFLO_BO_FEP01_T10000_R008.INP;1
BRAGFLO_BO_FEP01_T10000_R009.INP;1 BRAGFLO_BO_FEP01_T10000_R010.INP;1
BRAGFLO_BO_FEP01_T10000_R011.INP;1 BRAGFLO_BO_FEP01_T10000_R012.INP;1
BRAGFLO_BO_FEP01_T10000_R013.INP;1 BRAGFLO_BO_FEP01_T10000_R014.INP;1
BRAGFLO_BO_FEP01_T10000_R015.INP;1 BRAGFLO_BO_FEP01_T10000_R016.INP;1
BRAGFLO_BO_FEP01_T10000_R017.INP;1 BRAGFLO_BO_FEP01_T10000_R018.INP;1
BRAGFLO_BO_FEP01_T10000_R019.INP;1 BRAGFLO_BO_FEP01_T10000_R020.INP;1
BRAGFLO_BO_FEP05_T00100_R001.INP;1 BRAGFLO_BO_FEP05_T00100_R002.INP;1
BRAGFLO_BO_FEP05_T00100_R003.INP;1 BRAGFLO_BO_FEP05_T00100_R004.INP;1
BRAGFLO_BO_FEP05_T00100_R005.INP;1 BRAGFLO_BO_FEP05_T00100_R006.INP;1
BRAGFLO_BO_FEP05_T00100_R007.INP;1 BRAGFLO_BO_FEP05_T00100_R008.INP;1
BRAGFLO_BO_FEP05_T00100_R009.INP;1 BRAGFLO_BO_FEP05_T00100_R010.INP;1
BRAGFLO_BO_FEP05_T00100_R011.INP;1 BRAGFLO_BO_FEP05_T00100_R012.INP;1
BRAGFLO_BO_FEP05_T00100_R013.INP;1 BRAGFLO_BO_FEP05_T00100_R014.INP;1
BRAGFLO_BO_FEP05_T00100_R015.INP;1 BRAGFLO_BO_FEP05_T00100_R016.INP;1
BRAGFLO_BO_FEP05_T00100_R017.INP;1 BRAGFLO_BO_FEP05_T00100_R018.INP;1
BRAGFLO_BO_FEP05_T00100_R019.INP;1 BRAGFLO_BO_FEP05_T00100_R020.INP;1
BRAGFLO_BO_FEP05_T00500_R001.INP;1 BRAGFLO_BO_FEP05_T00500_R002.INP;1
BRAGFLO_BO_FEP05_T00500_R003.INP;1 BRAGFLO_BO_FEP05_T00500_R004.INP;1
BRAGFLO_BO_FEP05_T00500_R005.INP;1 BRAGFLO_BO_FEP05_T00500_R006.INP;1
BRAGFLO_BO_FEP05_T00500_R007.INP;1 BRAGFLO_BO_FEP05_T00500_R008.INP;1
BRAGFLO_BO_FEP05_T00500_R009.INP;1 BRAGFLO_BO_FEP05_T00500_R010.INP;1
BRAGFLO_BO_FEP05_T00500_R011.INP;1 BRAGFLO_BO_FEP05_T00500_R012.INP;1
BRAGFLO_BO_FEP05_T00500_R013.INP;1 BRAGFLO_BO_FEP05_T00500_R014.INP;1
BRAGFLO_BO_FEP05_T00500_R015.INP;1 BRAGFLO_BO_FEP05_T00500_R016.INP;1
BRAGFLO_BO_FEP05_T00500_R017.INP;1 BRAGFLO_BO_FEP05_T00500_R018.INP;1
BRAGFLO_BO_FEP05_T00500_R019.INP;1 BRAGFLO_BO_FEP05_T00500_R020.INP;1
BRAGFLO_BO_FEP05_T01000_R001.INP;1 BRAGFLO_BO_FEP05_T01000_R002.INP;1
BRAGFLO_BO_FEP05_T01000_R003.INP;1 BRAGFLO_BO_FEP05_T01000_R004.INP;1
BRAGFLO_BO_FEP05_T01000_R005.INP;1 BRAGFLO_BO_FEP05_T01000_R006.INP;1
BRAGFLO_BO_FEP05_T01000_R007.INP;1 BRAGFLO_BO_FEP05_T01000_R008.INP;1
BRAGFLO_BO_FEP05_T01000_R009.INP;1 BRAGFLO_BO_FEP05_T01000_R010.INP;1
BRAGFLO_BO_FEP05_T01000_R011.INP;1 BRAGFLO_BO_FEP05_T01000_R012.INP;1
BRAGFLO_BO_FEP05_T01000_R013.INP;1 BRAGFLO_BO_FEP05_T01000_R014.INP;1
BRAGFLO_BO_FEP05_T01000_R015.INP;1 BRAGFLO_BO_FEP05_T01000_R016.INP;1
BRAGFLO_BO_FEP05_T01000_R017.INP;1 BRAGFLO_BO_FEP05_T01000_R018.INP;1
BRAGFLO_BO_FEP05_T01000_R019.INP;1 BRAGFLO_BO_FEP05_T01000_R020.INP;1
BRAGFLO_BO_FEP05_T10000_R001.INP;1 BRAGFLO_BO_FEP05_T10000_R002.INP;1
BRAGFLO_BO_FEP05_T10000_R003.INP;1 BRAGFLO_BO_FEP05_T10000_R004.INP;1
BRAGFLO_BO_FEP05_T10000_R005.INP;1 BRAGFLO_BO_FEP05_T10000_R006.INP;1
BRAGFLO_BO_FEP05_T10000_R007.INP;1 BRAGFLO_BO_FEP05_T10000_R008.INP;1
BRAGFLO_BO_FEP05_T10000_R009.INP;1 BRAGFLO_BO_FEP05_T10000_R010.INP;1

BRAGFLO_BO_FEP05_T10000_R011.INP;1 BRAGFLO_BO_FEP05_T10000_R012.INP;1
BRAGFLO_BO_FEP05_T10000_R013.INP;1 BRAGFLO_BO_FEP05_T10000_R014.INP;1
BRAGFLO_BO_FEP05_T10000_R015.INP;1 BRAGFLO_BO_FEP05_T10000_R016.INP;1
BRAGFLO_BO_FEP05_T10000_R017.INP;1 BRAGFLO_BO_FEP05_T10000_R018.INP;1
BRAGFLO_BO_FEP05_T10000_R019.INP;1 BRAGFLO_BO_FEP05_T10000_R020.INP;1
BRAGFLO_BO_FEP07_T00100_R001.INP;1 BRAGFLO_BO_FEP07_T00100_R002.INP;1
BRAGFLO_BO_FEP07_T00100_R003.INP;1 BRAGFLO_BO_FEP07_T00100_R004.INP;1
BRAGFLO_BO_FEP07_T00100_R005.INP;1 BRAGFLO_BO_FEP07_T00100_R006.INP;1
BRAGFLO_BO_FEP07_T00100_R007.INP;1 BRAGFLO_BO_FEP07_T00100_R008.INP;1
BRAGFLO_BO_FEP07_T00100_R009.INP;1 BRAGFLO_BO_FEP07_T00100_R010.INP;1
BRAGFLO_BO_FEP07_T00100_R011.INP;1 BRAGFLO_BO_FEP07_T00100_R012.INP;1
BRAGFLO_BO_FEP07_T00100_R013.INP;1 BRAGFLO_BO_FEP07_T00100_R014.INP;1
BRAGFLO_BO_FEP07_T00100_R015.INP;1 BRAGFLO_BO_FEP07_T00100_R016.INP;1
BRAGFLO_BO_FEP07_T00100_R017.INP;1 BRAGFLO_BO_FEP07_T00100_R018.INP;1
BRAGFLO_BO_FEP07_T00100_R019.INP;1 BRAGFLO_BO_FEP07_T00100_R020.INP;1
BRAGFLO_BO_FEP07_T00500_R001.INP;1 BRAGFLO_BO_FEP07_T00500_R002.INP;1
BRAGFLO_BO_FEP07_T00500_R003.INP;1 BRAGFLO_BO_FEP07_T00500_R004.INP;1
BRAGFLO_BO_FEP07_T00500_R005.INP;1 BRAGFLO_BO_FEP07_T00500_R006.INP;1
BRAGFLO_BO_FEP07_T00500_R007.INP;1 BRAGFLO_BO_FEP07_T00500_R008.INP;1
BRAGFLO_BO_FEP07_T00500_R009.INP;1 BRAGFLO_BO_FEP07_T00500_R010.INP;1
BRAGFLO_BO_FEP07_T00500_R011.INP;1 BRAGFLO_BO_FEP07_T00500_R012.INP;1
BRAGFLO_BO_FEP07_T00500_R013.INP;1 BRAGFLO_BO_FEP07_T00500_R014.INP;1
BRAGFLO_BO_FEP07_T00500_R015.INP;1 BRAGFLO_BO_FEP07_T00500_R016.INP;1
BRAGFLO_BO_FEP07_T00500_R017.INP;1 BRAGFLO_BO_FEP07_T00500_R018.INP;1
BRAGFLO_BO_FEP07_T00500_R019.INP;1 BRAGFLO_BO_FEP07_T00500_R020.INP;1
BRAGFLO_BO_FEP07_T01000_R001.INP;1 BRAGFLO_BO_FEP07_T01000_R002.INP;1
BRAGFLO_BO_FEP07_T01000_R003.INP;1 BRAGFLO_BO_FEP07_T01000_R004.INP;1
BRAGFLO_BO_FEP07_T01000_R005.INP;1 BRAGFLO_BO_FEP07_T01000_R006.INP;1
BRAGFLO_BO_FEP07_T01000_R007.INP;1 BRAGFLO_BO_FEP07_T01000_R008.INP;1
BRAGFLO_BO_FEP07_T01000_R009.INP;1 BRAGFLO_BO_FEP07_T01000_R010.INP;1
BRAGFLO_BO_FEP07_T01000_R011.INP;1 BRAGFLO_BO_FEP07_T01000_R012.INP;1
BRAGFLO_BO_FEP07_T01000_R013.INP;1 BRAGFLO_BO_FEP07_T01000_R014.INP;1
BRAGFLO_BO_FEP07_T01000_R015.INP;1 BRAGFLO_BO_FEP07_T01000_R016.INP;1
BRAGFLO_BO_FEP07_T01000_R017.INP;1 BRAGFLO_BO_FEP07_T01000_R018.INP;1
BRAGFLO_BO_FEP07_T01000_R019.INP;1 BRAGFLO_BO_FEP07_T01000_R020.INP;1
BRAGFLO_BO_FEP07_T10000_R001.INP;1 BRAGFLO_BO_FEP07_T10000_R002.INP;1
BRAGFLO_BO_FEP07_T10000_R003.INP;1 BRAGFLO_BO_FEP07_T10000_R004.INP;1
BRAGFLO_BO_FEP07_T10000_R005.INP;1 BRAGFLO_BO_FEP07_T10000_R006.INP;1
BRAGFLO_BO_FEP07_T10000_R007.INP;1 BRAGFLO_BO_FEP07_T10000_R008.INP;1
BRAGFLO_BO_FEP07_T10000_R009.INP;1 BRAGFLO_BO_FEP07_T10000_R010.INP;1
BRAGFLO_BO_FEP07_T10000_R011.INP;1 BRAGFLO_BO_FEP07_T10000_R012.INP;1
BRAGFLO_BO_FEP07_T10000_R013.INP;1 BRAGFLO_BO_FEP07_T10000_R014.INP;1
BRAGFLO_BO_FEP07_T10000_R015.INP;1 BRAGFLO_BO_FEP07_T10000_R016.INP;1
BRAGFLO_BO_FEP07_T10000_R017.INP;1 BRAGFLO_BO_FEP07_T10000_R018.INP;1
BRAGFLO_BO_FEP07_T10000_R019.INP;1 BRAGFLO_BO_FEP07_T10000_R020.INP;1
DIRLIST.LIS;1 DMS.COM;1 MACRO_BASE.MAC;6 MACRO_WICK.MAC;3
PREBRAG.EXE;56 PREBRAG_BASE.COM;2 PREBRAG_DMS.INP;2 PREBRAG_RAD.COM;1
PREBRAG_SYMBOL_NOTES.TXT;4 PREBRAG_WICK.COM;2

Directory F1:[FEP.DMS_BLOWOUT.BO_BRAGFLO]

BATCH_1.COM;12 BF2_BRAGFLO.EXE;1 BF2_BRAGFLO.FOR;1 BF2_BRAGFLO.OBJ;1
BRAGFLO_BO_FEP01_T00100_R001.BIN;1 BRAGFLO_BO_FEP01_T00100_R002.BIN;1
BRAGFLO_BO_FEP01_T00100_R003.BIN;1 BRAGFLO_BO_FEP01_T00100_R004.BIN;1
BRAGFLO_BO_FEP01_T00100_R005.BIN;1 BRAGFLO_BO_FEP01_T00100_R006.BIN;1
BRAGFLO_BO_FEP01_T00100_R007.BIN;1 BRAGFLO_BO_FEP01_T00100_R008.BIN;1
BRAGFLO_BO_FEP01_T00100_R009.BIN;1 BRAGFLO_BO_FEP01_T00100_R010.BIN;1
BRAGFLO_BO_FEP01_T00100_R011.BIN;1 BRAGFLO_BO_FEP01_T00100_R012.BIN;1
BRAGFLO_BO_FEP01_T00100_R013.BIN;1 BRAGFLO_BO_FEP01_T00100_R014.BIN;1
BRAGFLO_BO_FEP01_T00100_R015.BIN;1 BRAGFLO_BO_FEP01_T00100_R016.BIN;1
BRAGFLO_BO_FEP01_T00100_R017.BIN;1 BRAGFLO_BO_FEP01_T00100_R018.BIN;1
BRAGFLO_BO_FEP01_T00100_R019.BIN;1 BRAGFLO_BO_FEP01_T00100_R020.BIN;1
BRAGFLO_BO_FEP01_T00500_R001.BIN;1 BRAGFLO_BO_FEP01_T00500_R002.BIN;1
BRAGFLO_BO_FEP01_T00500_R003.BIN;1 BRAGFLO_BO_FEP01_T00500_R004.BIN;1
BRAGFLO_BO_FEP01_T00500_R005.BIN;1 BRAGFLO_BO_FEP01_T00500_R006.BIN;1
BRAGFLO_BO_FEP01_T00500_R007.BIN;1 BRAGFLO_BO_FEP01_T00500_R008.BIN;1
BRAGFLO_BO_FEP01_T00500_R009.BIN;1 BRAGFLO_BO_FEP01_T00500_R010.BIN;1
BRAGFLO_BO_FEP01_T00500_R011.BIN;1 BRAGFLO_BO_FEP01_T00500_R012.BIN;1
BRAGFLO_BO_FEP01_T00500_R013.BIN;1 BRAGFLO_BO_FEP01_T00500_R014.BIN;1
BRAGFLO_BO_FEP01_T00500_R015.BIN;1 BRAGFLO_BO_FEP01_T00500_R016.BIN;1
BRAGFLO_BO_FEP01_T00500_R017.BIN;1 BRAGFLO_BO_FEP01_T00500_R018.BIN;1
BRAGFLO_BO_FEP01_T00500_R019.BIN;1 BRAGFLO_BO_FEP01_T00500_R020.BIN;1
BRAGFLO_BO_FEP01_T01000_R001.BIN;1 BRAGFLO_BO_FEP01_T01000_R002.BIN;1
BRAGFLO_BO_FEP01_T01000_R003.BIN;1 BRAGFLO_BO_FEP01_T01000_R004.BIN;1
BRAGFLO_BO_FEP01_T01000_R005.BIN;1 BRAGFLO_BO_FEP01_T01000_R006.BIN;1
BRAGFLO_BO_FEP01_T01000_R007.BIN;1 BRAGFLO_BO_FEP01_T01000_R008.BIN;1
BRAGFLO_BO_FEP01_T01000_R009.BIN;1 BRAGFLO_BO_FEP01_T01000_R010.BIN;1
BRAGFLO_BO_FEP01_T01000_R011.BIN;1 BRAGFLO_BO_FEP01_T01000_R012.BIN;1
BRAGFLO_BO_FEP01_T01000_R013.BIN;1 BRAGFLO_BO_FEP01_T01000_R014.BIN;1
BRAGFLO_BO_FEP01_T01000_R015.BIN;1 BRAGFLO_BO_FEP01_T01000_R016.BIN;1
BRAGFLO_BO_FEP01_T01000_R017.BIN;1 BRAGFLO_BO_FEP01_T01000_R018.BIN;1
BRAGFLO_BO_FEP01_T01000_R019.BIN;1 BRAGFLO_BO_FEP01_T01000_R020.BIN;1
BRAGFLO_BO_FEP01_T10000_R001.BIN;1 BRAGFLO_BO_FEP01_T10000_R002.BIN;1
BRAGFLO_BO_FEP01_T10000_R003.BIN;1 BRAGFLO_BO_FEP01_T10000_R004.BIN;1
BRAGFLO_BO_FEP01_T10000_R005.BIN;1 BRAGFLO_BO_FEP01_T10000_R006.BIN;1
BRAGFLO_BO_FEP01_T10000_R007.BIN;1 BRAGFLO_BO_FEP01_T10000_R008.BIN;1
BRAGFLO_BO_FEP01_T10000_R009.BIN;1 BRAGFLO_BO_FEP01_T10000_R010.BIN;1
BRAGFLO_BO_FEP01_T10000_R011.BIN;1 BRAGFLO_BO_FEP01_T10000_R012.BIN;1
BRAGFLO_BO_FEP01_T10000_R013.BIN;1 BRAGFLO_BO_FEP01_T10000_R014.BIN;1
BRAGFLO_BO_FEP01_T10000_R015.BIN;1 BRAGFLO_BO_FEP01_T10000_R016.BIN;1
BRAGFLO_BO_FEP01_T10000_R017.BIN;1 BRAGFLO_BO_FEP01_T10000_R018.BIN;1
BRAGFLO_BO_FEP01_T10000_R019.BIN;1 BRAGFLO_BO_FEP01_T10000_R020.BIN;1
BRAGFLO_BO_FEP05_T00100_R001.BIN;1 BRAGFLO_BO_FEP05_T00100_R002.BIN;1

BRAGFLO_BO_FEP05_T00100_R003.BIN;1
BRAGFLO_BO_FEP05_T00100_R004.BIN;1
BRAGFLO_BO_FEP05_T00100_R005.BIN;1
BRAGFLO_BO_FEP05_T00100_R006.BIN;1
BRAGFLO_BO_FEP05_T00100_R007.BIN;1
BRAGFLO_BO_FEP05_T00100_R008.BIN;1
BRAGFLO_BO_FEP05_T00100_R009.BIN;1
BRAGFLO_BO_FEP05_T00100_R010.BIN;1
BRAGFLO_BO_FEP05_T00100_R011.BIN;1
BRAGFLO_BO_FEP05_T00100_R012.BIN;1
BRAGFLO_BO_FEP05_T00100_R013.BIN;1
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BRAGFLO_BO_FEP05_T00100_R015.BIN;1
BRAGFLO_BO_FEP05_T00100_R016.BIN;1
BRAGFLO_BO_FEP05_T00100_R017.BIN;1
BRAGFLO_BO_FEP05_T00100_R018.BIN;1
BRAGFLO_BO_FEP05_T00100_R019.BIN;1
BRAGFLO_BO_FEP05_T00100_R020.BIN;1
BRAGFLO_BO_FEP05_T00500_R001.BIN;1
BRAGFLO_BO_FEP05_T00500_R002.BIN;1
BRAGFLO_BO_FEP05_T00500_R003.BIN;1
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BRAGFLO_BO_FEP05_T00500_R005.BIN;1
BRAGFLO_BO_FEP05_T00500_R006.BIN;1
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BRAGFLO_BO_FEP05_T00500_R015.BIN;1
BRAGFLO_BO_FEP05_T00500_R016.BIN;1
BRAGFLO_BO_FEP05_T00500_R017.BIN;1
BRAGFLO_BO_FEP05_T00500_R018.BIN;1
BRAGFLO_BO_FEP05_T00500_R019.BIN;1
BRAGFLO_BO_FEP05_T00500_R020.BIN;1
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BRAGFLO_BO_FEP05_T01000_R003.BIN;1
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BRAGFLO_BO_FEP05_T10000_R005.BIN;1
BRAGFLO_BO_FEP05_T10000_R006.BIN;1
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BRAGFLO_BO_FEP05_T10000_R008.BIN;1
BRAGFLO_BO_FEP05_T10000_R009.BIN;1
BRAGFLO_BO_FEP05_T10000_R010.BIN;1
BRAGFLO_BO_FEP05_T10000_R011.BIN;1
BRAGFLO_BO_FEP05_T10000_R012.BIN;1
BRAGFLO_BO_FEP05_T10000_R013.BIN;1
BRAGFLO_BO_FEP05_T10000_R014.BIN;1
BRAGFLO_BO_FEP05_T10000_R015.BIN;1
BRAGFLO_BO_FEP05_T10000_R016.BIN;1
BRAGFLO_BO_FEP05_T10000_R017.BIN;1
BRAGFLO_BO_FEP05_T10000_R018.BIN;1
BRAGFLO_BO_FEP05_T10000_R019.BIN;1
BRAGFLO_BO_FEP05_T10000_R020.BIN;1
BRAGFLO_BO_FEP07_T00100_R001.BIN;1
BRAGFLO_BO_FEP07_T00100_R002.BIN;1
BRAGFLO_BO_FEP07_T00100_R003.BIN;1
BRAGFLO_BO_FEP07_T00100_R004.BIN;1
BRAGFLO_BO_FEP07_T00100_R005.BIN;1
BRAGFLO_BO_FEP07_T00100_R006.BIN;1
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BRAGFLO_BO_FEP07_T00100_R010.BIN;1
BRAGFLO_BO_FEP07_T00100_R011.BIN;1
BRAGFLO_BO_FEP07_T00100_R012.BIN;1
BRAGFLO_BO_FEP07_T00100_R013.BIN;1
BRAGFLO_BO_FEP07_T00100_R014.BIN;1

BRAGFLO_BO_FEP07_T00100_R015.BIN;1 BRAGFLO_BO_FEP07_T00100_R016.BIN;1
BRAGFLO_BO_FEP07_T00100_R017.BIN;1 BRAGFLO_BO_FEP07_T00100_R018.BIN;1
BRAGFLO_BO_FEP07_T00100_R019.BIN;1 BRAGFLO_BO_FEP07_T00100_R020.BIN;1
BRAGFLO_BO_FEP07_T00500_R001.BIN;1 BRAGFLO_BO_FEP07_T00500_R002.BIN;1
BRAGFLO_BO_FEP07_T00500_R003.BIN;1 BRAGFLO_BO_FEP07_T00500_R004.BIN;1
BRAGFLO_BO_FEP07_T00500_R005.BIN;1 BRAGFLO_BO_FEP07_T00500_R006.BIN;1
BRAGFLO_BO_FEP07_T00500_R007.BIN;1 BRAGFLO_BO_FEP07_T00500_R008.BIN;1
BRAGFLO_BO_FEP07_T00500_R009.BIN;1 BRAGFLO_BO_FEP07_T00500_R010.BIN;1
BRAGFLO_BO_FEP07_T00500_R011.BIN;1 BRAGFLO_BO_FEP07_T00500_R012.BIN;1
BRAGFLO_BO_FEP07_T00500_R013.BIN;1 BRAGFLO_BO_FEP07_T00500_R014.BIN;1
BRAGFLO_BO_FEP07_T00500_R015.BIN;1 BRAGFLO_BO_FEP07_T00500_R016.BIN;1
BRAGFLO_BO_FEP07_T00500_R017.BIN;1 BRAGFLO_BO_FEP07_T00500_R018.BIN;1
BRAGFLO_BO_FEP07_T00500_R019.BIN;1 BRAGFLO_BO_FEP07_T00500_R020.BIN;1
BRAGFLO_BO_FEP07_T01000_R001.BIN;1 BRAGFLO_BO_FEP07_T01000_R002.BIN;1
BRAGFLO_BO_FEP07_T01000_R003.BIN;1 BRAGFLO_BO_FEP07_T01000_R004.BIN;1
BRAGFLO_BO_FEP07_T01000_R005.BIN;1 BRAGFLO_BO_FEP07_T01000_R006.BIN;1
BRAGFLO_BO_FEP07_T01000_R007.BIN;1 BRAGFLO_BO_FEP07_T01000_R008.BIN;1
BRAGFLO_BO_FEP07_T01000_R009.BIN;1 BRAGFLO_BO_FEP07_T01000_R010.BIN;1
BRAGFLO_BO_FEP07_T01000_R011.BIN;1 BRAGFLO_BO_FEP07_T01000_R012.BIN;1
BRAGFLO_BO_FEP07_T01000_R013.BIN;1 BRAGFLO_BO_FEP07_T01000_R014.BIN;1
BRAGFLO_BO_FEP07_T01000_R015.BIN;1 BRAGFLO_BO_FEP07_T01000_R016.BIN;1
BRAGFLO_BO_FEP07_T01000_R017.BIN;1 BRAGFLO_BO_FEP07_T01000_R018.BIN;1
BRAGFLO_BO_FEP07_T01000_R019.BIN;1 BRAGFLO_BO_FEP07_T01000_R020.BIN;1
BRAGFLO_BO_FEP07_T10000_R001.BIN;1 BRAGFLO_BO_FEP07_T10000_R002.BIN;1
BRAGFLO_BO_FEP07_T10000_R003.BIN;1 BRAGFLO_BO_FEP07_T10000_R004.BIN;1
BRAGFLO_BO_FEP07_T10000_R005.BIN;1 BRAGFLO_BO_FEP07_T10000_R006.BIN;1
BRAGFLO_BO_FEP07_T10000_R007.BIN;1 BRAGFLO_BO_FEP07_T10000_R008.BIN;1
BRAGFLO_BO_FEP07_T10000_R009.BIN;1 BRAGFLO_BO_FEP07_T10000_R010.BIN;1
BRAGFLO_BO_FEP07_T10000_R011.BIN;1 BRAGFLO_BO_FEP07_T10000_R012.BIN;1
BRAGFLO_BO_FEP07_T10000_R013.BIN;1 BRAGFLO_BO_FEP07_T10000_R014.BIN;1
BRAGFLO_BO_FEP07_T10000_R015.BIN;1 BRAGFLO_BO_FEP07_T10000_R016.BIN;1
BRAGFLO_BO_FEP07_T10000_R017.BIN;1 BRAGFLO_BO_FEP07_T10000_R018.BIN;1
BRAGFLO_BO_FEP07_T10000_R019.BIN;1 BRAGFLO_BO_FEP07_T10000_R020.BIN;1
BRF_BASE1.COM;2 BRF_BASE2.COM;2 BRF_RAD1.COM;1 BRF_RAD2.COM;1
BRF_WICK1.COM;2 BRF_WICK2.COM;2 DIRLIST.LIS;1 MACRO_BASE1.MAC;3
MACRO_BASE2.MAC;2 MACRO_WICK1.MAC;2 MACRO_WICK2.MAC;2

Directory F1:[FEP.DMS_BLOWOUT.POSTBRAG]

ALGEBRA_BO_PSTB_FEP01_T00100_R001.CDB;1
ALGEBRA_BO_PSTB_FEP01_T00100_R002.CDB;1
ALGEBRA_BO_PSTB_FEP01_T00100_R003.CDB;1
ALGEBRA_BO_PSTB_FEP01_T00100_R004.CDB;1
ALGEBRA_BO_PSTB_FEP01_T00100_R005.CDB;1
ALGEBRA_BO_PSTB_FEP01_T00100_R006.CDB;1

ALGEBRA_BO_PSTB_FEP01_T00100_R007.CDB;1
ALGEBRA_BO_PSTB_FEP01_T00100_R008.CDB;1
ALGEBRA_BO_PSTB_FEP01_T00100_R009.CDB;1
ALGEBRA_BO_PSTB_FEP01_T00100_R010.CDB;1
ALGEBRA_BO_PSTB_FEP01_T00100_R011.CDB;1
ALGEBRA_BO_PSTB_FEP01_T00100_R012.CDB;1
ALGEBRA_BO_PSTB_FEP01_T00100_R013.CDB;1
ALGEBRA_BO_PSTB_FEP01_T00100_R014.CDB;1
ALGEBRA_BO_PSTB_FEP01_T00100_R015.CDB;1
ALGEBRA_BO_PSTB_FEP01_T00100_R016.CDB;1
ALGEBRA_BO_PSTB_FEP01_T00100_R017.CDB;1
ALGEBRA_BO_PSTB_FEP01_T00100_R018.CDB;1
ALGEBRA_BO_PSTB_FEP01_T00100_R019.CDB;1
ALGEBRA_BO_PSTB_FEP01_T00100_R020.CDB;1
ALGEBRA_BO_PSTB_FEP01_T00500_R001.CDB;1
ALGEBRA_BO_PSTB_FEP01_T00500_R002.CDB;1
ALGEBRA_BO_PSTB_FEP01_T00500_R003.CDB;1
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ALGEBRA_BO_PSTB_FEP01_T01000_R011.CDB;1
ALGEBRA_BO_PSTB_FEP01_T01000_R012.CDB;1

ALGEBRA_BO_PSTB_FEP01_T01000_R013.CDB;1
ALGEBRA_BO_PSTB_FEP01_T01000_R014.CDB;1
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ALGEBRA_BO_PSTB_FEP05_T01000_R014.CDB;1
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ALGEBRA_BO_PSTB_FEP07_T10000_R020.CDB;1

ALG_BATCH1.COM;2 BATCH_B1.COM;4 BLOT.PST;2 BLOT.PST;1
BO_PB_ALG.INP;2 DIRLIST.LIS;2 DIRLIST.LIS;1 FOR001.DAT;1
FOR002.DAT;1 GROPE.LIS;1 MACRO_ALG.MAC;2
MACRO_POSTBRAG.MAC;1 POSTBRAG.COM;2 POSTBRAG_ALG.COM;2
POSTBRAG_ALG_RAD.COM;1 POSTBRAG_BO_FEP01_T00100_R001.CDB;2
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POSTBRAG_BO_FEP07_T01000_R003.CDB;1
POSTBRAG_BO_FEP07_T01000_R004.CDB;1
POSTBRAG_BO_FEP07_T01000_R005.CDB;1
POSTBRAG_BO_FEP07_T01000_R006.CDB;1
POSTBRAG_BO_FEP07_T01000_R007.CDB;1
POSTBRAG_BO_FEP07_T01000_R008.CDB;1
POSTBRAG_BO_FEP07_T01000_R009.CDB;1
POSTBRAG_BO_FEP07_T01000_R010.CDB;1
POSTBRAG_BO_FEP07_T01000_R011.CDB;1
POSTBRAG_BO_FEP07_T01000_R012.CDB;1
POSTBRAG_BO_FEP07_T01000_R013.CDB;1
POSTBRAG_BO_FEP07_T01000_R014.CDB;1
POSTBRAG_BO_FEP07_T01000_R015.CDB;1
POSTBRAG_BO_FEP07_T01000_R016.CDB;1
POSTBRAG_BO_FEP07_T01000_R017.CDB;1
POSTBRAG_BO_FEP07_T01000_R018.CDB;1
POSTBRAG_BO_FEP07_T01000_R019.CDB;1
POSTBRAG_BO_FEP07_T01000_R020.CDB;1
POSTBRAG_BO_FEP07_T10000_R001.CDB;1
POSTBRAG_BO_FEP07_T10000_R002.CDB;1
POSTBRAG_BO_FEP07_T10000_R003.CDB;1
POSTBRAG_BO_FEP07_T10000_R004.CDB;1
POSTBRAG_BO_FEP07_T10000_R005.CDB;1
POSTBRAG_BO_FEP07_T10000_R006.CDB;1
POSTBRAG_BO_FEP07_T10000_R007.CDB;1
POSTBRAG_BO_FEP07_T10000_R008.CDB;1
POSTBRAG_BO_FEP07_T10000_R009.CDB;1
POSTBRAG_BO_FEP07_T10000_R010.CDB;1
POSTBRAG_BO_FEP07_T10000_R011.CDB;1
POSTBRAG_BO_FEP07_T10000_R012.CDB;1
POSTBRAG_BO_FEP07_T10000_R013.CDB;1
POSTBRAG_BO_FEP07_T10000_R014.CDB;1
POSTBRAG_BO_FEP07_T10000_R015.CDB;1
POSTBRAG_BO_FEP07_T10000_R016.CDB;1
POSTBRAG_BO_FEP07_T10000_R017.CDB;1
POSTBRAG_BO_FEP07_T10000_R018.CDB;1
POSTBRAG_BO_FEP07_T10000_R019.CDB;1
POSTBRAG_BO_FEP07_T10000_R020.CDB;1
POSTBRAG_RAD.COM;1
POST_ALG_VARS.INP;5

Directory F2:[FEP.GARNER]

ALGEBRA.INP;1 BASE.DIR;1 BLOW.DIR;1 BPANEL.EXE;1
CCDFPLOT.COM;4 CCDFPLOT.COM;3 CCDFPLOT.COM;2 CCDFPLOT.COM;1
CCDFPLOT.OUT;1 CCDFPLOT.PST;4 CCDFPLOT.PST;3 CCDFPLOT.PST;2
CCDFPLOT.PST;1 CCDFPLOT_E0.INP;8 CCDFPLOT_E0.INP;7 CCDFPLOT_E0.INP;6
CCDFPLOT_E0.INP;5 CCDFPLOT_E0.INP;4 CCDFPLOT_E0.INP;3 CCDFPLOT_E0.INP;2
CCDFPLOT_E0.INP;1 CCDFPLOT_E1.INP;7 CCDFPLOT_E1.INP;6 CCDFPLOT_E1.INP;5
CCDFPLOT_E1.INP;4 CCDFPLOT_E1.INP;3 CCDFPLOT_E1.INP;2 CCDFPLOT_E1.INP;1
CCDFPLOT_E1D.INP;8 CCDFPLOT_E1D.INP;7 CCDFPLOT_E1D.INP;6 CCDFPLOT_E1D.INP;5
CCDFPLOT_E1D.INP;4 CCDFPLOT_E1D.INP;3 CCDFPLOT_E1D.INP;2 CCDFPLOT_E1D.INP;1
CCDFPLOT_MBC.COM;1 CCDFPLOT_MBE0.INP;8 CCDFPLOT_MBE0.INP;7
CCDFPLOT_MBE0.INP;6
CCDFPLOT_MBE0.INP;5 CCDFPLOT_MBE0.INP;4 CCDFPLOT_MBE0.INP;3
CCDFPLOT_MBE0.INP;2
CCDFPLOT_MBE0.INP;1 CCDFPLOT_MBE0C.INP;7
CCDFPLOT_MBE0C.INP;1 CCDFPLOT_MBE1.INP;8 CCDFPLOT_MBE1.INP;7
CCDFPLOT_MBE1.INP;6 CCDFPLOT_MBE1.INP;5 CCDFPLOT_MBE1.INP;4
CCDFPLOT_MBE1.INP;3
CCDFPLOT_MBE1.INP;2 CCDFPLOT_MBE1.INP;1 CCDFPLOT_MBE1C.INP;7
CCDFPLOT_MBE1C.INP;1 CCDFPLOT_MBE1D.INP;8
CCDFPLOT_MBE1D.INP;7 CCDFPLOT_MBE1D.INP;6
CCDFPLOT_MBE1D.INP;5 CCDFPLOT_MBE1D.INP;4
CCDFPLOT_MBE1D.INP;3 CCDFPLOT_MBE1D.INP;2
CCDFPLOT_MBE1D.INP;1 CCDFPLOT_MBE1DC.INP;7
CCDFPLOT_MBE1DC.INP;1 DGAS.DIR;1 DRZ.DIR;1
GENNET_S00.CDB;1 GENNET_S00.INP;1 LHS_S00_S_R001.CDB;1
LHS_S00_S_R002.CDB;1 LHS_S00_S_R003.CDB;1
LHS_S00_S_R004.CDB;1 LHS_S00_S_R005.CDB;1
LHS_S00_S_R006.CDB;1 LHS_S00_S_R007.CDB;1
LHS_S00_S_R008.CDB;1 LHS_S00_S_R009.CDB;1
LHS_S00_S_R010.CDB;1 LHS_S00_S_R011.CDB;1
LHS_S00_S_R012.CDB;1 LHS_S00_S_R013.CDB;1
LHS_S00_S_R014.CDB;1 LHS_S00_S_R015.CDB;1
LHS_S00_S_R016.CDB;1 LHS_S00_S_R017.CDB;1
LHS_S00_S_R018.CDB;1 LHS_S00_S_R019.CDB;1
LHS_S00_S_R020.CDB;1 MATSET_S00.CDB;1 MATSET_S00.INP;1
MCS.DIR;1 MPANEL.EXE;1 PLOT.N1;1 PLOT.N10;1
PLOT.N2;1 PLOT.N3;1 PLOT.N4;1 PLOT.N5;1
PLOT.N6;1 PLOT.N7;1 PLOT.N8;1 PLOT.N9;1
POSTLHS_S00.INP;1 PUD.DIR;1 RAD.DIR;1 SCENARIO_00.LOG;1
SECO.DIR;1 SPANEL.EXE;1 VPC.DIR;1 WICK.DIR;1

Directory F2:[FEP.GARNER.BLOW]

CCDFPLOT.COM;2 CCDFPLOT.COM;1 CCDFPLOT.PST;6 CCDFPLOT.PST;5
CCDFPLOT.PST;4 CCDFPLOT.PST;3 CCDFPLOT.PST;2 CCDFPLOT.PST;1
CCDFPLOT_R.COM;2 CCDFPLOT_R.COM;1 CCDFPLOT_T00100.INP;1
CCDFPLOT_T00500.INP;1 CCDFPLOT_T01000.INP;1
CCDFPLOT_T10000.INP;1 CCDFPLOT_T10000R.INP;3
CCDFPLOT_T10000R.INP;2 CCDFPLOT_T10000R.INP;1
PANEL1.DIR;1 PANEL5.DIR;1 PANEL7.DIR;1 PLOT.B1;1
PLOT.B2;1 PLOT.B3;1 PLOT.B4;1

Directory F2:[FEP.GARNER.BLOW.PANEL1]

BATCHALL.COM;3 BATCHALL.COM;2 BATCHALL.COM;1 BATCH_BLOW.COM;1
BATCH_BLOW_A.COM;1 CCDF.DIR;1 PANEL_T00100_S00_S_R001.CDB;2
PANEL_T00100_S00_S_R001.DBG;1 PANEL_T00100_S00_S_R002.CDB;2
PANEL_T00100_S00_S_R002.DBG;1 PANEL_T00100_S00_S_R003.CDB;2
PANEL_T00100_S00_S_R003.DBG;1 PANEL_T00100_S00_S_R004.CDB;2
PANEL_T00100_S00_S_R004.DBG;1 PANEL_T00100_S00_S_R005.CDB;2
PANEL_T00100_S00_S_R005.DBG;1 PANEL_T00100_S00_S_R006.CDB;2
PANEL_T00100_S00_S_R006.DBG;1 PANEL_T00100_S00_S_R007.CDB;2
PANEL_T00100_S00_S_R007.DBG;1 PANEL_T00100_S00_S_R008.CDB;2
PANEL_T00100_S00_S_R008.DBG;1 PANEL_T00100_S00_S_R009.CDB;2
PANEL_T00100_S00_S_R009.DBG;1 PANEL_T00100_S00_S_R010.CDB;2
PANEL_T00100_S00_S_R010.DBG;1 PANEL_T00100_S00_S_R011.CDB;2
PANEL_T00100_S00_S_R011.DBG;1 PANEL_T00100_S00_S_R012.CDB;2
PANEL_T00100_S00_S_R012.DBG;1 PANEL_T00100_S00_S_R013.CDB;2
PANEL_T00100_S00_S_R013.DBG;1 PANEL_T00100_S00_S_R014.CDB;2
PANEL_T00100_S00_S_R014.DBG;1 PANEL_T00100_S00_S_R015.CDB;2
PANEL_T00100_S00_S_R015.DBG;1 PANEL_T00100_S00_S_R016.CDB;2
PANEL_T00100_S00_S_R016.DBG;1 PANEL_T00100_S00_S_R017.CDB;2
PANEL_T00100_S00_S_R017.DBG;1 PANEL_T00100_S00_S_R018.CDB;2
PANEL_T00100_S00_S_R018.DBG;1 PANEL_T00100_S00_S_R019.CDB;2
PANEL_T00100_S00_S_R019.DBG;1 PANEL_T00100_S00_S_R020.CDB;2
PANEL_T00100_S00_S_R020.DBG;1 PANEL_T00500_S00_S_R001.CDB;2
PANEL_T00500_S00_S_R001.DBG;1 PANEL_T00500_S00_S_R002.CDB;2
PANEL_T00500_S00_S_R002.DBG;1 PANEL_T00500_S00_S_R003.CDB;2
PANEL_T00500_S00_S_R003.DBG;1 PANEL_T00500_S00_S_R004.CDB;2
PANEL_T00500_S00_S_R004.DBG;1 PANEL_T00500_S00_S_R005.CDB;2
PANEL_T00500_S00_S_R005.DBG;1 PANEL_T00500_S00_S_R006.CDB;2
PANEL_T00500_S00_S_R006.DBG;1 PANEL_T00500_S00_S_R007.CDB;2
PANEL_T00500_S00_S_R007.DBG;1 PANEL_T00500_S00_S_R008.CDB;2
PANEL_T00500_S00_S_R008.DBG;1 PANEL_T00500_S00_S_R009.CDB;2
PANEL_T00500_S00_S_R009.DBG;1 PANEL_T00500_S00_S_R010.CDB;2
PANEL_T00500_S00_S_R010.DBG;1 PANEL_T00500_S00_S_R011.CDB;2
PANEL_T00500_S00_S_R011.DBG;1 PANEL_T00500_S00_S_R012.CDB;2

PANEL_T00500_S00_S_R012.DBG;1
PANEL_T00500_S00_S_R013.DBG;1
PANEL_T00500_S00_S_R014.DBG;1
PANEL_T00500_S00_S_R015.DBG;1
PANEL_T00500_S00_S_R016.DBG;1
PANEL_T00500_S00_S_R017.DBG;1
PANEL_T00500_S00_S_R018.DBG;1
PANEL_T00500_S00_S_R019.DBG;1
PANEL_T00500_S00_S_R020.DBG;1
PANEL_T01000_S00_S_R001.DBG;1
PANEL_T01000_S00_S_R002.DBG;1
PANEL_T01000_S00_S_R003.DBG;1
PANEL_T01000_S00_S_R004.DBG;1
PANEL_T01000_S00_S_R005.DBG;1
PANEL_T01000_S00_S_R006.DBG;1
PANEL_T01000_S00_S_R007.DBG;1
PANEL_T01000_S00_S_R008.DBG;1
PANEL_T01000_S00_S_R009.DBG;1
PANEL_T01000_S00_S_R010.DBG;1
PANEL_T01000_S00_S_R011.DBG;1
PANEL_T01000_S00_S_R012.DBG;1
PANEL_T01000_S00_S_R013.DBG;1
PANEL_T01000_S00_S_R014.DBG;1
PANEL_T01000_S00_S_R015.DBG;1
PANEL_T01000_S00_S_R016.DBG;1
PANEL_T01000_S00_S_R017.DBG;1
PANEL_T01000_S00_S_R018.DBG;1
PANEL_T01000_S00_S_R019.DBG;1
PANEL_T01000_S00_S_R020.DBG;1
PANEL_T10000_S00_S_R001.DBG;1
PANEL_T10000_S00_S_R002.DBG;1
PANEL_T10000_S00_S_R003.DBG;1
PANEL_T10000_S00_S_R004.DBG;1
PANEL_T10000_S00_S_R005.DBG;1
PANEL_T10000_S00_S_R006.DBG;1
PANEL_T10000_S00_S_R007.DBG;1
PANEL_T10000_S00_S_R008.DBG;1
PANEL_T10000_S00_S_R009.DBG;1
PANEL_T10000_S00_S_R010.DBG;1
PANEL_T10000_S00_S_R011.DBG;1
PANEL_T10000_S00_S_R012.DBG;1
PANEL_T10000_S00_S_R013.DBG;1
PANEL_T10000_S00_S_R014.DBG;1
PANEL_T10000_S00_S_R015.DBG;1
PANEL_T10000_S00_S_R016.DBG;1
PANEL_T10000_S00_S_R017.DBG;1
PANEL_T10000_S00_S_R018.DBG;1
PANEL_T10000_S00_S_R019.DBG;1
PANEL_T10000_S00_S_R020.DBG;1

PANEL_T00500_S00_S_R013.CDB;2
PANEL_T00500_S00_S_R014.CDB;2
PANEL_T00500_S00_S_R015.CDB;2
PANEL_T00500_S00_S_R016.CDB;2
PANEL_T00500_S00_S_R017.CDB;2
PANEL_T00500_S00_S_R018.CDB;2
PANEL_T00500_S00_S_R019.CDB;2
PANEL_T00500_S00_S_R020.CDB;2
PANEL_T01000_S00_S_R001.CDB;2
PANEL_T01000_S00_S_R002.CDB;2
PANEL_T01000_S00_S_R003.CDB;2
PANEL_T01000_S00_S_R004.CDB;2
PANEL_T01000_S00_S_R005.CDB;2
PANEL_T01000_S00_S_R006.CDB;2
PANEL_T01000_S00_S_R007.CDB;2
PANEL_T01000_S00_S_R008.CDB;2
PANEL_T01000_S00_S_R009.CDB;2
PANEL_T01000_S00_S_R010.CDB;2
PANEL_T01000_S00_S_R011.CDB;2
PANEL_T01000_S00_S_R012.CDB;2
PANEL_T01000_S00_S_R013.CDB;2
PANEL_T01000_S00_S_R014.CDB;2
PANEL_T01000_S00_S_R015.CDB;2
PANEL_T01000_S00_S_R016.CDB;2
PANEL_T01000_S00_S_R017.CDB;2
PANEL_T01000_S00_S_R018.CDB;2
PANEL_T01000_S00_S_R019.CDB;2
PANEL_T01000_S00_S_R020.CDB;2
PANEL_T10000_S00_S_R001.CDB;2
PANEL_T10000_S00_S_R002.CDB;2
PANEL_T10000_S00_S_R003.CDB;2
PANEL_T10000_S00_S_R004.CDB;2
PANEL_T10000_S00_S_R005.CDB;2
PANEL_T10000_S00_S_R006.CDB;2
PANEL_T10000_S00_S_R007.CDB;2
PANEL_T10000_S00_S_R008.CDB;2
PANEL_T10000_S00_S_R009.CDB;2
PANEL_T10000_S00_S_R010.CDB;2
PANEL_T10000_S00_S_R011.CDB;2
PANEL_T10000_S00_S_R012.CDB;2
PANEL_T10000_S00_S_R013.CDB;2
PANEL_T10000_S00_S_R014.CDB;2
PANEL_T10000_S00_S_R015.CDB;2
PANEL_T10000_S00_S_R016.CDB;2
PANEL_T10000_S00_S_R017.CDB;2
PANEL_T10000_S00_S_R018.CDB;2
PANEL_T10000_S00_S_R019.CDB;2
PANEL_T10000_S00_S_R020.CDB;2

Directory F2:[FEP.GARNER.BLOW.PANEL5]

BATCHALL.COM;4 BATCH_BLOW.COM;2 BATCH_BLOW_A.COM;2 CCDF.DIR;1
PANEL_T10000_S00_S_R001.CDB;2 PANEL_T10000_S00_S_R001.DBG;1
PANEL_T10000_S00_S_R002.CDB;2 PANEL_T10000_S00_S_R002.DBG;1
PANEL_T10000_S00_S_R003.CDB;2 PANEL_T10000_S00_S_R003.DBG;1
PANEL_T10000_S00_S_R004.CDB;2 PANEL_T10000_S00_S_R004.DBG;1
PANEL_T10000_S00_S_R005.CDB;2 PANEL_T10000_S00_S_R005.DBG;1
PANEL_T10000_S00_S_R006.CDB;2 PANEL_T10000_S00_S_R006.DBG;1
PANEL_T10000_S00_S_R007.CDB;2 PANEL_T10000_S00_S_R007.DBG;1
PANEL_T10000_S00_S_R008.CDB;2 PANEL_T10000_S00_S_R008.DBG;1
PANEL_T10000_S00_S_R009.CDB;2 PANEL_T10000_S00_S_R009.DBG;1
PANEL_T10000_S00_S_R010.CDB;2 PANEL_T10000_S00_S_R010.DBG;1
PANEL_T10000_S00_S_R011.CDB;2 PANEL_T10000_S00_S_R011.DBG;1
PANEL_T10000_S00_S_R012.CDB;2 PANEL_T10000_S00_S_R012.DBG;1
PANEL_T10000_S00_S_R013.CDB;2 PANEL_T10000_S00_S_R013.DBG;1
PANEL_T10000_S00_S_R014.CDB;2 PANEL_T10000_S00_S_R014.DBG;1
PANEL_T10000_S00_S_R015.CDB;2 PANEL_T10000_S00_S_R015.DBG;1
PANEL_T10000_S00_S_R016.CDB;2 PANEL_T10000_S00_S_R016.DBG;1
PANEL_T10000_S00_S_R017.CDB;2 PANEL_T10000_S00_S_R017.DBG;1
PANEL_T10000_S00_S_R018.CDB;2 PANEL_T10000_S00_S_R018.DBG;1
PANEL_T10000_S00_S_R019.CDB;2 PANEL_T10000_S00_S_R019.DBG;1
PANEL_T10000_S00_S_R020.CDB;2 PANEL_T10000_S00_S_R020.DBG;1

Directory F2:[FEP.GARNER.BLOW.PANEL7]

BATCHALL.COM;3 BATCHALL.COM;2 BATCHALL.COM;1 BATCH_BLOW.COM;1
BATCH_BLOW_A.COM;1 CCDF.DIR;1 PANEL_T00100_S00_S_R001.CDB;2
PANEL_T00100_S00_S_R001.DBG;1 PANEL_T00100_S00_S_R002.CDB;2
PANEL_T00100_S00_S_R002.DBG;1 PANEL_T00100_S00_S_R003.CDB;2
PANEL_T00100_S00_S_R003.DBG;1 PANEL_T00100_S00_S_R004.CDB;2
PANEL_T00100_S00_S_R004.DBG;1 PANEL_T00100_S00_S_R005.CDB;2
PANEL_T00100_S00_S_R005.DBG;1 PANEL_T00100_S00_S_R006.CDB;2
PANEL_T00100_S00_S_R006.DBG;1 PANEL_T00100_S00_S_R007.CDB;2
PANEL_T00100_S00_S_R007.DBG;1 PANEL_T00100_S00_S_R008.CDB;2
PANEL_T00100_S00_S_R008.DBG;1 PANEL_T00100_S00_S_R009.CDB;2
PANEL_T00100_S00_S_R009.DBG;1 PANEL_T00100_S00_S_R010.CDB;2
PANEL_T00100_S00_S_R010.DBG;1 PANEL_T00100_S00_S_R011.CDB;2
PANEL_T00100_S00_S_R011.DBG;1 PANEL_T00100_S00_S_R012.CDB;2
PANEL_T00100_S00_S_R012.DBG;1 PANEL_T00100_S00_S_R013.CDB;2
PANEL_T00100_S00_S_R013.DBG;1 PANEL_T00100_S00_S_R014.CDB;2
PANEL_T00100_S00_S_R014.DBG;1 PANEL_T00100_S00_S_R015.CDB;2
PANEL_T00100_S00_S_R015.DBG;1 PANEL_T00100_S00_S_R016.CDB;2
PANEL_T00100_S00_S_R016.DBG;1 PANEL_T00100_S00_S_R017.CDB;2

PANEL_T00100_S00_S_R017.DBG;1
PANEL_T00100_S00_S_R018.DBG;1
PANEL_T00100_S00_S_R019.DBG;1
PANEL_T00100_S00_S_R020.DBG;1
PANEL_T00500_S00_S_R001.DBG;1
PANEL_T00500_S00_S_R002.DBG;1
PANEL_T00500_S00_S_R003.DBG;1
PANEL_T00500_S00_S_R004.DBG;1
PANEL_T00500_S00_S_R005.DBG;1
PANEL_T00500_S00_S_R006.DBG;1
PANEL_T00500_S00_S_R007.DBG;1
PANEL_T00500_S00_S_R008.DBG;1
PANEL_T00500_S00_S_R009.DBG;1
PANEL_T00500_S00_S_R010.DBG;1
PANEL_T00500_S00_S_R011.DBG;1
PANEL_T00500_S00_S_R012.DBG;1
PANEL_T00500_S00_S_R013.DBG;1
PANEL_T00500_S00_S_R014.DBG;1
PANEL_T00500_S00_S_R015.DBG;1
PANEL_T00500_S00_S_R016.DBG;1
PANEL_T00500_S00_S_R017.DBG;1
PANEL_T00500_S00_S_R018.DBG;1
PANEL_T00500_S00_S_R019.DBG;1
PANEL_T00500_S00_S_R020.DBG;1
PANEL_T01000_S00_S_R001.DBG;1
PANEL_T01000_S00_S_R002.DBG;1
PANEL_T01000_S00_S_R003.DBG;1
PANEL_T01000_S00_S_R004.DBG;1
PANEL_T01000_S00_S_R005.DBG;1
PANEL_T01000_S00_S_R006.DBG;1
PANEL_T01000_S00_S_R007.DBG;1
PANEL_T01000_S00_S_R008.DBG;1
PANEL_T01000_S00_S_R009.DBG;1
PANEL_T01000_S00_S_R010.DBG;1
PANEL_T01000_S00_S_R011.DBG;1
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Section I- PLATFORM

The FEP screening calculations were performed on a Digital Equipment Corporation (DEC) ALPHA 2100/4 (named Beatle), which is a member machine of the WIPP ALPHA Cluster. The operating system is Open VMS Version 1.5.

Section J - PLAN OF WORK

This document describes the process for conducting sidebar calculations. This work was planned, conducted, and documented in accordance with the FEP Management Plan title - ***'Features, Events, and Processes (FEPs) Screening: Analysis Plan, Version 5-2, for Phase I FEPs.'***

Section K - CERTIFICATION AND TRAINING

The analysis team was identical on each FEP issue. The following individuals were reponsible for performing analyses:
J. Bean, J. Garner, M. Lord, R. MacKinnon (Lead), D. McArthur, A. Shinta, J. Schreiber and P. Vaughn

The technical reviewers were identical for each FEP:
Reviewer 1: Mel G. Marietta (6821)
Reviewer 2:
Reviewer 3:

Copies of certification of personnel qualifications for the above staff are on file in the SWCF. All staff were trained on QAPs.

Section L - CORRESPONDENCE

None

Section M - VERIFICATIONS AND ASSESSMENTS

Two surveillance were conducted; one December 13-14, 1995 (S-96-04) and another held on April 30 and May1, 1996 (S-96-32).
Surveillance S-96-04 found
Surveillance S-96-04 found

The attached signature pages at the front of this document indicate the technical and lead staff signatures and dates of review for completeness and accuracy.

Management, technical, editorial, and QA reviews of this records package were performed and comments were addressed to complete the records package as indicated by the signatures on the attached pages at the front of this document.

Section N - APPROVED PLANNING MEMOS OF RECORD

DR-2: CAPILLARY ACTION (WICKING)
Planning Memo of Record

DATE: June 12, 1995

TO: D. R. Anderson

FROM: P. Vaughn

SUBJECT: FEP Screening Issue DR-2

STATEMENT OF SCREENING ISSUE

Wicking is the ability of a material to carry a fluid by capillary action above the level it would normally seek in response to gravity. Since the present gas generation model defines drastically different rates depending upon whether the waste is in direct contact with liquid or surrounded by water vapor, the physical extent of these regions of contact could be important. Present assumptions are that capillary action in cellulosics is not likely to be important because it applies to only a small portion of the waste, which aside from its containers is not likely to contain much metal. Similarly, a capillarity in metal waste is also not likely because the sizes of the metal waste fragments are much larger than the 'pore' size needed to sustain capillarity. While 'pore' size of the sludges is probably small enough for capillary forces to be important, aside from the containers, the sludge is assumed to contain no free water because liquid sorbing materials such as dry portland cement are intentionally added to the sludge. Finally, while capillarity in the backfill is possible, it would be important only in regard to backfill that is in direct contact with metal (note there is no backfill in the current repository design).

While representation of wicking is implied by the use of two-phase Darcy flow, this physical process has been considered in the past to represent a level of detail that is beyond the available data for defining the effect of capillarity in past calculations. Nevertheless, the effect of capillary action on gas generation and their importance on releases to the environment are at present unknown and need evaluation.

APPROACH

Calculation Design

A two-phased computational procedure is proposed. The first phase is intended to be a 'shake-out' phase designed to raise confidence that 1) capillary action is implemented properly, 2) that no numerical instabilities occur, and 3) that non-physical behavior is absent. Some preliminary sensitivity analysis and screening may occur during the first phase. All other FEP conceptual models will be disabled with the exception of repository dip. The evaluation will cover the parameter uncertainty space resulting from a Latin hypercube sampling (LHS) of 20 realizations for the E1, E1/E2, and Undisturbed scenarios.

The second phase is intended to be the sensitivity analysis used as a basis for possible screening, assuming that screening has not been previously justified as a result of the phase one analysis. The relative importance of capillary action will be evaluated simultaneously with other FEP issues (including repository dip) to incorporate the possible influence of synergism on the sensitivity analysis, which is absent in the 'ceritus paribus' study of phase one. The phase two analysis will use results generated from a large LHS that includes the uncertainties of multiple FEP issues, as well as parameter uncertainty. The E1, E1/E2, and Undisturbed scenarios will be evaluated.

DR-3: DYNAMIC CLOSURE OF THE NORTH END AND HALLWAYS
Planning Memo of Record

DATE: June 12, 1995

TO: D. R. Anderson

FROM: P. Vaughn

SUBJECT: FEP Screening Issue DR-3

STATEMENT OF SCREENING ISSUE

In past calculations, the dynamic effect of halite creep and room consolidation on room porosity was only modeled in the waste disposal regions. Both permeability and porosity were held constant within the experimental regions and the hallways, as described below. Formal evaluation of these assumptions and their implications has not been made.

Other portions of the repository such as the experimental region in the north end and the hallways were modeled assuming fixed (invariant with time) properties. In these region the permeability was held at a fixed high value representative of nearly unconsolidated material or modestly consolidated. The porosity in these regions was maintained at relatively low values associated with highly consolidated material. It was assumed that this combination of low porosity and high permeability would conservatively overestimate flow through these regions and minimize the capacity of this material to store fluids, thereby providing a conservative worst-case estimate of releases to the environment.

Dynamic closure of the north-end and hallways reflects additional realism; it has now been included into the Performance Assessment model for brine and gas flow (BRAGFLO), and the sensitivity of repository behavior to these dynamics can be evaluated.

APPROACH

Calculation Design

A two-phased computational procedure is proposed. The first phase is intended to be a 'shake-out' phase designed to raise confidence that 1) dynamic closure of the north end and hallways is implemented properly, 2) that no numerical instabilities occur, and 3) that non-physical behavior is absent. Some preliminary sensitivity analysis and screening may occur during the first phase. All other FEP conceptual models will be disabled with the exception of repository dip. The evaluation will cover the parameter uncertainty space resulting from a Latin hypercube sampling (LHS) of 20 realizations for the E1, E1/E2, and Undisturbed scenarios.

The second phase will be the sensitivity analysis used as a basis for possible screening, assuming that screening has not been previously justified as a result of the phase one analysis. The relative importance of the dynamic closure of the north end and hallways will be evaluated simultaneously with other FEP issues (including repository dip) to incorporate the possible influence of synergism on the sensitivity analysis, which is absent in the 'ceritus paribus' study of the first phase. The phase two analysis will use results generated from a large LHS that includes the uncertainties of multiple FEP issues, as well as parameter uncertainty. The E1, E1/E2, and Undisturbed scenarios will be evaluated.

DR-6: BRINE PUDDLING IN THE REPOSITORY
Planning Memo of Record

DATE: **June 12, 1995**

TO: **D. R. Anderson**

FROM: **P. Vaughn**

SUBJECT: FEP Screening Issue DR-6

STATEMENT OF SCREENING ISSUE

The flow model within a disposal room, and within the repository as a whole, determines how fast fluids flow within and out of the waste. The present (and accepted) model is based on the assumption of two-phase Darcy flow. Fluid flow modeling within a disposal room has three important considerations: 1) fluid distribution in the waste and flow within the room and repository, 2) fluid flow to and from the Salado Formation, and 3) flow up a human intrusion borehole. The first aspect may affect the rate and amount of gas generation. The second and third aspects may affect how much brine remains in the room, how much brine leaves the room, and the potential radionuclide release to the environment. For example, when the repository pressure is sufficient to drive gas out of the room, it may drive out brine as well, altering the total amount of brine available for gas generation.

The previous modeling of flow within the repository has been based on homogenizing the room contents into large computational volumes. However, heterogeneity of room contents may influence the gas and brine behavior in the room. To address room heterogeneity issues, an additional parameter has been added to specify the active brine flow fraction. Above this limit the 'normal' descriptions of two-phase flow apply (i.e., either the Brooks/Corey or VanGenuchten/Parker models). Below this minimum, the brine is immobile although it may still be consumed during the gas generation reactions.

Justification for the saturation limit assumption is based on the presumed heterogeneity of the waste and the fact that the repository dips slightly. One of the factors that could cause this effect would be gas flow among channels or preferential paths in the waste, bypassing entire regions. Isolated regions would exist because (1) they would be isolated by low-permeability waste barriers, 2) connectivity with the interbeds occurs only at particular locations within the repository, or 3) the repository dip itself promotes preferential gas flow in the upper regions of the waste.

Because the heterogeneity of the waste has now been incorporated into the Performance Assessment model for brine and gas flow (BRAGFLO), the sensitivity of repository behavior to brine puddling in the waste disposal regions can be evaluated.

APPROACH

Calculation Design

A two-phased computational procedure is proposed. The first phase is intended to be a 'shake-out' phase designed to raise confidence that 1) brine puddling is implemented properly, 2) that no numerical instabilities occur, and 3) that non-physical behavior is absent. Some preliminary sensitivity analysis and screening may occur in the first phase. All other FEP conceptual models will be disabled with the exception of repository dip.

The evaluation will cover the parameter uncertainty space resulting from a Latin hypercube sampling (LHS) of 20 realizations for the E1, E1/E2, and Undisturbed scenarios.

The second phase is intended to be the sensitivity analysis used as a basis for possible screening, assuming that screening has not been previously justified as a result of the phase one analysis. The relative importance of brine puddling in the waste disposal regions will be evaluated simultaneously with other FEP issues (including repository dip) to incorporate the possible influence of synergism on the sensitivity analysis, which is absent in the 'ceritus paribus' study of phase one. The phase two analysis will use results generated from a large LHS that includes the uncertainties of multiple FEP issues, as well as parameter uncertainty. The E1, E1/E2, and Undisturbed scenarios will be evaluated.

DR-7: PERMEABILITY VARYING WITH POROSITY IN CLOSURE REGIONS
Planning Memo of Record

DATE: June 12, 1995

TO: D. R. Anderson

FROM: P. Vaughn

SUBJECT: FEP Screening Issue DR-7

STATEMENT OF SCREENING ISSUE

In past calculations, the dynamic effects of halite creep and room consolidation on room porosity were only modeled in the waste disposal regions. Permeability was held constant in the flow field, and both permeability and porosity were held constant within the experimental regions and the hallways, as described below. Formal evaluation of these assumptions and their implications has not been made.

During past flow field calculations, the permeability of the waste disposal regions was uniformly fixed at a high value so as not to impede flow. The porosity varied dynamically with time and repository pressure. Direct releases to the surface via cuttings and spallings depend in part on the permeability of the waste at the time of intrusion. These direct releases were calculated conditioned on a permeability that was consistent with the porosity and degree of consolidation at the time of intrusion. The determination of this permeability was done outside of the flow field calculations and was not the same value of permeability used to estimate the flow fields.

Other portions of the repository, such as the experimental region in the north end and the hallways, were modeled assuming fixed (invariant with time) values for both porosity and permeability. In these regions the permeability was held at a fixed high value representative of nearly unconsolidated or modestly consolidated material. The porosity in these regions was maintained at relatively low values associated with highly co-nsolidated material. It was assumed that this combination of low porosity and high permeability would conservatively overestimate flow through these regions and minimize the capacity of these regions to store fluids, thus providing a maximized release to the environment.

This dynamic varying of permeability with porosity and consolidation in the repository reflects additional realism; it has now been included into the Performance Assessment model for brine and gas flow (BRAGFLO), and the sensitivity of repository behavior to these dynamics can be evaluated.

APPROACH

Calculation Design

A two-phased computational procedure is proposed. The first phase is intended to be a 'shake-out' phase designed to raise confidence that 1) the dynamics of varying permeability with porosity and consolidation in the repository is implemented properly, 2) that no numerical instabilities occur, and 3) that non-physical behavior is absent. Some preliminary sensitivity analysis and screening may occur in the first phase. All other FEP conceptual models will be disabled with the exception of repository dip. The evaluation will cover the parameter uncertainty space resulting from a Latin hypercube sampling (LHS) of 20 realizations for the E1, E1/E2, and Undisturbed scenarios.

The second phase is intended to be the sensitivity analysis used as a basis for possible screening, assuming that screening has not been previously justified as a result of the phase one analysis. The relative importance of varying the permeability with porosity during repository consolidation will be evaluated simultaneously with other FEP issues (including repository dip) to incorporate the possible influence of synergism on the sensitivity analysis, which is absent in the 'ceritus paribus' study of phase one. The phase two analysis will use results generated from a large LHS that includes the uncertainties of multiple FEP issues, as well as parameter uncertainty. The E1, E1/E2, and Undisturbed scenarios will be evaluated.

S-6: DYNAMIC ALTERATION OF THE DRZ/TRANSITION ZONE
Planning Memo of Record

DATE: **June 12, 1995**

TO: **D. R. Anderson**

FROM: **M. Lord**

SUBJECT: FEP Screening Issue S-6

STATEMENT OF SCREENING ISSUE

The capability for treating the alteration of formation properties within the disturbed rock zone (DRZ) and transition zone can be evaluated. The technique for altering the properties within these regions will use the current formation-alteration capability imposed within the marker beds. The parameter values used in the formulation describing the formation alteration will differ between the interbeds and the DRZ/transition zone. This is now included in the Performance Assessment model for brine and gas flow (BRAGFLO) and the effect on behavior of the DRZ and transition zone alteration can be evaluated. The formation porosity and permeability will be dependent on brine pressure with the effect of increasing porosity and permeability with increasing pressure. There will be a dual effect from the formation alterations. With pressure build-up due to gas generation and creep closure within the waste, the increased porosity within the DRZ and transition zone will offer more fluid storage with resulting lower pressures. The increase in formation permeability will enhance the flow of fluid away from the DRZ and transition zone. Parameter values are selected that will greatly increase permeability while modestly increasing porosity.

The current scenario is conservative in estimating releases to the accessible environment. The effects under consideration may influence (retard) the transport of brine and gas to the marker beds, to the shaft and to any existing borehole.

APPROACH

Calculation Design

A two-phased computational procedure is proposed. Initial computations are intended to 1) demonstrate that the formation alteration is properly implemented, 2) investigate any numerical problems associated with the formation alteration of the DRZ and transition zone, 3) justify the physical reality of the formation alterations. Some preliminary sensitivity analysis and screening may occur during the first phase. The results that include formation alteration will be compared to the results without formation alteration; all other FEP conceptual models will be disabled with the exception of repository dip.

The second phase is intended to be the sensitivity analysis used as a basis for possible screening, assuming that screening has not been previously justified as a result of the phase one analysis. In phase two the relative importance of formation alteration will be evaluated simultaneously with other FEP issues. This will be done to evaluate the possible coupling of the effect of solution gas to other FEP conceptual models. The phase two analysis will use results generated from a large Latin hypercube sampling (LHS) that includes the uncertainties of multiple FEP issues (including repository dip) as well as parameter uncertainty. The E1, E1/E2 and Undisturbed scenarios will be evaluated.

Section O - DEVIATIONS (if applicable) of APPROVED PLANNING MEMOS OF RECORD

All calculations undertaken in the screening analyses were successfully completed. Deviations from the analysis plan did not occur. The screening analyses of FEPs DR2, DR3, DR6, DR7, and S6 show that each of the FEPs have insignificant impact o releases to the accessible environment. Therefore, the influence of synergism or interactions between multiple FEP issues on the sensitivity analysis will be small. For this reason, simulations examining multiple FEP issues were not performed.

Section P - REFERENCES

Butcher, B.M., Thompson, T.W., VanBuskirk, R.G., and Patti, N.C. 1991. Mechanical Compaction of Waste Isolation Pilot Plant Simulated Waste. SAND90-1206. Sandia National Laboratories, Albuquerque, NM.

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