Department of Energy
Carlsbad Field Office
P. O. Box 3090
Carlsbad, New Mexico 88221
November 1, 2004

Ms. Elizabeth Cotsworth, Director
Office of Radiation and Indoor Air
U. S. Environmental Protection Agency
Ariel Rios Building, 6601J
1200 Pennsylvania Ave., N.W.
Washington, DC 20460

Subject: Initial Response to Environmental Protection Agency (EPA) September 2, 2004, Letter on Compliance Recertification Application

Dear Ms. Cotsworth:

In response to the EPA's letter of September 2, 2004, the U.S. Department of Energy (DOE) is providing information that answers some of the questions included in the enclosure to that letter. DOE determined, after review of the EPA September 2, 2004, letter, that the responses to several of the items, including those that address the technical areas of concern, required additional analysis or significant effort.

DOE is investigating the technical areas of concern addressed in EPA's letter and will provide responses to these issues and the remaining questions in the November or December timeframe. The following is a summary of comments received, DOE responses in this submittal and responses still pending.

Comments Received Sept 2, 2004	Included in this Submittal	Pending
G-10 Ground water basin modeling and ground water chemistry		✓
G-11 Inclusion of omitted areas in mining transmissivity calculation		✓
G-12 Potential effects of heterogenous waste loading on chemical conditions		✓
G-13 Ligands potentially produced as aqueous metabolites		✓
G-14 Methanogenesis		✓
C-14-1 Figure 2-37 revision		✓
C-14-2 Background conditions since CCA	✓	
C-14-3 Post-CCA seismic events	✓	
C-15-1 Compacted waste in or planned for inventory	✓	
C-23-11 95 percent confidence interval		✓
C-23-12 Documentation for chemical benefit of MgO emplacement		✓

CBFO:AMO:RP:GS:04-1742:UFC 5486.00

C-23-13 Organic ligand complexation on (V) and (VI) oxidation state actinides		✓
C-23-14 Identification of relevant non-WIPP actinide solubility data		✓
C-23-15 Organic ligand sensitivity		✓
C-23-16 Actinide solubility uncertainty		✓
C-23-17 Metallorganic ligand competition for actinides and solution ionic strength		✓
C-23-18 Sensitivity of top ten releases		✓
C-23-19 Identification and justification for changes to all parameters		✓
C-23-20 Exclusion of parameter correlations	✓	
C-24-5 Inclusion of information on complexing agents, nitrates and phosphates		✓
C-24-6 Importance and nature of waste stream profile inconsistencies	✓	
C-24-7 Impact of waste loading within TDOP containers		✓
C-31-1 ORIGEN 2.2 decay model	✓	
C-32-1 Nuclear criticality possibility with non-random waste loading	✓	
C-42-5 Status of all monitoring programs	✓	
C-42-6 Location where Appendix DATA Attachment C tables are analyzed	✓	
C-53-1 Reference to support NUTS code tracer exercise		✓
R-23-1 Reference	✓	
R-23-2 Reference	✓	
R-23-3 Reference	✓	
R-23-4 (Section 6.4.3.5) Reference	✓	
R-7-1 (Section 7.3.2) Reference	✓	
R-7-2 (Section 7.3.2) Reference	✓	
R-7-3 (Section 7.3.2) Reference	✓	
R-7-4 (Section 7.3.2) Reference	✓	
R-24-2 (Section 4.1.3.3, Appendix DATA Annex F) Reference	✓	
R-MON-1 (Appendix MON) Reference	✓	

This submittal includes two enclosures. Enclosure 1 is a hard copy of the responses. Enclosure 2 (on compact disc) provides the references for documents identified in Enclosure 1 and other references requested. An electronic copy of Enclosure 1 is also included in Enclosure 2.

If you have any questions, please contact Russ Patterson of my staff at 505-234-7457.

Sincerely,

R. Paul Detwiler
Acting Manager

Enclosure(s)

cc: w/enclosures
B. Forinash, EPA *ED
C. Byrum, EPA *ED
T. Peake, EPA *ED
R. Lee, EPA *ED
J. Schramke, Contract *ED
CBFO M&RC

cc: w/o enclosures
G. Basabilvazo, DOE *ED
P. Shoemaker, SNL *ED
N. Elikins, LANL *ED

*ED denotes electronic distribution

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EPA Comment C-14-2 Background conditions since CCA

DOE has removed discussion of all "background" environmental conditions, but does not address how information obtained since the approval of the CCA may have affected these "background" conditions. For example, groundwater monitoring has occurred for several years, yet the discussion pertaining to Water Quality remains unchanged with respect to the hydrochemical facies.

DOE Response

The CRA states in section 2.4, Background Environmental Conditions:

"Background environmental conditions at and near the WIPP site were characterized prior to the initiation of the operation of the facility and are described in CCA Section 2.4. Because background characterization focuses on environmental conditions existing prior to operations, it is not meaningful to redefine background environmental conditions after operations began. Accordingly, information presented in CCA Section 2.4 is not repeated and updated in this recertification application. "

Background environmental conditions discussed in CCA Chapter 2 included terrestrial and aquatic ecological, surface and groundwater quality, air quality and the radiological conditions for each. It is true that redefining background environmental conditions is no longer meaningful after first waste receipt because most all of the environmental monitoring activities were performed to determine conditions before radionuclides were introduced. A baseline was developed such that continued monitoring could readily identify changes from the background conditions. However, certain environmental monitoring activities produce data that are used in PA conceptual models. DOE uses the compliance monitoring program developed to comply with 40 CFR 194.42 requirements to assess changes relating to important PA assumptions and conditions. Specifically, groundwater environmental monitoring data is used to monitor changes in groundwater composition and flow as they relate to the PA groundwater conceptual model. Changes identified and activities resulting from these programs have been discussed in the CRA Section 2.2.1.4.1., and in the SNL Annual Compliance Monitoring Parameter Assessment reports (COMPs; reports provided on July 15, 2004 in response to EPA request R-42-1).

The discussion pertaining to water quality has not changed since the CCA because monitoring has detected no changes in groundwater quality. Figure 1 shows Piper diagrams with the results of 15 rounds of sampling at the WQSP Culebra wells conducted between 1995 and 2002 (WRES 2003). The first 10 rounds (collected through May 2000) were used to establish baseline concentrations of the major ions (IT Corporation 2000). No changes to the baseline hydrochemical facies were observed over the five subsequent rounds of sampling. WRES (2003) presents time-trend plots for the major ions and other water-quality parameters for all 15 rounds of sampling, showing the absence of changes from the baseline values.

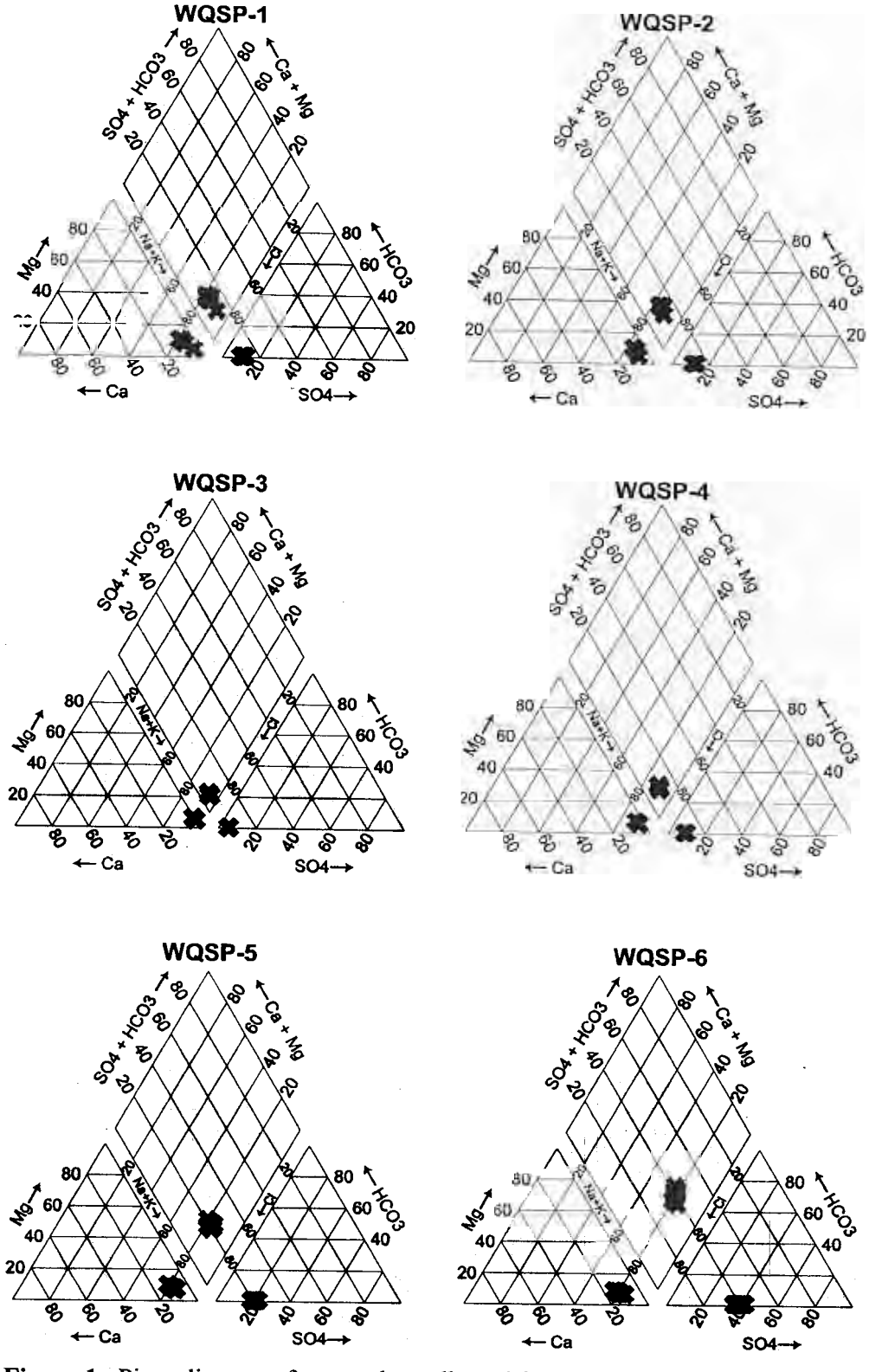

Figure 1. Piper diagrams for samples collected from WQSP wells from 1995 through 2002.

References

IT Corporation. 2000. *Addendum 1, Waste Isolation Pilot Plant RCRA Background Groundwater Quality Baseline Update Report.* Prepared for Westinghouse Electric Corporation, Carlsbad, NM.

WRES (Washington Regulatory and Environmental Services). 2003. Waste Isolation Pilot Plant Site Environmental Report Calendar Year 2002. DOE/WIPP 03-2225. Carlsbad, NM: WRES.

Comment C-14-3 Post-CCA seismic events

The CRA includes a discussion of seismicity in the WIPP vicinity, but does not discuss post-CCA seismic events. If no events occurred, the CRA should so state. Additionally, Figure 2-57 does not clearly present events that are "post CCA", even though the title of the figure implies that it includes these events. DOE needs to identify the seismic events that have occurred since the CCA.

DOE Response

Figure 2-57 has been updated to show the seismic events with a magnitude greater than 3.0 within 150 miles of the WIPP Site. The seismic events in black occurred during the CCA time frame, while the events in red are from the CRA time frame. Also provided is a table that defines the location, the magnitude, the time, and the date of each event in Figure 2-57.

(If more detail is needed, an electronic copy of the compiled responses, including Figure 2-57, is included in Enclosure 2.)

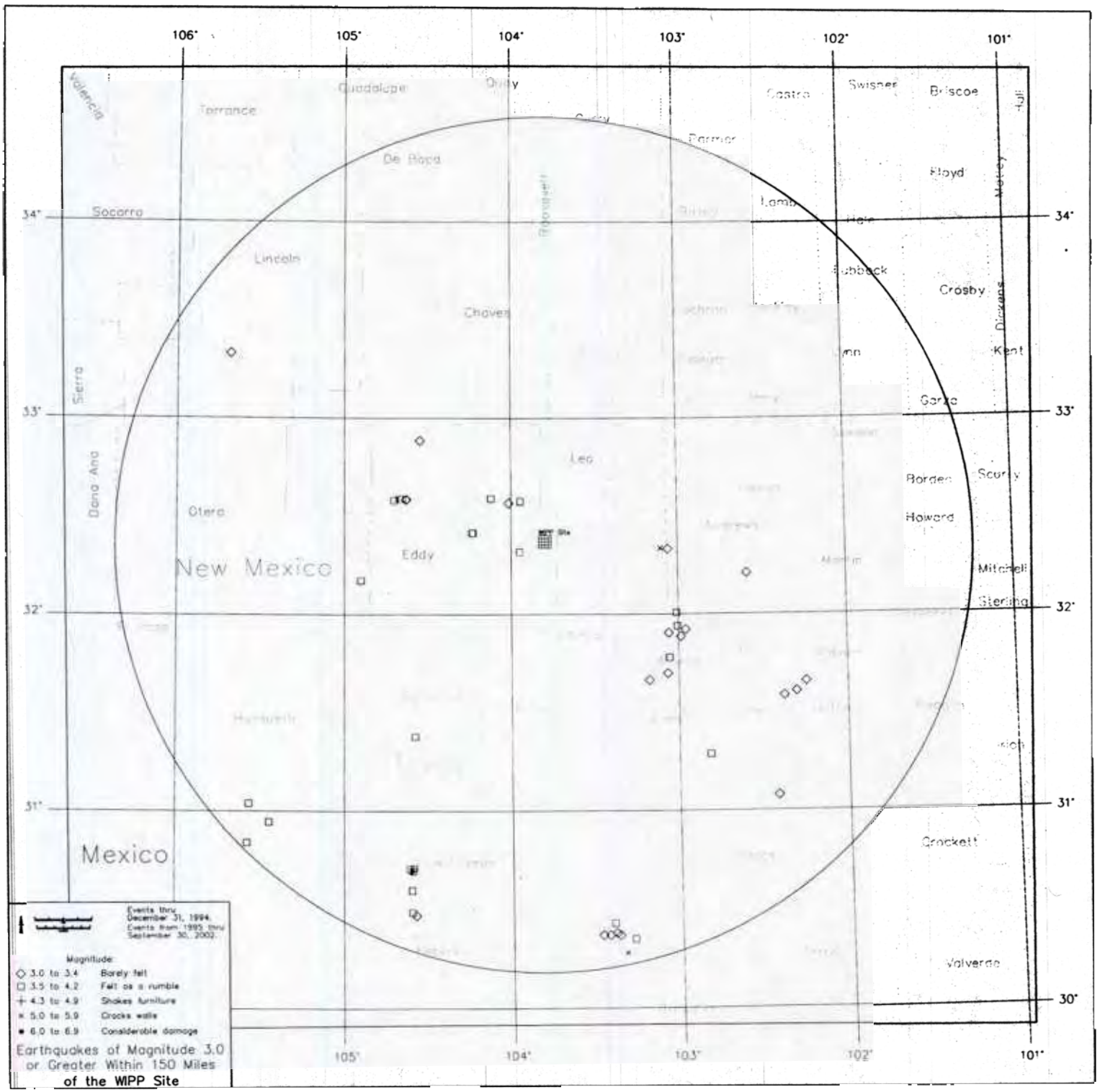

Figure 2-57. Seismic events with a magnitude greater than 3.0 within 150 miles of the WIPP site.

Earthquakes of Magnitude 3.0 or Greater Within 150 Miles of the WIPP Site

Date	Country/State	County	Magnitude	Time	Latitude	Longitude
Earthquakes greater than Magnitude 3.0 during the CCA - 1926 through 12/31/1994						
7/17/1926	NEW MEXICO	EDDY	3.0	22:00:00	32 53 09	104 32 48
8/16/1931	TEXAS	JEFF DAVIS	6.0	11:40:00	30 42 00	104 36 00
8/16/1931	TEXAS	JEFF DAVIS	4.0	19:33:00	30 42 00	104 36 00
8/18/1931	TEXAS	JEFF DAVIS	4.2	19:36:00	30 42 00	104 36 00
8/19/1931	TEXAS	JEFF DAVIS	4.0	1:36:00	30 42 00	104 36 00
1/8/1936	NEW MEXICO	EDDY	3.5	6:46:00	32 25 00	104 13 45
2/2/1949	NEW MEXICO	EDDY	3.5	23:00:00	32 25 00	104 13 45
5/22/1952	NEW MEXICO	OTERO	3.5	4:20:00	32 10 21	104 54 00
1/27/1955	TEXAS	JEFF DAVIS	3.5	0:37:00	30 36 00	104 36 00
3/6/1962	TEXAS	CULBERSON	3.5	9:59:09	31 22 43.2	104 34 40.2
2/3/1965	TEXAS	WINKLER	3.3	19:59:32	31 55 24	102 57 28.2
8/14/1966	TEXAS	WINKLER	3.9	15:25:47	32 00 28.2	103 00 36.6
11/26/1966	TEXAS	HUDSPETH	3.5	20:05:43	30 56 55.8	105 26 37.8
10/19/1969	MEXICO		3.8	11:51:31	30 59 39	105 34 19.8
7/30/1971	TEXAS	WINKLER	3.6	1:45:50	31 46 43.2	103 03 18
7/31/1971	TEXAS	WINKLER	3.3	14:53:48	31 41 54	103 03 57
9/24/1971	TEXAS	WINKLER	3.0	1:01:54	31 39 51.6	103 10 38.4
7/26/1972	NEW MEXICO	EDDY	3.1	4:35:44	32 34 04.2	104 00 45
8/2/1973	TEXAS	HUDSPETH	3.6	9:20:37	31 02 25.2	105 33 44.4
11/28/1974	NEW MEXICO	EDDY	4.0	3:35:22	32 34 31.2	103 56 39
8/1/1975	TEXAS	PRESIDIO	3.6	7:27:41	30 29 15	104 35 50.4
11/28/1975	NEW MEXICO	EDDY	3.7	3:35:20	32.59	104.12
12/12/1975	TEXAS	UPTON	3.0	14:24:35	31 36 24	102 18 24.6
1/19/1976	TEXAS	WINKLER	3.3	4:03:31	31 54 22.2	103 03 28.2
1/25/1976	TEXAS	WINKLER	3.8	4:48:27	31 56 30	103 00 20.4
3/5/1976	TEXAS	UPTON	3.2	2:58:18	31 39 25.2	102 14 55.2
9/19/1976	TEXAS	PRESIDIO	3.0	10:40:45	30 28 21	104 34 27.6
4/26/1977	TEXAS	WINKLER	3.1	9:03:07	31 53 13.8	102 59 11.4
3/2/1978	TEXAS	CRANE	3.3	10:04:50	31 35 04.2	102 22 45
6/29/1978	TEXAS	PECOS	3.2	20:58:50	31 04 41.4	102 25 13.8
1/4/1982	TEXAS	WARD	3.6	16:56:08	31 17 18	102 49 03
1/2/1992	NEW MEXICO	LEA	5.0	11:45:36	32 20 16	103 06 06
8/26/1992	TEXAS	ANDREWS	3.2	3:24:51	32 12 33.6	102 35 31.2
12/22/1993	NEW MEXICO	LINCOLN	3.2	19:25:11	33 19 52.2	105 40 54.6
Earthquakes greater than Magnitude 3.0 during the CRA - 1/1/1995 through 9/30/2002						
4/14/1995	TEXAS	BREWSTER	5.3	0:32:59	30.28	103.33
4/14/1995	TEXAS	BREWSTER	3.1	2:19:39	30.37	103.43
4/15/1995	TEXAS	BREWSTER	3.8	14:48:33	30.43	103.4
4/21/1995	TEXAS	BREWSTER	3.0	4:41:45	30.37	103.47
6/1/1995	TEXAS	BREWSTER	3.2	1:06:16	30.37	103.37
11/12/1995	TEXAS	BREWSTER	3.3	17:46:03	30.38	103.4
10/19/1997	NEW MEXICO	EDDY	3.5	11:12:10	32.32	103.95
4/15/1998	TEXAS	BREWSTER	3.7	10:33:45	30.35	103.28
3/14/1999	NEW MEXICO	EDDY	4.0	22:43:18	32 35 12	104 39 12
3/17/1999	NEW MEXICO	EDDY	3.5	12:29:23	32 34 48	104 40 12
5/30/1999	NEW MEXICO	EDDY	3.9	19:04:25	32.58	104.7
6/2/2001	TEXAS	ANDREWS	3.1	1:55:53	32 20	103 04
9/17/2002	NEW MEXICO	EDDY	3.4	15:45:15	32 35 00	104 38 00
9/17/2002	NEW MEXICO	EDDY	3.1	23:34:19	32 35 00	104 38 00

EPA Comment C-15-1 Compacted Waste in Planned in Inventory

In our review of the Advanced Mixed Waste Treatment Facility we were informed that only INEEL would have compacted or supercompacted waste. It has recently come to our attention that other waste generator sites have compacted waste or may plan to compact waste in the next several years. DOE Must provide EPA with information on which sites may plan to compact or super compact wastes in the next five years as well as identify which waste streams that could be affected and verify that compacted waste is appropriately included in the CRA PA.

DOE Response

In addition to INEEL waste stream IN-BN-510, there are two waste streams that are reported in the current revision of the Transuranic Waste Inventory Update Report (Attachment F of Appendix DATA of the CRA) that mention compacted waste. As provided in Annex J, Rocky Flats Environmental Technology Site has identified two waste streams (RF-MT2116 and RF-TT2216) with a combined final form volume of 5.2 m^3. Oak Ridge National Laboratory may have a portion of compacted waste within its debris waste streams, but has not quantified the amount of debris waste that has been compacted. In addition, ORNL has not identified plans to generate compacted waste streams. No other waste streams were reported to contain compacted wastes by the sites.

In forecasting waste streams that may be compacted, it is important to realize that even though a site may elect to compact their wastes, these decisions could change based on contractual agreements with site contractors, inter-site plans for future waste management, and acceptance of compacted waste forms by the site and at WIPP. As an example, the Hanford Solid Waste Management contractor made the proposal to super compact waste. However, consideration for implementation of the compaction process has not been approved by DOE-RL nor has the contractor implemented it. In addition, DOE-CBFO has not accepted super compacted waste forms from Hanford at this time at WIPP. Therefore, based upon the most current information, we are unaware of any other sites intending to compact and ship waste to WIPP. Wastes reported within Annex J constitute the basis for the inventory utilized within the CRA performance assessment.

EPA Comment C-23-20 Exclusion of parameter correlations

Comparison of this section with the relevant section in the CCA Appendix PAR indicates that two examples of induced parameter correlations have been excluded in the CRA. These are: (1) the underlying variable americium properties and the defined variable curium properties (NUTS, PANEL, and SECOTP2D) and (2) the underlying variable CUMPROB and the defined variables of time-dependent permeabilities of the compacted salt seal permeabilities in the shaft. Were these excluded because they are no longer considered correlated, they are treated differently in the CRA or why? The wording in this section implies the list is not all inclusive, but why remove two examples?

DOE must document why these two examples were removed from the list or add them back in to the list.

DOE Response

DOE has reviewed the removal of two examples of induced parameter correlations from Attachment PAR, section PAR 4.0 of the CRA. The two examples removed were (1) the underlying variable americium properties and the defined variable curium properties (NUTS, PANEL, and SECOTP2D) and (2) the underlying variable CUMPROB and the defined variables of time-dependent permeabilities of the compacted salt seal permeabilities in the shaft.

The first example was removed in error and should be reinserted. A bullet should be added to the text which reads

- "the underlying variable americium properties and the defined variable curium properties (NUTS, PANEL, and SECOTP2D),"

The second example referred to the variable "CUMPROB". CUMPROB applied to the old shaft model and not the simplified shaft model used in the CRA. The example was therefore removed. Attachment MASS, section 4.2.2 includes a summary of the changes to the shaft model, and points the reader to AP-094 (James and Stein, 2002) for further information.

Reference

James and Stein, 2002. "AP-094, Analysis Plan for the Development of a Simplified Shaft Seal Model for the WIPP Performance Assessment". Sandia National Laboratories. Carlsbad, NM. ERMS # 524958.

EPA Comment C-24-6 Importance and nature of waste stream profile inconsistencies

The preface of Appendix DATA, Attachment F indicates that there are still several inconsistencies in the Waste Stream Profiles. However, the Preface does not clearly indicate the nature of these inconsistencies. Because DOE indicated that the inconsistencies were not significant to PA but did not provide information on these inconsistencies, EPA cannot verify this conclusion.

DOE must identify the location of or provide a summary listing of the types of identified inconsistencies in the Waste Stream Profiles as referred to in the Preface of Appendix DATA Attachment F, and justify why these inconsistencies are not important.

DOE Response

DOE believes the response to EPA comment C-24-1, as provided in our letter dated September 7, 2004, provides applicable information to satisfy this inquiry.

EPA Comment C-31-1 ORIGEN 2.2 decay model

A reference to the description of the input data to the ORIGEN 2.2 decay models is required in order to verify proper decay modeling.

DOE Response

In response to EPA Comment C-31-1, an email attaching the ORIGEN 2.2 input and output files was provided directly to one of your staff members on September 30, 2004. In addition, we are providing electronic copies of these files, on compact disk as an enclosure to this letter. The input and output files are demonstrative of the decay correction applied to the updated waste inventory data to support the 2004 CRA.

Reference

Email to Chuck Byrum (EPA) from Gregory D. Van Soest (LANL) regarding the ORIGEN Test Case Files, September 30, 2004.

EPA Comment C-32-1 Nuclear criticality possibility with non-random waste loading

CRA Section SCR-6.2.1.4 eliminates nuclear criticality as a possible source of heat by arguing that the average concentration of ^{239}Pu and ^{235}U is well below a level that could credibly produce a critical configuration. This argument may no longer be valid, since it relies on an average repository concentration rather than actual repository loading information. The possibility of criticality occurring on a local as well as on a repository averaged scale must be analyzed. Even though the overall radioactivity in the disposal system is lower than in the CCA, the specific question at issue is whether the heterogeneous emplacement of the waste and the potential higher concentration of radionuclides in areas modifies the current screening assumption of evenly distributed radionuclides and the finding of low probability of occurrence for this scenario.

DOE Response:

Although FEPs screening arguments in Attachment SCR of Appendix PA (CRA 2004) are based on analyses conducted for the CCA, new analyses are also referenced (e.g., Rechard et al. 2000 and 2001). Rechard et al. (2000) shows that even when considering containers loaded at the 200 fissile gram equivalent limit (as in pipe overpack), fissile mass is not sufficient to become critical, even with considerable height reduction (from 2.68 meters to 0.18 meters) (see Section 3.5.1 of Rechard et al., 2000). Such height reduction is not likely, however, as documented by recent structural analysis of pipe overpack showing that room closure is significantly reduced due to the rigidity of such containers (Park and Hansen 2004).

More recently, an evaluation of nuclear criticality for various WIPP waste containers and configurations was conducted in 2003 (Rhoden 2003). This analysis was conducted by the Management and Operating Contractor (M&OC) for the WIPP to evaluate the potential for criticality associated with new waste forms containing beryllium (Be) that may be shipped to the WIPP in the future. Because Be acts as a neutron reflector, an updated criticality analysis that accounts for Be was warranted. Although this analysis was focused on the operational timeframe, it serves as a meaningful reference for an evaluation of criticality using heterogeneous waste loading assumptions.

Section 5.3.2.3 of Rhoden (2003) provides an analysis of 55-gallon drums containing pipe overpack loaded at their approved maximum of 200 grams of ^{239}Pu. This analysis used a bounding "infinite array" configuration that assumed the waste was stacked three high, but assumes an infinite number of drums in the horizontal direction. The analysis concluded that even with optimized Be reflection, the fissile masses remain subcritical by a significant margin, even if the fissile contents were increased to 300 grams of ^{239}Pu per container. Therefore, Rhoden (2003) represents a bounding case for what is expected to by the highest activity waste containers hypothetically placed in an entire disposal room.

References

Park, B.Y. and Hansen, F.D. 2004. *Simulations of the Pipe Overpack to Compute Constitutive Model Parameters for Use in WIPP Room Closure Calculations.* SAND2004-1390. Sandia National Laboratories, Albuquerque, NM. ERMS # 536354.

Rechard, R.P., L.C. Sanchez, C.T. Stockman, and H.R. Trellue. 2000. *Consideration of Nuclear Criticality When Disposing of Transuranic Waste at the Waste Isolation Pilot Plant.* SAND99-2898. Sandia National Laboratories, Albuquerque, NM. ERMS # 514911.

Rechard, R.P., L.C. Sanchez, H.R. Trellue, and C.T. Stockman. 2001. *Unfavorable Conditions for Nuclear Criticality Following Disposal of Transuranic Waste at the Waste Isolation Pilot Plant.* Nuclear Technology, Vol. 136, Oct. 2001, pp. 99-129.

Rhoden, G.W. 2003. *Waste Isolation Pilot Plant Nuclear Criticality Safety Evaluation for Contact Handled Transuranic Waste Storage.* CS-2003-001. Westinghouse TRU Solutions, Carlsbad, NM.

Comment C-42-5 Status of all monitoring programs

It is unclear whether some monitoring programs have been eliminated (e.g, biological monitoring) while others appear to continue. DOE needs to specifically list the status of all of the monitoring programs used or to be used to demonstrate compliance with EPA requirements in the CRA, as some of the edits make it questionable whether some of the previous programs will be continued.

DOE Response

The WIPP monitoring effort is composed of several monitoring programs, each based on requirements such as the Agreement for Consultation and Cooperation between the State of New Mexico and Department of Energy (DOE) (DOE 1981), New Mexico State regulations, DOE Orders, federal regulations, and health and safety considerations. The WIPP Compliance Certification Application included appendices that described each of the WIPP's monitoring programs. These monitoring programs described activities that demonstrated compliance with different regulatory requirements. It is important to note that not all of the activities and outputs from these programs are needed to demonstrate compliance with the radioactive waste disposal regulations at 40 CFR Part 191 Subparts B and C and 40 CFR Part 194. On January 3, 2002 the DOE submitted a letter to Frank Marcinowski of the Environmental Protection Agency (EPA) requesting EPA approval to delete Appendices BECR, LMP and VCMP from the compliance certification because they are not needed to demonstrate compliance with 40 CFR § 191.14(b). The letter also requested Appendices SER and DEL be changed to references and Appendices EMP, GWMP, GTMP, SMP, and DMP be deleted and Appendix MON be rewritten to incorporate the portions of those plans specifically required to demonstrate compliance with 40 CFR § 191.14(b) in accordance with the criteria established by 40 CFR §194.42. The EPA approved this request in a letter to CBFO and to the EPA Docket A-98-49, II-B-3, Item 24, on March 15, 2002.

The Compliance Recertification Application (CRA), Chapter 7 and Appendix MON were revised to describe the specific activities of the monitoring programs that are conducted to demonstrate compliance with the radioactive waste disposal regulations at 40 CFR 191 Subparts B and C and the compliance criteria at 40 CFR 194. The CRA for example does not address monitoring activities intended to demonstrate compliance with 40 CFR Part 191 Subpart A, nor does it address monitoring of air, soil or water that are done for short-term facility operations compliance. The disposal regulations require the monitoring of parameters important to long-term performance (i.e., 10,000 years) and not for demonstration of short-term facility operations compliance.

The monitoring program described in the CRA only addresses those parameters important to the long-term performance expectations for the disposal system that are monitored to detect substantial deviations from expected performance and which are used in conceptual models, scenarios, and assumptions developed for the WIPP Performance Assessment. This compliance monitoring program which is described in the CRA Chapter 7 and CRA Appendix MON addresses the ten parameters identified in the EPA's certification decision. These parameters are:

1 Creep Closure and Stresses

2. Extent of Brittle Deformation
3. Initiation of Brittle Deformation
4. Displacement of Deformation Features
5. Culebra Groundwater Composition
6. Change in Culebra Groundwater Flow
7. Drilling Rate
8. Probability of Encountering a Castile Brine Reservoir
9. Subsidence
10. Waste Activity

Comment C-42-6 Location where Appendix DATA Attachment C tables are analyzed

A reference to where in the CRA the data in the tables from this appendix are analyzed and shown to prove continued compliance with requirements is needed. It is obvious from looking at the graphs that there are some anomalous data that may require explanation, as well as some trends in concentrations, particularly for potassium (generally slight increase in concentration over time). To be complete, DOE needs to reference where in the CRA this discussion occurs.

DOE Response

Appendix DATA Attachment C – Water Quality Sampling Data is analyzed in the annual "Sandia National Laboratories Annual Compliance Monitoring Parameter Assessment" report. This annual report is submitted each year as an attachment to the DOE Annual Change Report required by 40 CFR 194.4(b)(4).

Reference

Sandia National Laboratories Annual Compliance Monitoring Parameter Assessment Report for 2002. Sandia National Laboratories, Carlsbad, NM. ERMS# 524449 (this reference previously submitted with response to comment C-42-1)

EPA Comment R-23-4 (Section 6.4.3.5)

The reference Helton (1998), cited during a discussion of important actinides in the repository on page 6-92, appears to be missing from the reference list or should be listed as Helton et al (1998) for which there is a reference. Please clarify.

DOE Response

The reference citation on page 6-92 should have been Helton et al. (1998) which is in the reference list (see specifically Helton et al. page 4-44 for the discussion on important actinides). This reference has been provided with the CRA.

References Required

R-7-1 (Section 7.3.2)
John Hart and Associates, P.A. 2000a. Contractor Report, Permanent Markers Monument Survey, Waste Isolation Pilot Plant, Carlsbad, NM.

R-7-2 (Section 7.3.2)
John Hart and Associates, P.A. 2000b. Contractor Report, Permanent Markers Materials Analysis, Waste Isolation Pilot Plant, Carlsbad, NM.

R-7-3 (Section 7.3.2)
John Hart and Associates, P.A. 2000c. Contractor Report, Ancient Cementitious Materials, Waste Isolation Pilot Plant, Carlsbad, NM.

R-7-4 (Section 7.3.2)
Not cited in reference section but referenced in Section 7.3.2: Permanent Markers Testing Program Plan, Waste Isolation Pilot Plant (DOE 2000)

R-23-1
Leigh and Lott. 2003. Estimate of Portland Cement in TRU Waste For Disposal in WIPP for the Compliance Recertification Application, Supercedes ERMS #529684, Revision 1. Routine Calculation ERMS #53 1562 Carlsbad, NM: Sandia National Laboratories.

R-23-2
Leigh and Sparks-Roybal. 2003. Final Estimate of Oxyanion Mass in TRU Waste for Disposal in WIPP for the Compliance Recertification Application. Routine Calculation. ERMS #530984. Carlsbad, NM: Sandia National Laboratories.

R-23-3
DOE has not provided or referenced any of the relevant information that documents the adequacy of the computer codes (e.g., Design Documents, Verification and Validation Documents, Analysis Plans etc.), although draft versions of some of these documents ha previously been reviewed by EPA. DOE must provide this documentation.

R-24-2 (Section 4.1.3.3, Appendix DATA Annex F)
Giambalvo, E. 2002. *"Sandia's WIPP Inventory Data Needs for Performance Assessment,* Letter to J. Harvill, April 22, 2002, Sandia National Laboratories, Carlsbad, NM. ERMS # 522011.

R-MON-1 (Appendix MON)
Wagner, S. W. and R. Kirkes, 2003 "MONPAR Reassessment," December 2003. Carlsbad, NM. Sandia National Laboratory. ERMS #533098

DOE Response

The documents requested are provided in Enclosure 2