552374

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OCT 19 2009

OFFICE OF
AIR AND RADIATION

Dave Moody, PhD.
Manager, Carlsbad Field Office
U.S. Department of Energy
P.O. Box 3090
Carlsbad, NM 88221-3090

Dear Dr. Moody: [EPA third letter requesting additional information on the CRA-2009]

The U.S. Environmental Protection Agency (EPA) received the U.S. Department of Energy's (DOE) 2009 Compliance Recertification Application (CRA09) for the Waste Isolation Pilot Plant (WIPP) on March 24, 2009. On May 21, 2009, and July 16, 2009, we provided you with comments related to completeness of the CRA-2009 documentation. In our ongoing review, we have identified additional information needed to constitute a complete application. This letter contains comments related to waste inventory; chemistry-related issues; features, events, and processes; and performance assessment parameters and codes.

EPA believes that this letter may be the last of our "completeness" letters. However, the Agency does not consider the CRA09 to be complete until responses to all of our completeness letters and final documents related to the 2009 recertification performance assessment baseline calculations (PABC09) have been received and reviewed by EPA. At that point, additional completeness letters or comments may be warranted to support the Agency's final technical review of the 2009 recertification. Comments received from stakeholders also may precipitate additional completeness comments.

The Agency continues to review the CRA09 and appreciates DOE's effort in providing EPA's requested documents in a timely manner. If you have any questions regarding these issues, please contact Tom Peake at (202) 343-9765.

Sincerely,

Tom Kelly, Acting Director
Office of Radiation and Indoor Air

Enclosure

WIPP: 1.2.5: PA; NQ: 548687

cc: Electronic Distribution
Frank Marcinowski, DOE/EM
Russ Patterson, DOE,CBFO
Steve Zappe, NMED
Nick Stone, EPA Region 6
EPA Docket

Enclosure: CRA-2009 Third (3) Completeness Letter

Inventory (194.24)

3-24-1 Table 5-4 of PAIR 2008 provides without comment a comparison of waste material parameters used in the PABC and PABC09 (the 2009 PABC). Significant reductions are noted for metals (e.g., 26% for iron-based) and CPR (e.g., 12 to 33%). Since these materials have important implications for the PA, DOE needs to provide a discussion as to the cause for these changes.

Chemistry (C) Issues

3-C-25 The K_d values used to model matrix actinide sorption during transport through the Culebra were based on the consideration of experimental data for low to intermediate organic ligand concentrations (Brush and Storz 1996). However, since the time of the CCA when these parameters were evaluated, predicted organic ligand concentrations in repository brines have increased significantly. Current predicted maximum acetate and citrate repository brine concentrations are now comparable to the high organic ligand concentrations used in the K_d experiments, and the predicted maximum EDTA concentration in repository brine now exceeds the highest concentrations used in the organic ligand K_d experiments (Brush and Storz 1996). Because the experimental K_d values reported for the +III and +IV actinides with high organic ligand concentrations are smaller than the K_d ranges used in the CRA-2009 PA (see Table below), and the importance of americium(III), plutonium(III), and plutonium(IV) to total releases from the repository, the increased concentration of organic ligands indicates that the Kds used in the CRA-2009 are potentially too high and overestimate the potential retardation in the Culebra. Please defend the use of the higher Kds in light of the much higher organic ligand concentrations.

Actinide Oxidation State	CRA-2004 PA and PABC and CRA-2009 PA and PABC PAVT K_d Range [m^3/kg] (Brush and Storz 1996)	K_d Range, High Concentration Organics [m^3/kg] (Brush and Storz 1996)
Americium (III)	0.02 – 0.4	0.00505 – 0.00740
Plutonium(III)	0.02 – 0.4	--
Uranium(IV)	0.7 – 10	--
Neptunium(IV)	0.7 – 10	--
Thorium(IV)	0.7 – 10	0.000467 – 0.00469
Plutonium(IV)	0.7 – 10	--
Neptunium(V)	0.001 – 0.2	0.00 – 0.00249
Uranium(VI)	0.00003 – 0.02	0.00 – 0.0101

FEPs (194.23)

3-23-8 The screening argument for FEP W45 is combined with that for FEPs W44 (Degradation of Organic Material) and W48 (Effects of Biofilms on Microbial Gas Generation), and is presented in Section 2.2.3.9 of Kirkes 2008 [ERMS 550489]. The screening argument for these three FEPs was changed to reflect repository inventory changes in non-radioactive materials that result in increased heat generation from exothermic chemical reactions. Although these three FEPs have been appropriately screened in and gas generation due to microbial activity is included in PA, EPA believes that the updated screening argument does not adequately demonstrate that the microbial gas generation models used in PA remain appropriate under the increased repository temperatures. The screening argument identifies the reference temperature under which the gas generation experiments were carried out (30°C), but does not present or discuss comparative information on the new average repository temperature resulting from the inventory changes. The argument states that increases in temperature from ambient up to 40°C or 50°C have been reported to increase gas production. The argument's concluding assertion that "...the effects of temperature on microbial gas generation are implicitly incorporated in the gas generation rates used" is not adequately supported. With the exception of FEP W45, EPA concurs with DOE's screening argument changes and conclusions reached. DOE needs to better support conclusions related to FEP W45.

3-23-9 EPA supports the systematic approach required by SP 9-4 and believes that it will improve the maintenance, accuracy, and traceability of DOE's FEPs baseline. In reviewing SP 9-4, EPA found discrepancies in the identification of documentation that should be resolved. Section 3.0 of SP 9-4 identifies three QA Records: a FEPs Assessment Analysis Report, a Document Review Comment form per NP 6-1, and a Revised Baseline FEPs List (BFL). The FEPs Assessment Analysis Report appears to be the report documenting the results and recommendations of the baseline FEPs assessment mentioned in Section 2.4.8 of SP 9-4, however, Section 2.4.9 of SP 9-4 states that the PA Manager is to sign the cover sheet for the FEPs Impact Assessment Report. If the FEPs Impact Assessment Report is different from the FEPs Assessment Analysis Report, it should also be included as part of the QA record. If these are the same reports, they should be given the same name. DOE should clarify these different documents when including them in the future.

Parameters (194.23)

3-23-10 The focus of EPA's review of the CRA09 input files was on changes that occurred since the PABC 2004. Identified changes involving hard-coded numerical inputs included both run control parameters and parameters that EPA recommends drawing from the parameter database (PAPDB). Parameters recommended as drawing from the PAPDB instead of hard-coding include those with the potential to be changed, for example when implementing sensitivity studies, and those for which references to supporting documentation is desirable. Referencing supporting documentation is an integral part of the PAPDB and is readily traceable. Referencing supporting documentation can be accomplished as comments within a code, but is not an integral part of a code and is not as readily traceable. The parameters identified in EPA's review of the CRA09 input files as recommended for incorporation into the PAPDB are summarized in the following tabulation. EPA recommends that DOE incorporate these parameters into the PAPDB.

CRA09 Hard Coded Inputs Recommended for Incorporation in the PAPDB

Input File	Code	Parameter Value	Parameter Type
ALGEBRA1	BRAGFLO	1.7	Factor converting mass of plastic to equivalent mass of cellulosics.
ALGEBRA1	BRAGFLO	1.0	Moles of CO_2 produced per mole of organic carbon [SMIC_CO2]
ALGEBRA1	BRAGFLO	1.05	Factor to calculate minimum brine saturation when using capillary pressure Model 3
PREBRAG	BRAGFLO	101325.0	Preclosure brine pressure for Cavities 1 through 4 [PRES_BRINE]
PREBRAG	BRAGFLO	0.0	Preclosure brine saturation for Cavities 1 through 4 [SAT_BRINE]
PREBRAG	BRAGFLO	1.5000E-02	Minimum brine saturation cutoff for the waste area [SOCMIN]
PREBRAG	BRAGFLO	1.0E-2	Tolerance for relative permeability Model 11 to prevent singularities when calculating capillary pressure at low saturations [TOL]
PREBRAG	BRAGFLO	1.0E-03	Tolerance for relative permeability Model 12 to prevent singularities when calculating capillary pressure at low saturations [SOCEFFMIN]
ALGEBRA2	BRAGFLO_DBR	1.05	Factor to calculate minimum brine saturation when using capillary pressure Model 3
ALGEBRA2	BRAGFLO_DBR	32.1	Panel closure dimension - length of the open drift and explosion wall [D1]
ALGEBRA2	BRAGFLO_DBR	7.9	Panel closure dimension - length of the concrete panel closure [D2]
ALGEBRA2	BRAGFLO_DBR	40.0	Panel closure dimension – total length [DE]
PREBRAG	BRAGFLO_DBR	3.888E5	Maximum time for uncontrolled intrusion borehole flow [TIME]

3-23-11 Appendix PA-2009 states in Section PA-4.2.2, Initial Conditions, last paragraph, that the initial waste disposal area pressure is 1.01325×10^5 Pa, rather than the value of 1.28039×10^5 Pa used in the 2004 Performance Assessment Baseline Calculation (PABC04). In PABC04 DOE used a new initial waste disposal area pressure that combines atmospheric pressure (1.01325×10^5 Pa) and total initial gas generated (26.714×10^3 Pa) to account for the initial state of the two stage microbial gas generation

exhibited in long-term gas generation experiments. It appears that ERMS 540527, Analysis Package for BRAGFLO for PABC04, documents the correct value in Section 5.5. EPA searched throughout the CRA09 documentation and could only find the correct value in this secondary documentation. DOE should correct these errors and assure that the performance assessment uses the correct value.

Computer Codes

3-23-12 A number of secondary computer codes are used to support CRA-2009. Please provide QA documentation for these codes that demonstrate they are reasonably qualified for use in PA. These secondary computer codes include (but are not limited to): SigmaPlot, VARIOWIN, KT3D, Perl Script, nSights, Matlab, VarioWin, KaleidaGraph, GMS, MVS, Mathcad, and ARCInfo.

References

Brush, L.H. and L.J. Storz. 1996. *Revised Ranges and Probability Distributions of K_ds for Dissolved Pu, Am, U, Th and Np in the Culebra for the PA calculations to Support the WIPP CCA.* Memorandum to M.S. Tierney, Sandia National Laboratories, Albuquerque, New Mexico, July 24, 1996, ERMS 241561.

Cotsworth, E. 2009. *CRA-2009 First (1) Completeness Letter.* U.S. Environmental Protection Agency Office of Radiation and Indoor Air, letter to D. Moody, U.S. Department of Energy Carlsbad Field Office, May 21, 2009.

EPA (Environmental Protection Agency) 2006. *Technical Support Document for Section 194.23: Review of the 2004 Compliance Recertification Performance Assessment Baseline Calculation.* Office of Radiation and Indoor Air, Docket No. A-98-49, Item II-B1-3, March 2006.

Leigh, C., J. Kanney, L. Brush, J. Garner, R. Kirkes, T. Lowry, M. Nemer, J. Stein, E. Vugrin, S. Wagner, and T. Kirchner. 2005. *2004 Compliance Recertification Application Performance Assessment Baseline Calculation.* Sandia National Laboratories, Carlsbad, New Mexico, ERMS 541521.

Wilson, C., D. Porter, J. Gibbons, E. Oswald, G. Sjoblom, and F. Caporuscio. 1997b. *Conceptual Models Third Supplementary Peer Review Report.* Prepared for the U.S. Department of Energy, Carlsbad, New Mexico, April 1997, Docket No. A-93-02 Item II-G-22.