Dear Dr. Moody:

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
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 $+\text{III}$ and $+\text{IV}$ 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($\text{III}$), plutonium($\text{III}$), and plutonium($\text{IV}$) to total releases from the repository, the increased concentration of organic ligands indicates that the $K_d$s used in the CRA-2009 are potentially too high and overestimate the potential retardation in the Culebra. Please defend the use of the higher $K_d$s in light of the much higher organic ligand concentrations.

|-------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------
| Americium ($\text{III}$) | 0.02 – 0.4                                                                                   | 0.00505 – 0.00740                                                               |
| Plutonium($\text{III}$)  | 0.02 – 0.4                                                                                   | --                                                                            |
| Uranium($\text{IV}$)     | 0.7 – 10                                                                                     | --                                                                            |
| Neptunium($\text{IV}$)   | 0.7 – 10                                                                                     | --                                                                            |
| Thorium($\text{IV}$)     | 0.7 – 10                                                                                     | 0.000467 – 0.00469                                                            |
| Plutonium($\text{IV}$)   | 0.7 – 10                                                                                     | --                                                                            |
| Neptunium($\text{V}$)    | 0.001 – 0.2                                                                                  | 0.00 – 0.00249                                                                |
| Uranium($\text{VI}$)     | 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

<table>
<thead>
<tr>
<th>Input File</th>
<th>Code</th>
<th>Parameter Value</th>
<th>Parameter Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALGEBRA1</td>
<td>BRAGFLO</td>
<td>1.7</td>
<td>Factor converting mass of plastic to equivalent mass of cellulosics.</td>
</tr>
<tr>
<td>ALGEBRA1</td>
<td>BRAGFLO</td>
<td>1.0</td>
<td>Moles of CO₂ produced per mole of organic carbon [SMIC_CO₂]</td>
</tr>
<tr>
<td>ALGEBRA1</td>
<td>BRAGFLO</td>
<td>1.05</td>
<td>Factor to calculate minimum brine saturation when using capillary pressure Model 3</td>
</tr>
<tr>
<td>PREBRAG</td>
<td>BRAGFLO</td>
<td>101325.0</td>
<td>Preclosure brine pressure for Cavities 1 through 4 [PRES_BRINE]</td>
</tr>
<tr>
<td>PREBRAG</td>
<td>BRAGFLO</td>
<td>0.0</td>
<td>Preclosure brine saturation for Cavities 1 through 4 [SAT_BRINE]</td>
</tr>
<tr>
<td>PREBRAG</td>
<td>BRAGFLO</td>
<td>1.5000E-02</td>
<td>Minimum brine saturation cutoff for the waste area [SOCMIN]</td>
</tr>
<tr>
<td>PREBRAG</td>
<td>BRAGFLO</td>
<td>1.0E-2</td>
<td>Tolerance for relative permeability Model 11 to prevent singularities when calculating capillary pressure at low saturations [TOL]</td>
</tr>
<tr>
<td>PREBRAG</td>
<td>BRAGFLO</td>
<td>1.0E-03</td>
<td>Tolerance for relative permeability Model 12 to prevent singularities when calculating capillary pressure at low saturations [SOCEFFMIN]</td>
</tr>
<tr>
<td>ALGEBRA2</td>
<td>BRAGFLO_DBR</td>
<td>1.05</td>
<td>Factor to calculate minimum brine saturation when using capillary pressure Model 3</td>
</tr>
<tr>
<td>ALGEBRA2</td>
<td>BRAGFLO_DBR</td>
<td>32.1</td>
<td>Panel closure dimension - length of the open drift and explosion wall [D1]</td>
</tr>
<tr>
<td>ALGEBRA2</td>
<td>BRAGFLO_DBR</td>
<td>7.9</td>
<td>Panel closure dimension - length of the concrete panel closure [D2]</td>
</tr>
<tr>
<td>ALGEBRA2</td>
<td>BRAGFLO_DBR</td>
<td>40.0</td>
<td>Panel closure dimension – total length [DE]</td>
</tr>
<tr>
<td>PREBRAG</td>
<td>BRAGFLO_DBR</td>
<td>3.888E5</td>
<td>Maximum time for uncontrolled intrusion borehole flow [TIME]</td>
</tr>
</tbody>
</table>

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 $1.01325 \times 10^5$ Pa, rather than the value of $1.28039 \times 10^5$ 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 ($1.01325 \times 10^5$ Pa) and total initial gas generated ($26.714 \times 10^3$ 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


