

EPA Comment	Included in this Submittal	Previously Submitted	Pending
<b>Comments Received May 21, 2009</b>			
1-G-1 Stakeholder-Water Flow Model Concerns - ext from the Citizens for Alternatives to Radioactive Dumping (CARD) news release on March 25, 2009, raises questions...		✓	
1-G-2 Shielded Containers - The shielded container planned change request has been an ongoing activity that was not completed before the CRA-2009 was received by EPA.		✓	
1-G-3 Inventory- As outlined in the Executive Summary of DOE/TRU-2008-3379, Rev. 1 (ATWIR 2007), DOE has proposed that ATWIR 2008 be used as the inventory source...		✓	
1-23-1 New Compliant Performance Assessment - EPA believes it is necessary to perform a new performance assessment to capture changes since the last recertification...		✓	
1-23-2 Chemistry PA - References from Appendix SOTERM-2009: - References from Appendix SOTERM-2009: Borkowski...; Lucchini...; Reed...; Richmann...		✓	
1-23-3 Chemistry PA- DOE summarizes thermodynamic data for the +111, +IV, and +V actinides that have become available since the CRA-2004 PABC in Appendix SOTERM...		✓	
1-23-4 Chemistry PA- AP-137 (Clayton 2008), includes the statement on pages 17 and 18 that the ligand concentrations were expected to increase from the 2004 to 2007 inventories.		✓	
1-23-5 Chemistry PA- In Appendix SOTERM-2009, Section 3.3.2 and SOTERM-2009, Section 3.6.2, DOE states that the pCH of the WIPP brines is expected to be approximately 8.7...		✓	
1-23-6 Chemistry PA- DOE reports uranium (VI) solubility experiments in the absence of carbonate and ligands (Appendix SOTERM-2009, Section 3.3.2).			
1-23-6 a. If the experimental results in GWB are extrapolated to pCH 9.64, the Nd (III) solubility could be approximately two orders of magnitude greater ( $\sim 4 \times 10^{-5}$ M) than the value...		✓	
1-23-6 b. -Given the evidence that borate complexation appears to affect the +111 and +VI actinide solubilities, DOE should address whether the +IV actinide solubilities...		✓	

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1-23-6 c. -The current actinide solubility conceptual model includes the assumption that "The important ions in WIPP brines are H+, Na+, K+, Mg2+, OH-, CL-, CO32-, SO42-and Ca2+.		✓	
1-C-1 Chemistry Issues- DOE states that the characterization data for the Martin Marietta MgO has been obtained from a single lot (SL2980076) of this material (Appendix MgO-2009...		✓	
1-C-2 Chemistry Issues- The reactivity test used for MgO material acceptance was developed in 1997. At that time, the MgO used as backfill had a lower reactivity, but was...		✓	
1-C-3 Chemistry Issues- Appendix PA-2009, Section 7.1.1 attributes slower changes in repository pressure after 2,000 years to cessation of room closure, slowing of brine inflow...		✓	
1-C-4 Chemistry Issues- Appendix MASS-2009 and Appendix SOTERM-2009 do not address the current assumption that plastic and rubber degradation (if occurring)...		✓	
1-C-5 Chemistry Issues- It is stated in Appendix PA-2009, Section 2.3.1, that water is neither created nor consumed by microbial reactions.		✓	
1-C-6 Chemistry Issues- DOE should provide justification for the statement in Appendix SOTERM-2009, Section 3.7 that "Of the four organic chelating agents considered, only citrate...		✓	
1-C-7 Chemistry Issues- Appendix SOTERM-2009, Table SOTERM-I, provides an incomplete list of the current chemistry model assumptions.		✓	
1-C-8 Chemistry Issues- The fourth paragraph of Appendix SOTERM-2009, Section 2.3.2 states: "the expected pH, when little or no carbonate is present, is 8.69 in GWB brine and...		✓	
1-C-9 Chemistry Issues- DOE states that carbonate complexation of Nd(III) is unimportant at conditions expected in WIPP brines (Appendix SOTERM-2009, Section 3.6.2).		✓	
1-C-10 Chemistry Issues- n Appendix SOTERM-2009, Section 4.4, DOE states that the chemical potential ( $\mu_o/RT$ ) for Th(OH)4(s) was changed in the FMT database since the...		✓	
1-C-11 Chemistry Issues- In Appendix SOTERM-2009, Section 4.4, DOE should explain what is meant by their statement that, "The effects of hydromagnesite and calcite...		✓	

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1-C-12 Chemistry Issues- n the caption for Appendix SOTERM-2009, Figure SOTERM-11, DOE states that the Eh-pH diagram demonstrates that Pu(IV) species would be...		✓	
1-C-13 Chemistry Issues- DOE should provide the carbonate concentration, total americium concentration, and assumed ionic strength for generation of Appendix SOTERM-2009...		✓	
1-C-14 Chemistry Issues- DOE states in Appendix SOTERM-2009, Section 4.6 that organic ligands do not significantly affect actinide solubilities, despite data presented in Appendix...		✓	
1-C-15 Chemistry Issues- n Appendix SOTERM-2009, Table SOTERM-21, the parameter descriptions for PHUMCIM and PHUMSIM indicate "actinide solubilities are inorganic only..."		✓	
1-C-16 Chemistry Issues- In Appendix SOTERM-2009, Section 2.4.1.1, DOE cites "degradation of solubilizing organic ligands, leading to lower actinide solubility" as a possible...		✓	
1-C-17 Chemistry Issues - In Appendix SOTERM-2009, Section 2.3.2, Brush et al. (2006) is cited as part of the documentation for the CRA-2004 PABC, but this report was...		✓	
1-C-18 Chemistry Issues - In Appendix MgO-2009, Section 4.2.2, DOE claims that hydromagnesite will completely convert to magnesite during the 10,000 year WIPP regulatory time...		✓	
1-C-19 Chemistry Issues - In Appendix MgO-2009, Section 5.1, DOE states that the actinide solubilities in WIPP brines calculated for the CRA-2004 PA and CRA-2004 PABC		✓	
1-C-20 Chemistry Issues - In the discussion of MgO uncertainties (Appendix MgO-2009, Section 6.2.4.4), DOE does not include the uncertainties associated with the...		✓	
1-C-21 Chemistry Issues- Appendix PA-2009, Table PA-10 does not include units for the concentrations, which should be moles/L.		✓	
1-C-22 Chemistry Issues - Appendix PA-2009, Section 4.9 includes a statement that releases are controlled almost entirely by direct releases to the surface as cuttings, cavings...		✓	
1-C-23 Chemistry Issues - To facilitate EPA's technical review, DOE should provide EPA with copies of all FMT input and output files used to update the actinide solubility uncertainty...		✓	

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<b>Comments Received July 16, 2009</b>			
2-G-4 Inventory-Quality Assurance Sign-offs - While reviewing some of the quality assurance documents used by the LANL-CO inventory team to develop, manipulate and...		✓	
CARD 2009 Recertification Comments (as noted in the 1 <sup>st</sup> completeness letter) The group, Citizens Against Radioactive Dumping (CARD), has submitted a report entitled, "Proof of Rapid Rainwater Recharge at the WIPP Site,		✓	
2-15-CARD-1 page 1, last line- CARD states, "This is why the proponents of WIPP deny the existence of karst at the WIPP site. They argue, in effect, that WIPP is a karst-free island...		✓	
2-15-CARD-2 page 2, first line- CARD states, "The supposed reliability of the Rustler Formation as a barrier to the migration of contaminated water hangs upon a postulated...		✓	
2-15-CARD-3 page 2, third paragraph- CARD states, "Proof of rainwater recharge at the WIPP site would constitute proof that WIPP is part of the regional karstland of the Pecos River...		✓	
2-15-CARD-4 page 3, third paragraph- CARD states, "This is the very definition of karst. Simply stated, if rainwater recharge does reach the Culebra dolomite, the Culebra is not a...		✓	
2-15-CARD-5 page 4, paragraph 2-CARD states, "But the point to remember is this: none of this rainwater recharge is supposed to be happening. This invalidates the groundwater...		✓	
2-15-CARD-6 page 14 last line-CARD states, "This strongly suggests that the water table will continue to rise at the WIPP site. Thus the Culebra is not in hydraulic steady state, as...		✓	
2-15-CARD-7 page 30, first paragraph-CARD states, "If groundwater is supposed to be flowing from north to south, as DOE contends, how then did dissolved halite appear in these...		✓	
2-15-CARD-8 page 36, 6th paragraph-CARD states in conclusion, Proof of rapid rainwater recharge at the WIPP site renders invalid the hydrologic model of the Culebra by which...		✓	
2-C-24 Inventory-Chemistry - The PA team requested data on the cement inventory as documented in PAIR 2008 (Crawford et al 2009, Section 3.1). The scaled mass of cement was...		✓	

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2-23-7 Adequacy of Minimum Brine Calculations for Actinide Solubility Determinations The minimum brine volume is the volume of brine needed for a direct brine release (DBR) to...		✓	
2-33-1 Please provide the following reference... RL. Resources, Monthly Injection & Saltwater Report for ...		✓	
2-33-2 40 CFR 194.33(c)(2) states: (c) Performance assessments shall document that in analyzing the consequences of drilling events, the Department assumed that. ..(2) Natural...		✓	
2-33-3 Dakota Salts, LLC, is a Denver based company that has proposed the use of Deep Salt Caverns for storage of compressed air generated by wind farms. Dakota Salts...		✓	
2-33-4 Carbon sequestration is being assessed on a nationwide basis, including the Permian Basin ( <a href="http://www.southwestcarbonpartnership.org">http://www.southwestcarbonpartnership.org</a> ). The Southwest...		✓	
2-33-5 In CRA-2009, DOE changed the maximum time a DBR can occur from 11 days to 4.5 days. The maximum DBR duration is represented in PA by the parameter MAXFLOW...		✓	
2-33-5 a. The South Culebra Bluff Blowout is cited as an inappropriate analogy for a WIPP brine release based on the formation encountered, downhole pressures anticipated...		✓	
2-33-5 b. Review of drillers' comments (Memorandum, Document Number 545844) indicates that many drillers have never encountered a situation that would require mitigation of...		✓	
2-33-5 c. Several drillers (reference 545844) indicated that they may never detect a brine release from the repository given the hypothetical release conditions posed by Kirkes (2007)		✓	
2-33-5 d. One driller interviewed in reference 545844 indicated that if a brine kick was encountered, he would probably let brine flow to surface without any attempt at mitigation...		✓	
2-33-5 e. Additionally, it is unclear what effect brine shut-in would have with respect to duration of flow and downhole conditions. Please provide references that address the effects..		✓	
<b>Comments Received October 19, 2009</b>			

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3-24-1 Inventory (194.24) Table 5-4 of PAIR 2008 provides without comment a comparison of waste material parameters used in the PABC and PABC09 (the 2009 PABC).		✓	
3-C-25 Chemistry (C) Issues The Kd values used to model matrix actinide sorption during transport through the Culebra were based on the consideration of experimental data...		✓	
3-23-8 FEPs (194.23) 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),...		✓	
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,...		✓	
3-23-10 Parameters (194.23) 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...		✓	
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 ...		✓	
3-23-12 Computer Codes 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.		✓	
<b>January 25, 2009 Follow-up questions to issues first raised in EPA's May 21, 2009 letter, comment 1-23-6</b>			
1. There seems to be a disconnect between the previous (CRA-2004 PABC) FMT modeling results and the experimental investigation of Nd(III) solubilities. Borkowski et al. (2008) assumed that the stable Nd(III) phase in the carbonate system would be NdOHCO <sub>3</sub> (s).	✓		
2. The observed differences in the concentrations at similar pCH in GWB and ERDA-6 brine are attributed to borate complexation. GWB has approximately 2.5 times the borate concentration of ERDA-6.	✓		
3. The "shoulder" in the Nd concentration in ERDA-6 brine as a function of increasing pCH was attributed by Borkowski et al. 2008 to borate complexation. However, the reason for the decreasing Nd complexation as a function of pCH above about 9.75 was not clear.	✓		
4. If the trend in Nd concentrations in GWB (Figure 4-8) is simply extrapolated up to pCH 9.4 (the pCH predicted by FMT modeling for GWB brine in the repository), the Nd concentration could be as high as $4 \times 10^{-5}$ M, which is much higher than the concentrations...	✓		

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5. When discussing possible effects of increased +III actinide solubilities on PA during our call, a LANL staff member said that he thought the increased ligands concentrations predicted for the CRA-2009 PABC FMT calculations might have increased the +III...	✓		
6. Figure 4-9 presents Nd(III) solubility data in GWB as a function of pCH in the absence of carbonate. At pCH values of approximately 7.3 and 8.0, the concentrations measured in experiments approached from undersaturation are higher by approximately an order of...	✓		
7. DOE's response to 1-23-6c dated November 25, 2009 statement that "For the III actinides, the complexation of borate effectively substitutes for the calculated effect of carbonate presently in the WIPP model."	✓		
8. DOE should perform FMT calculations to predict the concentrations of Nd(III) under the conditions of the Nd(III) solubility experiments in the NaCl, GWB, and ERDA-6 brines.			✓
9. Another question is related to the carbonate concentrations in the experiments that they conducted. I understand that they spiked an initial carbonate concentration into the solutions and used "gas-tight polypropylene bottles" for the experiments.	✓		
<b>Comments Received February 22, 2010</b>			
4-C-26 On page 12 of Borkowski et al. (2008), the americium-borate species is represented as AmB(OH)4 +, but on page 46, the neodymium-borate species are represented as NdB40 7+ and Nd(B407)2-. DOE should address whether there is any basis for			✓
4-C-27 DOE should address whether transformation of the initial NdOHC03(s) in their experiments to Nd(OH)3(s) could have substantially changed the carbonate concentrations during the undersaturation experiments, including whether it was possible that			✓
4-C-28 Figure 3-4 of Borkowski et al. (2008) shows the solution concentrations of americium(III) as a function of pCH in the absence and presence of CO2, and the data are attributed to Kim et al. (1984). However, examination of this reference shows that the reported			✓
4-C-29 Figure 4-7 of Borkowski et al. (2008) shows the neodymium concentration as a function of time in the undersaturation experiments with GWB and carbonate. The data in this figure show that neodymium concentrations increased rapidly after the start of the			✓
4-C-30 On page 46 of Borkowski et al. (2008), it is stated that the addition of carbonate to modeling calculations performed with Geochemists Workbench led to a slight increase in the			✓

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4-C-31 On page 46 of Borkowski et al. (2008), it is stated that the addition of carbonate to modeling calculations performed with Geochemists Workbench led to a slight increase in the			✓
4-C-32 On page 29 of Borkowski et al. (2008), it was stated that XRD analysis of NdOHC03(s) synthesized for the purpose of the experiments confirmed the "predominance" of a neodymium mixed hydroxy-carbonate phase. DOE should discuss whether any XRD			✓
4-C-33 On page 35 of Borkowski et al. (2008), it was stated that neodymium solubility was studied in 5 M NaCl at 10-2M total carbonate concentration. DOE should explain why this carbonate concentration was not listed in the test matrices			✓
4-C-34 Because the data in Figure 4-5 (neodymium(III) solubility in 5 M NaCl in the presence of carbonate) were obtained over different time periods and had different initial carbonate concentrations, it is difficult to interpret these data.			✓
4-C-35 A review of the recent literature regarding aqueous thorium speciation in carbonate solutions indicates that the speciation selected by the OECD critical review (Rand et al. 2009) is the most consistent with the available data.			✓
4-C-36 An experimental investigation reported by Altmaier et al. (2004) has indicated that intrinsic thorium colloids (eigencolloids) can form and remain stable at high ionic strength (up to 5 M NaCl or 4.5 M MgCl <sub>2</sub> ).			✓