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

DEC 22 2011

Mr. Ed Ziemianski
Carlsbad Field Office
U.S. Department of Energy
P.O. Box 3090
Carlsbad, New Mexico 88221-3090

Dear Mr. Ziemianski:

On August 30 and September 28, 2011 the U.S. Department of Energy (DOE) submitted two Planned Change Requests (PCRs) to the U.S. Environmental Protection Agency for review. The first PCR (DOE/CBFO-11-3478) proposes relocating Waste Panels 9 and 10 to the south of existing Waste Panels 4 and 5, the second PCR (DOE/CBFO-11-3479) proposes replacing the current 'Option D' Panel Closure System (PCS) with an alternative design. Both PCR packages use the Panel Closure Redesign and Repository Reconfiguration (PC3R) Performance Assessment (PA) modeling results and analyses.

As you know, 40 CFR Part 194 specifies in Appendix A, Condition 1 that the Option D Panel Closure be implemented at WIPP. Thus, any change in the panel closure design requires modification to the rule. EPA is reviewing the PC3R PA package to determine if it is sufficient for us to move ahead with a rulemaking and to identify areas that need additional supporting information or modification. The first set of review questions and comments is included in this package, it focuses on changes to the panel closures. Within the next few weeks, EPA will be providing additional questions and comments to DOE related to both the PCS and the repository reconfiguration.

Your timely and considered response to the attached questions and comments, as well as those you will receive over the next few weeks, will allow us to determine whether a rulemaking is feasible prior to DOE's next submission for recertification.

Sincerely,

Alan D. Perrin, Acting Director
Radiation Protection Division

cc: (Electronic Distribution)
George Basabilvazo, DOE/CBFO
Russ Patterson, DOE/CBFO
Steve Kouba, RES
Mike Gross, RES
Paul Shoemaker, SNL
Christi Leigh, SNL
Moo Lee, SNL
Chris Camphouse, SNL
Trais Kliphuis, NMED
Thomas Kesterson, NMED
Nick Stone, EPA Region 6

EPA Concerns

DOE's justification for adopting 100 years as the time frame for the T1 time period is not clear, especially given the range of values given by different sources.

Hansen and Thompson (2002, p.4) estimated that a reduction of ROM salt porosity from 0.33 to 0.10 would occur within a maximum of 100 years, and indicate that it would take more than 100 years for ROM salt porosity to drop to the target value of 0.05.

Numerical simulations conducted by Callahan and DeVries (1991, Figure 4-2 SAND91-7052) predicted the essentially total reduction in the void volume of a room filled with crushed salt within about 25 years. These predictions do not seem to be supported by the measured closure rates of Panel 1 access drifts used in Hansen and Thompson (2002).

In DOE's proposed 2006 panel closure redesign (which also used 100 feet of loosely placed ROM salt for the panel closure material), a value of 200 years was used for creep closure to reduce the porosity from an initial value of 0.33 (averaged to 0.27 when combined with the porosity of the concrete block explosion wall) to a final value of 0.05 (Vugrin and Dunagan 2006, Table 3 and p. 15 ERMS 543865). No reason is given for reducing the time required to reach a .05 porosity value from 200 years to 100 years in the PC3R PA.

1.2 Panel Closure Porosity

Parameter Name	PABC 2009 Value	Used in PC3R PA ERMS 555489	Units
PCS_T2: POROSITY	0.05 for CONC_PCS	0.05	--

Technical Question 1.2a: Please provide justification that the T2 porosity is an appropriate target value that correlates to the permeability and compressibility values used in the PC3R PA.

Technical Question 1.2b: How sensitive a parameter is the final porosity of the panel closure? That is, how much would changing the value of PCS_T2: POROSITY (e.g. to 0.01 or 0.075) change calculated results, such as waste area saturation and pressure, that are known to impact performance?

EPA Concerns

DOE's reasoning in selecting the final T2 porosity value of 0.05 is not explicit. Because the assigned porosity of the panel closure at T2 is the value from which the long-term permeability and compressibility of the panel closure are defined, EPA is asking for more information on the parameter's justification and the importance of the specific value used.

The PC3R T2 permeability values are similar to the values for fully reconsolidated crushed salt reported by Kelley et al. (1996) and Hurtado et al. (1997), but not representative of porosities equivalent to 0.05. The T2 permeabilities used to represent ROM salt at a porosity of 0.05 are generally 1.5 to 2 orders of magnitude lower than those reported by Butcher et al. (1991, reported in Hansen and Callahan, 1993), Brodsky (1994), Hurtado et al. (1997, SAND97-1287), and Hansen and Thompson (2002) for compacted salt equivalent to a porosity of 0.05.

1.4 Panel Closure DRZ Permeability

Parameter Name	PABC 2009 Value	Used in PC3R PA ERMS 555489	Units
Long Term T2 Values for the PCS DRZ			
PCS_T2:PRMX_LOG PCS_T2:PRMY_LOG PCS_T2:PRMZ_LOG	-20.7, -18.8, -17.0 for material CONC_PCS	-22.8, -20.2, -17.6 Triangular Distribution	$\log(m^2)$

Technical Question 1.4a: Please justify the assignment of permeability values to the PCS DRZ during time period T2 that appear to represent a fully reconsolidated material, when the ROM salt panel closure itself has not yet fully reconsolidated and stress equilibrium has not yet been achieved.

Completeness Question 1.4b: Please explain why the anhydrite marker beds surrounding the ROM salt panel seal are not treated in the same manner as those within the waste panel DRZ.

EPA Concerns

EPA cannot trace the justification for assigned permeabilities provided by Camphouse (2010, p. 5 ERMS 554614) to supporting documentation. Both the panel closure and the surrounding rock consist of essentially similar material, disturbed Salado halite. The porosity and permeability of the disturbed halite around an ROM salt panel closure will begin to decrease when back pressure from the compacting ROM salt begins to significantly increase.

As noted by Hansen and Callahan (1993, p. 7), laboratory results indicate that little resistance is created by crushed salt during consolidation until fractional densities on the order of 0.90 are achieved. According to Hansen and Thompson (2002, p. 2), a fractional density of 0.90 is equivalent to a porosity of 0.10 and a permeability on the order of 10^{-15} m^2. Full reconsolidation of the PCS DRZ halite would be unlikely to occur until the ROM salt panel closure is itself fully reconsolidated and stress equilibrium is achieved. The T2 permeabilities assigned to the ROM PC, and therefore, also to the T2 PCS DRZ halite, are more closely representative of fully reconsolidated salt at a porosity of about 0.01 than of a partially reconsolidated salt at a porosity of 0.05.