ENVIRONMENTAL EVALUATION GROUP

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Dr. Inés Triay, Manager
Carlsbad Field Office
U.S. Dept. of Energy
P. O. Box 3090
Carlsbad, NM 88221

Dear Dr. Triay:

We have a number of concerns about DOE's plans to continue to use Panel 1 until June 2002. Your mining/geotechnical engineering staff has concluded that it is possible to keep certain underground rooms open for two years after a new set of roof bolts, cables and meshing are installed. Our concern, however, is for the areas where ground control structures are more than two years old and where maintenance work cannot be carried out due to the presence of emplaced waste. Currently, Room 7 of Panel 1 is such an area. The entire 1950-South drift and Rooms 2 and 3 of Panel 1 may also become such areas if you proceed with a proposed plan to stack waste in that drift and in those rooms. This can happen if the waste arrival rate is slower than that assumed in the plan.

An additional concern for continued use of Panel 1 is due to the problems created by the high degree of vertical convergence of the rooms and drifts. The floor of Panel 1 has heaved so much and has been milled so often that it now sits directly on the fractured anhydrite of Marker Bed 139. Since sufficient vertical space to stack three 7-packs one over the other (and the MgO supersack at the top) no longer exists, your staff is proposing to stack the drums only two high in the selected rooms of Panel 1. This brings in to question the roof-fall scenarios analyzed in the WIPP Safety Analysis Report (SAR, Section 5.2.3.11).

The SAR assumes that any roof fall over a three-high stack of drums will result in a static loading, not a dynamic one. If the stacks are only two high, that assumption must be re-examined. We note that your staff has recognized this issue and has recently conducted an "Unreviewed Safety Question (USQ)" analysis to determine the maximum allowed distance between the roof and the top of MgO supersack. This analysis concludes that as long as the distance between the roof and the top of the MgO sack does not exceed 55.7 inches, there is no USQ, i.e., no unacceptable consequence. Attachment 1 to this letter provides the EEG analysis of the SAR/USQ issue in more detail. It appears to us that breaches of containers could occur and there is no factor of safety to offset the uncertainties inherent in a natural system.

Attachment 2 examines the likelihood of the projected rate of emplacement being achieved and the emplacement of RH-TRU in Panel 2. We concluded it would probably be later than the projected date of June 2002 before the S-1950 drift, Rooms 2, and Room 3 can be filled with two-high stacking. Also, some RH-TRU emplacement capacity will be lost in Panel 2 even if initial emplacement of CH-TRU into Panel 2 is delayed for at least 18 months.

Attachment 3 provides EEG analysis of a roof/fall scenario with the current waste being emplaced. We concluded that the radiological consequences of a roof fall are acceptable but that the public perception of this event, if it occurred, needs to be considered.

It may be possible to squeeze some additional life from an aging Panel 1, but Panel 2 is newly excavated and now ready for disposal of CH-TRU waste. Further delay in the use of Panel 2 will simply add to its excavated age. We understand the DOE desire to first emplace RH-TRU canisters in the walls of the Panel 2 rooms before losing access as a result of emplacing CH-TRU drums on the floor. At this time, it appears that saving space for RH-TRU waste in Panel 2 is not crucial. DOE's current projection of the RH-TRU inventory is approximately 70% of the design RH-TRU capacity of the repository. Moreover, RH-TRU shipments have not begun and there are uncertainties in the projected date of first arrival and subsequent shipment rates of RH-TRU waste to WIPP. In view of these uncertainties and our observations, DOE may find it prudent to cease using Panel 1 and to begin using Panel 2.

As always, we are available to discuss this issue with your staff and yourself, if you so desire.

Sincerely,

Matthew K. Silva
Director

MKS:LC:JKC:pf
Attachment

cc: Jack Gilbert, DOE/CBFO
Mary Kruger, EPA

Attachment 1
USQ for Stacking Containers Two-High

The USQ calculates that as long as the distance between the roof and top of the supersack is maintained at less than 55.7 inches that drum breach by crush forces will not occur. EEG agrees that the assumptions used and the methodology are reasonable. However, we do not agree that this calculation shows that breach will not occur for two reasons:

(1) A two-high stack of 55-gallon drums with 3 slip-sheets and a supersack will total about 96.9 inches [2x34.9 in for drums, 3 in for slipsheet, 24.5 in for supersack]. This means that in a 13-foot high room with no roof sag the distance between the top of the supersack and the roof would be about 59.1 inches. Therefore, a maximum free space of less than 55.7 inches cannot be assured unless there is a deliberate control procedure at the time of emplacement to ensure that the 55.7 inch space is not exceeded.

(2) The assumption of average waste values of 120 pounds per drum is a reasonable average, but not conservative. It seems most reasonable to consider the averages and variability of the wastes actually being emplaced now to arrive at an appropriate waste weight to use. The following results are for all wastes emplaced in the 23 shipments that have arrived at WIPP since October 1, 2000.

   (a) The average weight of all wastes is 45.6 kg (100.4 pounds).

   (b) The 14 shipments from RFETS, which contained 67% of the total drums, emplaced averaged 33.9 kg (74.7 pounds).

   (c) The one shipment from Hanford (5% of total drums averaged 23.3 kg (51.3 pounds).

   (d) Seven shipments (30% of total shipments and 36% of total drums) had average net weights of 48.7 to 53.7 pounds per drum.

   (e) The 6 shipments received in November to date had 53 individual drums (21%) with less than 37.4 lb. of waste. The lowest value was 17.2 pounds.

We must conclude that use of a 120-pound drum average weight would not lead to a conservative calculation. Even use of about 50 pounds per drum would protect only 70% of the shipments. The maximum roof distance for 50-pound drums would be 46.0 inches.

DOE needs to respond to both points (1) and (2) above and indicate how they plan to ensure that drum break by crush forces will not occur.

Attachment 2
Rate of Emplacement of CH-TRU & RH-TRU

CH-TRU

The rate of 2-high emplacement shown in the schematic (faxed to us on 10-26-00) for the S-1950 drift, Room 2, and Room 3 amounts to about 19 shipments per month in July-September 2001 and 43-48 shipments per month thereafter. The rate after October 2001 is consistent with the latest projections we have seen from CBFO. Experience to date is that CBFO projections of waste shipments a few months into the future have been optimistic and updated projections are consistently being reduced. At the current rate of emplacement, it would take 42 months to complete the planned emplacement in Panel 1 (until 5/04). Based on experience to date, we suspect that it will take at least 10%-20% longer than DOE is projecting to fill the areas indicted. A short delay in filling Panel 1 may not be a cause for concern.

RH-TRU

The time at which the first shipment of RH-TRU can be received and the emplacement rate in the early years are both very uncertain. Experience with the Permit for CH-TRU suggests that the time between CBFO's first submittal to NMED and an effective RH-TRU Permit will be longer than 15 months. EEG has seen no definitive information to estimate the rate of RH-TRU waste shipments for the first year or two after a Permit becomes effective. Experience with CH-TRU suggests that the rate of receipt for RH-TRU will be somewhat lower than expected.

RH-TRU canister emplacement will not be able to stay ahead of CH-TRU emplacement until the number of RH-TRU shipments become 38% of the number of full CH-TRU shipments per month. The implication of this is that some of the rooms in Panel 2 will not have full emplacement of RH-TRU regardless of when emplacement of CH-TRU begins in Panel 2. Nevertheless, it would be possible to salvage a few RH-TRU emplacement locations by delaying initial emplacement of CH-TRU in Panel 2, Room 7 (e.g. a few RH-TRU canisters might be able to be emplaced in the walls of Room 6 during the approximately 6 months it might take to fill Room 7 with CH-TRU. Then RH-TRU emplacement would have to shift to Room 5 so that CH-TRU emplacement would not be delayed).

DOE's proposed plan for continuing to use Panel 1 seems necessary only if space for CH-TRU or RH-TRU is expected to be short in the full repository. The latest DOE estimates for the RH-TRU volume ($3835 m^3$) can be accommodated in 5.9 panels. Since Panels 9 and 10 (north-south access drifts) will be available if needed, there seems to be a significant margin of space for RH-TRU. The proposed plan for continuing to emplace CH-TRU in Panel 1 would salvage space for about 19,000 drum equivalents (compared to immediately moving to Panel 2) which is 2.3% of the repository design limit. Recent projections of CH-TRU volume that we have seen are also well below the design volume.

Attachment 3
Consequence of Roof Fall in Panel 1

The SAR calculated quantities of radionuclides released and doses for the roof-fall accident (CH 11) in Appendix E, Tables E-45 and E-46 although they considered the probability of the event to be less than 1×10^{-6} per year. This low probability was based on the belief that ground control measures could prevent a roof fall and even if the event did occur there would be sufficient warning to allow mitigative measures to be taken. EEG believes the probability of a roof fall in Panel 1 is high enough to merit a consequence calculation.

The SAR roof fall scenario used a material at risk (MAR) value of 240 PE-Ci (from one breached drum containing 80 PE-Ci and 20 breached drums each containing 8 PE-Ci). EEG believes it is most reasonable to use PE-Ci concentrations for waste being emplaced at this time because these waste streams would comprise the bulk of the waste emplaced in Panel 1 in the next 1.5 years. The PE-Ci concentrations in waste being emplaced is considerably less than assumed in the SAR scenario. Waste emplaced between 10/01/00 and 11/20/00 averaged only 0.94 PE-Ci/drum and the maximum drum was 11.0 PE-Ci. Based on these actual data we believe a reasonable MAR value would be 31 PE-Ci (20 drums at 1.0 PE-Ci and one drum at 11.0 PE-Ci) which is 13% of the SAR value.

The SAR calculated unmitigated doses from the CH 11 accident of 5.2. rem at 100 m, 0.86 rem at the exclusive use boundary (285 m), and 0.041 rem at the site boundary. Rucker (in EEG-78) presented upper 95% confidence level values that agreed well with the first two values (5.03 rem and 0.87 rem). Thirteen percent of the SAR values would be 0.68 rem at 100 m, 0.11 rem at 285 m and 0.0053 rem at the site boundary. Also, a dose of 42 rem was calculated in the SAR to an immediate worker (located in the exhaust ventilation drift). Thirteen percent of this dose would be 5.4 rem.

The dose consequences of a roof fall event are significant but would clearly be acceptable according to the various relevant guides and regulations. Thus, for an unsealed room, dose consequence alone cannot justify preventing a roof fall at all cost. However, the public relations aspect would be significant and the credibility of DOE would be questioned. Also, there would likely be a disruption of waste emplacement operations at WIPP while the event was being investigated and contamination was cleaned up. DOE needs to decide on the acceptable risk of such a scenario.