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OCT 21 1986

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NOTE TO: T. Johnson  
T. Cardone  
P. Bemba  
D. Goode

FROM: N. Coleman

SUBJECT: HANFCRD TANK WASTE DEIS REVIEW

Enclosed is a memorandum from Regis Boyle dated 9/23 that contains a copy of staff review comments on the DEIS. Given that at least one concern has been raised about its contents, M. Fliegel wishes to ensure that there are no other items that we have major technical problems with. He has requested that I coordinate an overview of this document to help him make that determination.

Please review the 9/23 memorandum from Boyle and provide me with a written response by 10/21. Fliegel feels that this should consume no more than an hour of your time. If you find that more time is needed, and if you have other commitments of high priority, please notify me and contact your Section Leader for guidance. Thank you for your assistance in this matter.

*Need*

*See marked-up copy*

*No other problems*

*Ted  
10/21/86*

8702130088 861028  
PDR WASTE PDR  
WM-10

DETAILED COMMENTSDISPOSAL OF TRU WASTES WITH CONCENTRATIONS BELOW 100 nCi/GM

The NRC staff is concerned about disposal of wastes with TRU concentrations below 100 nCi/gm (e.g., Section 3.3.1.4, paragraph 1). Disposal of such wastes may require better protective measures than are evidenced in this DEIS. For example, NRC's analyses in support of 10 CFR Part 61 showed that Class C wastes, including wastes with TRU concentrations between 10 and 100 nCi/gm, must be disposed of using a stable waste form and the disposal facility must either permit emplacement at least 5 meters below the ground surface or must include an engineered intruder barrier. The staff encourages the DOE to consider the results of the Part 61 supporting analyses when developing disposal concepts for such wastes. (The staff notes that, for other projects, the DOE has committed itself to comply with the 10 CFR Part 61 performance objectives for disposal of low-level wastes. See, for example, the Proposed Finding of No Significant Impact, Disposal of Project Low-Level Waste, West Valley Demonstration Project, West Valley, New York, April 1986.)

PROTECTIVE BARRIER AND MARKER SYSTEMAppendix M, Preliminary Analysis Of The Performance Of The Protective Barrier And Marker System

The NRC staff recognizes that substantial research and development of barrier concepts remains to be completed before a decision can be made to implement either the in-place stabilization or the reference alternative. The following concerns regarding the design and performance of barriers should be considered during DOE's future barrier research and development efforts.

Overall Barrier Design

The barrier design shown in Figure M.3 of Appendix M is based on construction of a multilayer capillary (or "wick") barrier that is intended to reduce deep drainage. The key to this design is a layer of very coarse gravel or rock with an overlying revegetated layer of fine-textured soil. Under ideal conditions this multilayer design can minimize infiltration rates by trapping fluids in the uppermost soil layer and subsequently removing soil moisture through evapotranspiration. Such a cover is only effective to the extent that hydraulic pressure within the wick is insufficient to cause a breakthrough into the pervious layer beneath the wick. If breakthrough occurs the pervious layer must direct water horizontally so that it will not migrate further down toward the waste. In order to do this, the base of the pervious layer must have adequate slope, probably greater than 5 percent. Such a slope is not apparent in the barrier design of Appendix M.

It should be noted further that a wick design should be based on extreme precipitation events rather than average annual precipitation. Wetting fronts and subsequent breakthrough are likely to occur during storms with infrequent return periods. Given the time period during which this barrier must be effective, it is prudent to design it for a storm with a very low recurrence interval (e.g., 1000-yr, 24 hr storm).

The DEIS also states that the barrier would restrict penetration by plants and animals into the waste, because of the rock and absence of moisture beneath the wick. The staff is concerned, however, that even shallow burrowing within the upper soil layer (down to the rock) could impair the effectiveness of the wick as a moisture barrier. The DOE should investigate means for preventing or minimizing burrowing within the barrier.

#### Potential for Erosion

It appears that little or no consideration has been given to the potential for erosion of the soil cover of the protective barriers due to the occurrence of local intense precipitation. Several long-term stability investigations performed for the NRC staff indicated that the most disruptive natural phenomena affecting long-term stabilization are likely to be wind and water erosion (Nelson et al., 1983; Young et al., 1982; Lindsey et al., 1982; and Beedlow, 1984). These studies also indicated that wind and water erosion can be mitigated by a rock cover of reasonable thickness and that the size of the rock chosen for the protective cover will normally be controlled by a design precipitation or flood event.

The NRC staff considers it very important that adequate erosion protection be provided to prevent the occurrence of sheet erosion and the initiation of gully erosion. Gully erosion, once initiated, can cause extensive damage to any soil cover, such that previous assumptions regarding infiltration, biotic intrusion, erosion, and releases of radionuclides may no longer be valid.

On the basis of NRC staff experience with long-term stabilization in arid regions of the western United States, it is very unlikely that the proposed vegetative cover will provide adequate protection to prevent the occurrence of gully erosion (Nelson et al., 1983). In general, a rock cover is usually needed to provide such protection. A mixed rock/soil cover might provide similar protection while also allowing growth of a vegetative cover. The NRC staff recommends that such a protective cover be considered. To address various uncertainties and provide for a conservative design basis, it would be prudent for the DOE to design the rock cover for an occurrence of localized intense precipitation as ~~previously discussed~~. *Severe as the Probable Maximum Precipitation (PMP).*

#### Long-Term Stability

The performance of the barrier shown in Figure M.3 of Appendix M is dependent on the overall structural integrity of the barrier system and on the maintenance of interlayer textural differences. It is not known whether these factors can realistically remain stable over a time scale of 10,000 years. Even if structural integrity of the barrier can be maintained over this time scale, downward infiltration of fine-grained soil materials into voids of the gravel layer could compromise the barrier effectiveness by altering textural differences in the capillary barrier. This could occur through gradual settling or minor subsidence of the protective barrier after construction. (The structural stability of waste tanks is of particular concern in this regard.) Other mechanisms for altering textural differences would include biogenic activity (discussed above), and liquefaction of the base of the soil cover if it is near saturation and experiences significant seismic accelerations.

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Neil -

My very brief review does not indicate any major technical problems w/ NRC's comments. I note that some of my concerns w/ the capillary barrier have been addressed on p. 5 "Long-term stability".

*[Handwritten signature]*

22 Oct 86

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Reel:

After comparing the questions and comments contained in the attached 9/23 package from Boyle to those submitted by WMGT on 6/2/86, I find the 9/23 version representative and acceptable.

Tom Cardone 10/23/86