88/02/08/NC

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MEMORANDUM FOR: Malcolm R. Knapp, Director
Division of Low-Level Waste Management
and Decommissioning
Office of Nuclear Material Safety
and Safeguards

THRU: Robert E. Browning, Director
Division of High-Level Waste Management
Office of Nuclear Material Safety
and Safeguards

FROM: Ronald L. Ballard, Chief
Technical Review Branch
Division of High-Level Waste Management
Office of Nuclear Material Safety
and Safeguards

SUBJECT: REVIEW OF FINAL EIS: DISPOSAL OF HANFORD DEFENSE WASTES

The final EIS for disposal of defense wastes has been reviewed by Neil Coleman and Tin Mo of the Technical Review Branch. Enclosed are the final comments prepared by Neil Coleman. Draft comments were previously given to Chad Glenn by both reviewers as requested on February 8, 1988. The final comments by Tim Mo will be transmitted by COB February 29, 1988. Please contact me if there is any further assistance needed in this review.

/s/

Ronald L. Ballard, Chief
Technical Review Branch
Division of High-Level Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosures:
As stated

cc: Regis Boyle, LLWM
Chad Glenn, LLWM

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DATE: FEBRUARY , 1988

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CONCURRENCES

ORGANIZATION/CONCUREE	INITIALS	DATE CONCURRED
HLTR/N. Coleman	NMC	88/02/25
HLTR/T. Mo		88/02/25
HLTR/D. Chery		88/02/25
HLTR/D. Brooks		88/02/25
HLTR/R. Ballard		88/02/26
HLWM/R. Browning		88/02/1

HLTR COMMENTS ON HANFORD DEFENSE WASTE FINAL EIS

Appendix M: Preliminary Analysis of Protective Barrier

The DOE has proposed a protective capillary barrier to prevent precipitation, snowmelt, and other forms of recharge from contacting defense wastes disposed in the near-surface. This protective barrier is the key to hydrologic isolation of these wastes, which may be classified as high-level wastes. Such a barrier relies on the special properties of layered strata of varying textures to trap moisture near the surface where evapotranspiration can remove it. A final design for this barrier was not given in the DEIS or the FEIS - only a conceptual design was provided. DOE has started a Barrier Development Program to evaluate barrier designs and long-term performance. This program, which is described in detail by Adams and Wing (1987), is estimated to take 5-7 years to complete. On its completion, the DOE will prepare a final barrier design to be reviewed and approved by appropriate regulatory agencies. Given the importance of the protective barrier to waste isolation, it is recommended that the NRC staff monitor the progress of the Barrier Development Program and review the final barrier design. The following list summarizes major points affecting barrier performance that will be researched under DOE's Barrier Development Program:

- Extreme event scenarios
- Barrier failure scenarios
- Climate projections
- Potential for wind and water erosion
- Appropriate composition of vegetative covers
- Range fire denudation of barrier vegetative covers
- Seismic effects
- Biointrusion
- Human intrusion
- Composition and textures of barrier layers
- Influence of barrier slopes on performance

EIS Scope, Comment Response 2.3.1.14

During the DEIS review, the staff expressed concerns about the long-term cumulative effects of all ongoing and projected waste disposal activities at Hanford. The scope of the DEIS excluded disposal plans for low-level radioactive wastes in liquid and solid disposal sites and other categories of wastes. DOE stated that other waste operations would be subjects of additional NEPA reviews. DOE responded to the issue of long-term cumulative effects by revising the cumulative impact section in the Final EIS. A table of projected cumulative impacts for various operations was given on page 5.6 of the Final EIS. In brief, the impacts were projected to be substantially less than those permitted by the EPA and small in comparison with natural background radiation.

The GAO presented a different view of conditions at Hanford in their 1986 report "NUCLEAR WASTE: Unresolved Issues Concerning Hanford's Waste Management Practices." The GAO considered that "Hanford has been slow to implement both [RCRA and CERCLA] - it has not identified all units that should be regulated under RCRA nor has it identified all potential CERCLA sites that may require corrective actions. As a result, Hanford [DOE] does not know - nor can it ensure the regulatory agencies - that it is appropriately managing and/or disposing of its radioactive, hazardous, and mixed waste." The GAO report also noted that Hanford excluded at least 200 accidental release sites from its CERCLA Phase I assessment, and that a Hanford official could not estimate how many accidental release sites exist over the Hanford Reservation.

In view of the above, the staff reiterates the concern made in our DEIS comment about long-term cumulative effects of ongoing and projected waste disposal activities at Hanford. It would be prudent for the DOE to locate and characterize all existing waste sites prior to finalizing designs for waste disposal facilities and operations.

Mixed Wastes, Comment Response 2.4.1.9

A number of DEIS reviewers commented on the applicability of RCRA to Hanford defense wastes. DOE responded that on May 1, 1987 final rules were published in this regard. The nonradioactive, hazardous component of the wastes was deemed subject to RCRA. In effect, all DOE radioactive waste that is hazardous under RCRA will also be subject to regulation under the Atomic Energy Act. However, NRC has concerns based on GAO (1986) regarding DOE's identification of RCRA sites (see comments on response number 2.3.1.14). From NRC's perspective, if the defense wastes in storage tanks at Hanford may be classified as high-level wastes, then the presence of nonradioactive, hazardous components would identify them as high-level mixed wastes.

Paleogeomorphology, Comment Response 3.5.2.34

In the DEIS review the NRC staff noted the importance of paleogeomorphology in developing a better understanding of flow and transport in the unconfined aquifer system. In response, the DOE acknowledged the presence of paleochannels incised in the Ringold Formation and filled with higher-permeability deposits of the Hanford Formation. In some areas the water table occurs within these channels, and that accounts for the more rapid movement of groundwater southeasterly from the 200 East Area toward the Columbia River. DOE reported that this information is considered in both groundwater monitoring activities and in the numerical model of the unconfined aquifer. The significance of this information is that DOE is aware of some relatively rapid groundwater flow paths that can be monitored for contaminant releases during defense waste disposal operations.

Groundwater Recharge, Comment Response 3.5.3.1

The primary concern regarding recharge is the potential for rapid infiltration through failed capillary barriers. DOE cited lysimeter tests by Fayer, Gee, and Jones (1986) to support the assumption that little or no recharge of natural precipitation occurs on the 200 Areas plateau due to evapotranspiration. This broad assumption is questionable because of the limited spatial and temporal scales on which lysimeter tests are conducted. DOE will assess extreme event and barrier failure scenarios as part of the Barrier Development Program.

Potential for Explosions in Waste Storage Tanks, Comment Response 3.1.4.32

A DEIS comment submitted by the Environmental Policy Institute identified the potential for explosions to occur in high-level waste storage tanks following the accumulation of hydrogen produced via radiolysis. In addition to hydrogen buildup, the tank waste may also generate explosive organic vapors. Steam explosions could also occur under some circumstances. The evident concern is the potential for extensive aerial release of contaminants during the operational phase of tank waste disposal. Responding to this issue, the DOE recognized the need for chemical characterization of single-shell tank waste. The presence of chemicals sensitive to heat will be evaluated in studying techniques for drying tanks before disposal actions. DOE referred to a PNL study in which a tank explosion was evaluated as an upper-bound accident.

The staff is concerned that even small explosions in waste storage tanks could cause ruptures in corroded sides and bottoms, resulting in leaks of hazardous materials. DOE should carefully study methods of avoiding such potential accidents in all nuclear waste storage tanks, especially since extensive tank leaks have previously occurred at Hanford.

Tank Leaks, Comment Response 3.1.4.5

A number of DEIS reviewers raised the concern that retrieval of high-level wastes from single-shell tanks could damage the tanks, resulting in additional leaks. DOE responded that, for tanks known to leak, introduction of water as part of recovery operations (water sluicing, hydraulic cavitation) would increase chances of renewed leaks. Future DOE studies will evaluate retrieval methods and will compare safety, total cost, and potential for environmental impacts. It is noted that DOE has deferred decisions on disposal of single-shell tanks waste and plans to prepare a future EIS on this subject. However, the DOE should also consider the effects of waste recovery methods on integrity of double-shell tanks.

Some single-shell tanks at Hanford have leaked large volumes of radioactive wastes. GAO (1986) reported that about 492,000 gallons of high-level wastes and other contaminants have leaked from the tanks; the largest single leak was 115,000 gallons over a 2-month period in 1973. These tank leaks at Hanford

influence groundwater monitoring activities in the vicinity of the 200 Areas. For example, the Richland Low-Level Waste Facility is located less than one mile southwest of the 200 East Area. Widespread plumes of contaminants are known to be migrating away from the 200 East Area, in a general southeasterly direction. It is probable that background levels of contaminants in groundwater beneath the Richland facility are elevated due to the presence of nearby waste disposal facilities. If future tank leaks occur during waste recovery operations, the additional contamination would further complicate environmental monitoring efforts at the Richland facility and at other waste disposal sites.