UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

November 6, 1991

'91 NOV 12 P1:24

MEMORANDUM FOR: Mel Silberberg, Chief
Waste Management Branch
Division of Regulatory Research

FROM: Carlton Kammerer, Director
State Programs
Office of Governmental and Public Affairs

SUBJECT: DRAFT FEDERAL REGISTER NOTICE OF DENIAL OF WASHINGTON AND OREGON PETITION (PRM-60-4)

Mike Lesar —
Important. Please ensure publication after the denial letters are sent.
DAVID
11-18-91

State Programs has reviewed the subject draft notice and offers the following comments. The States of Washington and Oregon snould be notified of the denial prior to publication in the Federal Register. This is similar to NRC's practice of prior notification to States of those reactors to be placed on the NRC "Watch List." The Yakima Indian Nation, who were part of the original petition (January 2, 1990), should also be notified of the denial, along with the State Liaison Officers for Washington and Oregon. We have provided those names, addresses and telephone numbers below for your convenience.

Cecil Sanchey, Chairman
Radioactive Hazardous Waste Committee
Yakima Indian Nation
Post Office Box 151, Fort Road
Toppenish, Washington 98948
509/865-5121

David Stewart-Smith, Administrator
Division of Nuclear Safety
and Energy Facilities
Oregon Department of Energy
625 Marion Street, NE
Salem, Oregon 97310
503/378-6469

Dan Silver
Office of the Governor
Insurance Building AQ-44
Olympia, Washington 98504
206/753-1948

cc: S. Treby, OGC
D.L. Meyer, OA
J. Holonick, NMSS
J.H. Austin, NMSS

A/10

(L8)

NRC FORM 383
(11-81)

U.S. NUCLEAR REGULATORY COMMISSION

CALCULATION WORKSHEET

SHEET 1 OF 2

PROJECT	CALCULATED BY	DATE
Hanford Petition	JCS	5 Feb 92
DOCKET NUMBER / SUBJECT	CHECKED BY	DATE
Ref to Pt 61 Criteria		

Pgs 8 and 11 of Encl. 2 to Weltmer memo to Berrera on Denial of PRM 60-4 .... states that the residual waste from processing DST's will met 10 CFR 61 criteria.

Additional information includes:

- vault size is 50'h × 125'l × 34'h and a cold grout cap ASSUMED = 4'
- total TRU = 1×10^4 Ci
- total Cs = 7×10^6 Ci
- total Sr = 8×10^6 Ci

Vol of 1 vault = 50 × 125' × (34'-4') = 1.875E5 ft³

1.875E5 ft³ ÷ 35.31 ft³/m³ ≈ 5310 m³

$C_{Cs} = \frac{7E6\ Ci}{5310\ m^3} = 1318\ Ci/m^3 < 4600$ 44 V ⇒ 37

$C_{Sr} = \frac{8E6\ Ci}{5310\ m^3} = 1507\ Ci/m^3 < 7000$ 44 V ⇒ 2-4 A

C_{TRU} $\rho_{grout} = 160\ lb/ft^3$

160 lb/ft³ × 1.875E5 ft³ × 1 kg/2.2 lb = 1.4 E7 kg

(1E4 Ci)/(1.9 m Ci/g) / 1.4E7 kg) / (1E3 g/kg) = 733 n Ci/g

A/8

NRC FORM 380 (11-88)

U.S. NUCLEAR REGULATORY COMMISSION

CALCULATION WORKSHEET

SHEET ____ OF ____

PROJECT	CALCULATED BY	DATE
Hanford Petition	JCS	
DOCKET NUMBER / SUBJECT	CHECKED BY	DATE
General Comments		

p7 ¶2 ff	All ref's to authority of Energy Reorg Act of 1974 should use same words; recommend except from Act: "(licensing authority) for facilities authorized for express purpose of subsequent long-term storage of [HLW]."
~~pp ¶ ff~~	~~Refr to Part 50 App F may not be appropriate because DOE is not a licensee. Consider using NWPA of 1982 definition instead. In any case, include "solids from such Events"~~
pp 5, 6	For a single vault, TRU concentrations would exceed Part 61 limits - see calc.
	44 vaults OK
p #2 p 7	Ref to single shell tanks may confound issue because of debate surrounding classification of soil contaminated by leaks from SST's.

Petition comments 2/3

- Issues

  + 1st ¶ last sent: use previous draft words: jurisdiction over particular facilities (wastes & facilities are already defined)

  + p5 2d ¶ ... largest TECHNICALLY achievable ...

  + p5 3d ¶ concentration within CLASSIFICATION limits ... of 10 CFR 61

  + p5 4th ¶ (3) the HIGH LOWER waste ...

  + p6 1st ¶ addresses DST's only, not "site" which includes tanks?

  + p6 1st ¶ ; sent Hence ... is total response to item 2 of petition, compared to 5 pgs for item 1. I would at least make it a paragraph so petitioner can find it.

• FR Notice

- Summary: petition only addresses Hanford Tank

- II. Classification ...

  + p4 DOE facilities for LONG TERM storage ....

  + p5 insert paragraph from draft explaining EIS, [illegible] method, our conclusion that we have no authority.

  + p6 3d ¶ ... material DECAYED are expected to [illegible]

  + p6 3d ¶ DELETE "(- single-shell tanks ...)" because it detracts attention from petition

Nuclide	Hanford FEIS (DOE/EIS-0113) Table B.6 Hanford DST Waste (Ci/m³) Existing Grout	Future Grout	Savannah River FEIS (DOE/EIS-0082) Table 5.39 Savannah River (Ci/m³) Tank Waste Salt Cake	10 CFR Part 61 Classification Limits Class (Ci/m³) A	B	C
^{14}C	1×10^{-2}	3×10^{-3}	—	8.0×10^{-1}	NL	80
^{137}Cs **	6×10^{1}	4×10^{1}	2.1×10^{-2}	1.0	4.4×10^{1}	4.6×10
^{3}H	—	2×10^{-2}	2.8×10^{-2}	4.0×10^{1}	NL	NL
^{129}I ✓	1×10^{-4}	1×10^{-4}	9.8×10^{-5}	8×10^{-3}	NL	$8.0 \times 10^{-}$
^{147}Pm	—	1	2.2×10^{-3}	—	—	—
TRU						
^{241}Am **	9×10^{-3}	1×10^{-1}	2.8×10^{-4}	*	NL	*
^{238}Pu	6×10^{-6}	2×10^{-4}	1×10^{-4}	*	NL	*
^{239}Pu	5×10^{-5}	5×10^{-3}	1×10^{-6}	*	NL	*
^{240}Pu	1×10^{-5}	1×10^{-3}	6.8×10^{-7}	*	NL	*
TRU, TRU ✓	9×10^{-3}	1×10^{-1}	3.8×10^{-4}	1.4×10^{-2}	NL	1.4×10^{-1}
^{241}Pu ✓	2×10^{-4}	4×10^{-3}	8×10^{-5}	4.9×10^{-1}	NL	49
^{106}Ru	1×10^{-6}	8×10^{1}	—	—	—	—
^{151}Sm	1×10^{-1}	1×10^{-1}	3×10^{-2}	—	—	—
^{90}Sr	5	1×10^{1}	4×10^{-4}	4.6×10^{-2}	2.5×10^{2}	7×10
^{99}Tc ✓	8×10^{-2}	5×10^{-2}	2.6×10^{-2}	3×10^{-1}	NL	3.0
^{93}Zr	1×10^{-4}	1×10^{-3}	2×10^{-5}	—	—	—
Part 61 Class	C	C	A			

LEGEND

NL = No Limits Established

All 1988 CLLW
Cs-137 total → 13000 Ci
Sr-90 → 4000 Ci
1989 (CLLW) → 16400 Ci
Cs-137 → 16400 Ci
Sr-90 → 7245 Ci
1,622E6 ft³
46,100 m³
$\bar{x}$ = 0.35 Ci/m³

(L9)

TABLE 1

ESTIMATED RADIONUCLIDES DISPOSED TO GROUT

Nuclide	MCi	11 vaults 6022 m³
C-14	0.0027	-
Tc-99	0.016 - 0.028	2
I-129	33×10^{-6}	1
Sr-90*	1 - 8	1
Cs-137*	12 - 13	1
TRU	0.002 - 0.01	(830 nCi/g) > 8 vaults
Total Activity**	13 - 21	

*The Sr-90 and Cs-137 curies are decayed to the end of CY 1995

**Total activity taken as sum of Sr-90 plus Cs-137 since these two nuclides (and their daughter products) dominate the total inventory.

$(6022\ m^3)\left(\frac{100\ cm}{m}\right)^3\left(\frac{2\ g}{cm^3}\right) = 1.204E10\ g/vault$

2.125E5 ft³

$(2.125E5\ ft^3)\left(\frac{m}{3.28\ ft}\right)^3 = 6022\ m^3/vault$

$\frac{13E6\ Ci\ Cs\text{-}137}{6022\ m^2} = 2158.8\ Ci$

A/9

(L2)

CHRONOLOGY OF NRC INVOLVEMENT ON HANFORD TANK WASTE

O NRC COMMENTS ON DOE'S NOTICE OF INTENT TO PREPARE AN EIS	MAY 1983
O NRC COMMENTS ON DOE'S DEIS	SEPTEMBER 1986
O DOE ISSUES FEIS	DECEMBER 1987
O NRC-DOE MEETINGS ON CLASSIFICATION OF DOUBLE-SHELL TANK WASTES	JUNE AND SEPTEMBER 1988, JANUARY 1989

PRINCIPAL RESULTS FROM NRC-DOE MEETINGS:
TWO TANKS CONTAINING NEUTRALIZED CURRENT ACID WASTE ARE HLW

DOE PROPOSES ADDITIONAL RADIONUCLIDE REMOVAL FOR COMPLEXANT CONCENTRATE WASTE

O DOE SUBMITS PROPOSAL TO NRC FOR CLASSIFYING TANK WASTES	MARCH 1989
O STAFF INFORMS COMMISSION OF DOE PROPOSAL	MAY 1989
O COMMISSION DIRECTS STAFF TO SOLICIT COMMENTS FROM STATE OF WASHINGTON AND YAKIMA INDIAN NATION	JULY 1989
O NRC STAFF MET WITH STATE, TRIBE AND DOE	AUGUST 1989
O STATE AND TRIBE SUBMITS COMMENTS TO NRC	AUGUST 1989
O NRC RESPONSE TO STATE, TRIBE AND DOE	SEPTEMBER 1989

A/2

BACKUP QUESTIONS V + W FOR HEARING OF SENATE COMMITTEE ON GOVERNMENTAL AFFAIRS, APRIL 9, 1992

(L3)

V. What is NRC's position on the Hanford double-shell tank wastes?

ANSWER: NRC concluded in 1989 that the residual wastes remaining after removal and treatment of most of the radioactivity in the Hanford double-shell tanks are incidental wastes and, therefore, not subject to NRC regulation. NRC based this conclusion on its review of DOE's Environmental Impact Statement on Disposal of Hanford Defense High-Level, Transuranic, and Tank Wastes and several meetings and correspondences with DOE between 1986 and 1989. NRC's determination of incidental wastes was consistent with the rationale for the definition of high-level waste contained in NRC's regulations in Appendix F of 10 CFR Part 50. More than 97% of the original activity introduced to the tanks has either decayed during decades of storage, or will be removed from the tanks, solidified in glass, and disposed of in a deep mined geologic repository as high-level radioactive waste. We understand DOE is presently planning to dispose of the incidental wastes in near-surface grout vault disposal facilities.

A/3

W. What is NRC's response to the Washington-Oregon petition on the Hanford Tank wastes? Why has it taken NRC so long to respond?

ANSWER: The NRC staff is presently preparing a recommendation for the Commission's review on the petition submitted by the States of Washington and Oregon regarding the classification and disposal of the Hanford double-shell tank wastes. This recommendation should be presented to the Commission within the next several weeks. We regret the delay in developing our response. However, the petition raised substantive legal and technical issues that required thorough consideration prior to developing the recommendation.

Attachment 3

CONVERSATION RECORD

TIME 11:30 a.m. DATE 12/12/89

L4

TYPE ☐ VISIT ☐ CONFERENCE ☒ TELEPHONE ☐ INCOMING ☒ OUTGOING

Location of Visit/Conference:

ROUTING	
NAME/SYMBOL	INT
RBangart	
MBell	
RBoyle	

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU: Nick Kirch

ORGANIZATION (Office, dept., bureau, etc.): Westinghouse for DOE Richland Operations

TELEPHONE NO: FTS 440-2380

SUBJECT: Potential for Explosion in Hanford Tanks

SUMMARY

Over 1954-1957 timeframe, K & Na Ferrocyanide was added to Bismuth Phosphate waste (early reprocessing waste) to remove cesium from SST supernate. Due to the low solubility and low PH of ferrocyanide, this chemical precipitated and now resides in the sludge in some SSTs. Approximately 90% of the ferrocyanide is thought to be contained in 10 SSTs. The DSTs are not believed to contain this chemical in concentrations that represent a potential hazard.

PNL issued a report (PNL 5441) on ferrocyanide in 1984. The report identified an explosive reaction when a sample was heated in a lab above 460°F. Sen. Glenn released this report in October 1989. PNL is pursuing this question and is expected to publish its findings in late 1990. The State of Washington has also initiated its own study on this issue in November 1989 and expects to issue a report in early 1990. PNL's ongoing work seeks to define worst-case types of waste mixtures and heat required to trigger an explosion. The highest temperature ever recorded for a SST containing ferrocyanide was 135°F. The temperature in these tanks have been decreasing approximately 3°F/year.

ACTION REQUIRED

NAME OF PERSON DOCUMENTING CONVERSATION	SIGNATURE	DATE
Chad Glenn	Chad Glenn	12/12/89

ACTION TAKEN

SIGNATURE	TITLE	DATE

A/H

CONVERSATION RECORD

TIME 2:00P.M. DATE 4/5/90 LS

TYPE ☐ VISIT ☐ CONFERENCE ☒ TELEPHONE ☐ INCOMING ☐ OUTGOING

Location of Visit/Conference:

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU	ORGANIZATION (Office, dept., bureau, etc.)	TELEPHONE NO.
Don Woodrich	Westinghouse Corp. Hanford Site	FTS440-2038

ROUTING

NAME/SYMBOL	INT
R. Bangart	
J. Greeves	
R. Boyle	

SUBJECT

Potential of Explosion in Hanford Tank due to Hydrogen Buildup

SUMMARY

In a March 27, 1990 letter to Secretary Watkins, the Conway Safety Committee (of Defense Nuclear Safety Board) concluded that there is a very low probability of an explosion in a Hanford tank due to ferrocyanides. However, in this letter the Committee reported that Hydrogen buildup in double-shell tanks (DSTs) is a more serious concern.

The principal focus of this concern is with DST tank 101SY although hydrogen buildup is a concern to a lesser degree in 4 other DSTs and 15 single-shell tanks (SSTs). Tank 101SY was filled with 1 million gallons of neutralized waste between 1977-1980 and no waste has been added to this tank since that time. The waste in the tank have been run through an evaporator, and as a result, it is very viscous with the exception of a surface crust which has formed. The tank has an average organic content of approximately 18 grams/liter. This organic content results from a former solvent extraction process used in B Plant for Sr removal. Organic degradation is apparently occurring along with radioactive decay. The organic decomposition appears to be producing Nitrogen, Nitrous Oxides, and Hydrogen under the surface crust in the tank. This gas buildup is released periodically (every 2-3 months) with a rise and fall of the tank level. The main concern is with nitrous oxide supplying oxygen to hydrogen forming a potentially flammable gas if there is an ignition source. In one instance, a potentially flammable concentration of hydrogen (5 %) was measured near an exhaust vent. Activities around this tank have been restricted as a safeguard to prevent any potential source of ignition. Mr. Woodrich indicated the potential threat of an explosion due to the buildup of gases is very low.

DOE is presently trying to sample and analyze the gases produced to better characterize the chemical reaction taking place. DOE expects to have an internal plan in place this summer to mitigate this problem. The State of Washington and the GOA are also investigating this concern.

NAME OF PERSON DOCUMENTING CONVERSATION	SIGNATURE	DATE
Chad Glenn		4/6/90

ACTION TAKEN

None

SIGNATURE	TITLE	DATE

ALS

CONVERSATION RECORD

TIME 1:15 PM | DATE 8-3-90

TYPE ☐ VISIT ☒ CONFERENCE ☐ TELEPHONE ☐ INCOMING ☐ OUTGOING

Location of Visit/Conference:

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU	ORGANIZATION (Office, dept., bureau, etc.)	TELEPHONE NO.
Paula Clark (DOE Hanford Office) Don Woodrich (Westinghouse)		FTS 444-4718

SUBJECT
Hydrogen Build-up in Hanford Double Shell Tank 101 SY

ROUTING

NAME/SYMBOL	INT
R. Bangart	
J. Greeves	
J. Austin	
R. Boyle	
D. Fehringer	

SUMMARY

On August 3, 1990, I called DOE's Hanford Operations office for status on the hydrogen build-up in Double-Shell tank (DST) 101SY. Organic decomposition in this tank is thought to be producing nitrogen, nitrous oxides and hydrogen under a surface crust. This gas build-up, and rise in tank level, is released regularly every several months resulting in a drop (approx. 10 inches) in tank volume. The next gas release is expected within the next several days.

DOE reported that the last gas release occurred April 19, 1990. In anticipation of the last event, DOE equipped the tank with a continuous hydrogen monitor, a gas chromatograph, and had arranged for grab samples to be taken. The event yielded a pressure spike for a couple of minutes and an increase in hydrogen concentration. The maximum hydrogen concentration measured was 3.5% which lasted 5-10 minutes (hydrogen is potentially explosive at a concentration above 5%). The tank is also equipped with thermocouples running from top to bottom inside the tank at one location. The temperature in the tank varies with a maximum temperature of 140 degrees F at the base.

Gases sampled were analyzed using a mass spectrometer and found to be predominantly nitrous oxide and hydrogen. The principal gas constituents are thought to be hydrogen (30% by volume), nitrous oxide (30% by volume) and nitrogen (30% by volume). DOE estimates that between 4,000 to 10,000 cubic feet of gas was generated in this event.

DOE's Hanford Operations office has a "Safety Improvement Plan" in place to mitigate the problem with the hydrogen build-up. The plan calls for data gathering and lab studies to better understand the chemical reaction producing the gas. DOE intends to continue to sample the gas generated. A sprinkler system will also be installed to increase the moisture content above the surface crust in the tank. After the sprinkler system is installed and activated, DOE plans to to core (1" diameter) the tank from top to bottom and use these core samples for chemical analysis.

SIGNATURE Chad Glenn | TITLE | DATE 8/5/90

A/6

Max. Pressure 2" ± .1" for a couple of min

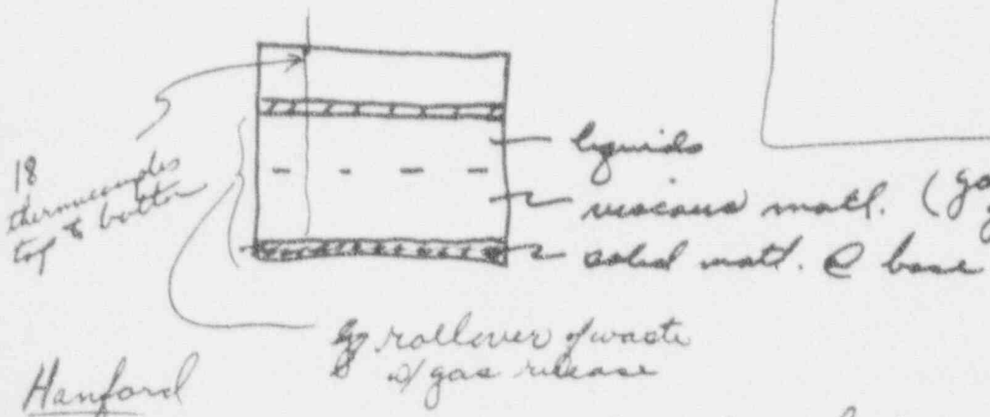
~~The~~ Max Credible Accident for hydrogen build up in DST would be an explosion ~~resulting in the~~ which blows off dome of tank and results in a dose of .3 rem to max individual of public (Same order of range as upper bound accident reported in Hanford EIS)

Potential Solution

Ultimate Resolution

- dilute the waste (make less viscous)

Model of Tank 101 SY



Hanford

- 9" level drop in seven days immediately after gas release
- Same concern w/ secondary chem reaction (no concern if moisture content > 20%)

Types of Waste in 101 SY (Evaporator)

(Double Shell Slurry Feed → Double Shell Slurry

Record of Conversation

~~Hanford~~ IDO ~~[illegible]~~

~~On today~~ I called Hanford Operations office today for the status ~~of [illegible]~~ on double-shell tank 101 SY. ~~[illegible]~~ Don Woodward (West) and Paula Clark (DOE) reported that tank "burped" ~~again~~ last on April 19, 1990 @ 1 AM. (The next burp expected any day — (See notes)) In ~~anticipation~~ advance of this event, DOE ~~had a continuous H_2 monitor~~ had arranged ~~the~~ following for the event: ~~and was had~~ a (1) continuous H_2 monitor, (2) gas chromatograph and (3) ~~personnel on hand to~~ take grab samples to be taken. (Also, a thermocouple runs from top to bottom of tank.) The event yield a pressure spike 2¼ + .1" for a couple of min and (3½)% H_2 which lasted 5-10 min before dec. (potentially explosive [ ] of H_2 is ≥ 5%). Gases ~~which~~ sampled were analyze using a mass spec and found to be pred minately Nitrous oxide and hydrogen. ~~West~~ The principal gas constit are expected to be H_2 (30%), Nitrous Oxide (30%) and Nitrogen (30%) and ~~[illegible]~~ ...

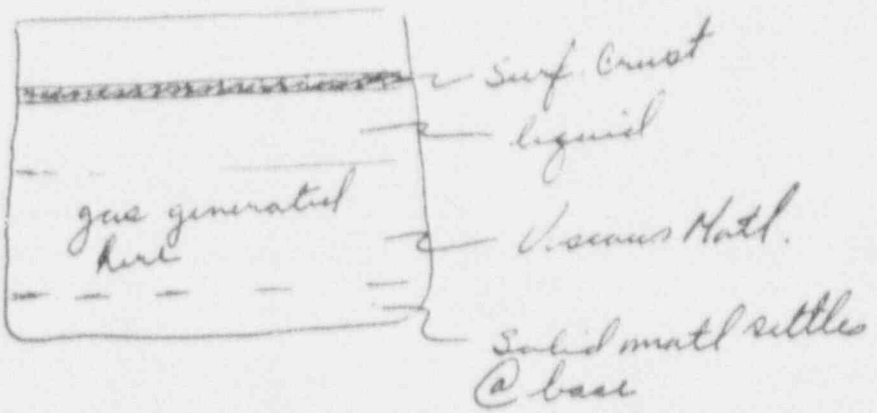
Apr 19

(Tot Vol of gas produced per each 'burp' is estimated to be between 1 Yme & 19,000 cu ft gas generated)

140° F @ [illegible] temp [illegible]

DOE has "Safety Response Plan in Place to Mitigate Probl
Plan Calls for data gathering, lab studies of Core. Objective
tank B is better understood
DOE's mitigation plan for this ~~situation~~ calls for
for installation of a sprinkler sys to inc. moisture
content above surf. ~~crust~~ above crust. After the
the sprinkler sys is installed & activated, DOE intends
(1 day or)
~~to core the tank contents from top to bottom~~
~~to have the 1st core from top & bottom~~. Core
an hypis to determine
samples will be used for chem. ~~characterization~~ and
~~corrosion~~ reactivity of waste & safety

Model of Tank 101 SY + H_2 Gas Generation



(rollover)

(LL)

[7590-01]

Nuclear Regulatory Commission

10 CFR Part 60

[Docket No. PRM-60-4]

States of Washington and Oregon; Filing of Petition for Rulemaking

AGENCY: Nuclear Regulatory Commission.

ACTION: Notice of receipt of petition for rulemaking.

SUMMARY: The Commission is publishing for public comment a notice of receipt of a petition for rulemaking dated July 27, 1990, which was filed with the Commission by the States of Washington and Oregon. The petition was docketed by the Commission on July 31, 1990, and has been assigned Docket No. PRM-60-4. The petitioners request that the Commission amend 10 CFR Part 60 to adopt a regulation concerning classification of high-level radioactive wastes currently stored in retrievable, surface, storage facilities at the U.S. Department of Energy's Hanford site. The petitioners seek to establish a procedural framework and substantive standards by which the Commission will determine whether a particular waste is defined as high-level radioactive waste and therefore is subject to the Commission's licensing authority.

DATE: Submit comments (60 days after publication in the Federal Register). Comments received after this date will be considered if it is practical to do so, but cons' 'eration cannot be given except as to comments received on or before this date.

A/1

ADDRESS: Submit comments to: Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555. Attention: Docketing and Service Branch. For a copy of the petition, write: Rules Review Section, Regulatory Publications Branch, Division of Freedom of Information and Publications Services, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

FOR FURTHER INFORMATION CONTACT: Michael T. Lesar, Chief, Rules Review Section, Regulatory Publications Branch, Division of Freedom of Information and Publications Services, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555, Telephone: 301 492-7758 or Toll Free: 800-368-5642.

SUPPLEMENTARY INFORMATION:

Petitioners' Request

The petitioners request that the Commission amend 10 CFR 60.2 to clarify the definition of "high-level radioactive waste" (HLW) and the definition of "HLW facility". The petitioners request that the Commission --

1. Establish a process to evaluate the treatment of defense reprocessing wastes in tanks so that such wastes will not be considered HLW if, prior to disposal, each tank is treated to remove the largest technically achievable amount of radioactivity; and

2. Require that the heat produced by residual radionuclides, together with the heat of reaction during grout processing (if employed as a treatment technology), will be within limits established to ensure that grout meets temperature requirements for long-term stability for low-level waste forms.

As used by the petitioner and defined by the Department of Energy (DOE), grout is a fluid mixture of cementitious materials and liquid waste that sets up as a solid mass and is used for waste fixation and immobilization.

The petitioners seek clarification that the disposal of wastes treated to this standard is not disposal in a "HLW facility" as presently defined in 10 CFR 60.2. The petitioners state that should the Commission regard 10 CFR Part 50, Appendix F as the controlling regulation to determine whether a waste is HLW, that the Commission also modify that definition as proposed in the petition.

Basis for the Petition

The petitioners state that this rulemaking is based, in part, on Section 202 of the 1974 Energy Reorganization Act, which defines Commission authority over retrievable surface storage facilities and other facilities authorized for the express purpose of subsequent long-term storage of high-level radioactive waste generated by DOE which are not used for, or are part of, research and development activities. The petitioners further state that the Nuclear Waste Policy Act (NWPA) 42 U.S.C. 10101 (12) gives the Commission the authority to define whether wastes are highly radioactive material or solids derived from liquid reprocessing wastes that contain fission products in sufficient concentrations.

According to the petitioners, legislative history reveals that Congress intended the Commission to license defense reprocessing tank wastes at the point of long-term storage of disposal. (H. Rep. No. 785, pt. 1, 97th Cong., 2d Sess., 38, Aug. 20, 1982). The petitioners note that low fraction wastes resulting from pretreatment of tank wastes are scheduled to be grouted and disposed of in land-based grout vaults on the Hanford site in accordance with regulations developed under the Resource Conservation and Recovery Act (RCRA). The petitioners believe that if such wastes are HLW, they clearly fall under the Commission's licensing jurisdiction under Section 202 (4) of the Energy Reorganization Act of 1974.

Reasons for Petition

The petitioners question the ability of the DOE to demonstrate that the largest technically achievable amount of activity from each tank can be or will be isolated for vitrification. The petitioners state that this is evidenced by the exceptionally large range of uncertainty concerning DOE's estimated residual activity scheduled for surface disposal via grout (between 13,000,000 and 21,000,000 curies). The petitioners state that over the last 45 years, mixing of wastes from different sources has complicated the classification of Hanford tank wastes including double-shell tank wastes. Moreover, the petitioners state that radionuclide inventories are estimates and subject to substantial uncertainty. Variables contributing to the uncertainty include incomplete and inaccurate records, the lack of actual fuel and/or waste analyses, and an incomplete understanding of the chemistry and pathways in reprocessing and waste treatment processes. The petitioners assert that neither DOE, the Commission, nor the petitioners have adequate information regarding the radioactive portion of the double-shell tank waste.

The petitioners state that the present definition of HLW in the Commission's regulations and the NWPA is source based. According to the petitioners, incidental waste source is impossible to ascertain due to mixing in defense waste tanks and the unavailability of accurate records. The petitioners offer that radioactive contamination in incidental waste may be from a HLW source, even though the amount of activity is comparable to LLW, and human health and the environment would be protected adequately by grout disposal. Thus, the petitioners believe that unless the Commission modifies the present definition of HLW and HLW facility, incidental wastes must be considered HLW because of their source and would be required to be disposed of according to Section 8 of NWPA. 42 U.S.C. 10107.

The petitioners state that because the definition of HLW has heretofore been based solely on the source of waste, the legal basis for finding that incidental wastes resulting from the treatment of defense high-level wastes

in tanks would not be HLW, must derive from 42 U.S.C. 10101 (12) (A), the NWPA definition of HLW. The NWPA definition combines a source-based definition and a quantitative-based definition for solid wastes derived from liquid processing. Further, the petitioners believe that characterizing incidental waste disposal in grout vaults as non-HLW is legally supported only if such wastes would not be HLW under the NWPA definition. The petitioners conclude that if solid, grouted wastes which are derived from defense HLW do not contain "fission products in sufficient concentrations," they could be considered incidental wastes and not HLW. The petitioners believe that the Commission needs to establish both a procedure and a standard for making this evaluation on a tank-by-tank basis.

Petitioners Proposal

The petitioners suggest that the definitions of "High-Level Radioactive Waste" and "HLW Facility" in 10 CFR 60.2 be revised and a new Appendix A be added to 10 CFR Part 60. The specific language suggested by the petitioners reads as follows:

1. In § 60.2, the definitions of "High-Level Radioactice Waste" and "HLW Facility" are revised to read as follows:

§ 60.2 Definitions.

* * * * *

"High-level radioactive waste" or "HLW" means: (1) Irradiated reactor fuel. (2) Liquid wastes resulting from the operation of the first cyle solvent extraction system, or equivalent, and the concentrated wastes from subsequent extraction cycles, or equivalent, in a facility for reprocessing irradiated reactor fuel. and (3) Solids into which such liquid wastes have been converted; provided that if, prior to disposal, defense reprocessing tank wastes are treated to remove the largest technically achievable amount of radioactivity on a tank-by-tank basis (as provided in Appendix A), the treated residual fraction shall be considered an incidental waste and therefore not HLW.

"HLW facility" means a facility subject to the licensing and related regulatory authority of the Commission pursuant to Sections 202(3) and 202(4) of the Energy Reorganization Act of 1974 (88 Stat 1244).[2]

* * * * *

2. A new Appendix - A is added to Part 60 to read as follows:

Appendix A - Procedures For Determining Largest Technically Achievable Treatment

At least one year before a tank of defense reprocessing wastes containing high-level waste components is treated, pretreated or blended prior to permanent disposal, DOE shall submit the following to the Commission and the affected state and publish in the Federal Register:

1. Data on physical characteristics of the waste, including dentistry and percent solids, inorganic and organic constitutents, and radiochemistry (e.g., gamma energy analysis, total alpha, total beta);

2. Volumetric data on untreated waste, on volume changes expected as a result of treatment, pretreatment or blending activities and the expected volume of the final waste form (grout, salcrete or vitrified waste);

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2 These are DOE "facilities used primarily for the receipt and storage of high-level radioactive wastes resulting from activities licensed under such Act [the Atomic Energy Act] " and "Retrievable Surface Storage Facilities and other facilities authorized for the express purpose of subsequent long-term storage of high-level radioactive wastes generated by [DOE], which are not used for, or are part of, research and development activities". Facilities for the long-term storage or disposal of incidental wastes resulting from treatment of defense reprocessing wastes are not HLW facilities.

3. A description of the treatment processes, including an estimated mass balance for each process, and estimated percent recovery for each separation, and concentrations of major waste components before and after treatment;

4. The proposed grout or saltcrete formulation, together with heat transfer calculations for the waste form; and

5. To the degree possible, treatment system models similar to the attached grout system model should be used to present data and describe processes.

At least six months before a tank of defense reprocessing tank wastes containing high-level waste components is pretreated, treated or blended prior to permanent disposal in near-surface or deep geologic facilities, the Commission shall require a license under Section 202(4) of the Energy Reorganization Act, 42 U.S.C. 5842 (4) unless the Commission, on a tank-by-tank basis determines the following:

1. The USDOE has demonstrated that the largest technically achievable amount of activity from the tank will be isolated for vitrification prior to permanent disposal; and

2. That use of permanent shallow land disposal for the tank waste will be limited to the incidental waste portion, which is the activity remaining after the largest technically achievable amount of activity has been removed; and

3. That the treatment, pretreatment and blending processes described in the USDOE submittal will achieve the stated separation and/or recovery efficiencies; and

4. That the treatment, pretreatment and blending processes described in the USDOE submittal are proven, cost effective, state-of-the-art processes, which are capable of removing the largest technically achievable amount of activity.

Conclusion

The petitioners state that rulemaking procedures are necessary to determine the nature of the incidental, lesser radioactive fraction of wastes and that rulemaking is appropriate to establish a procedural framework and substantive standards by which the Commission will determine whether a particular waste is or is not HLW. The petitioners state that this proposal is particularly appropriate because it establishes a process and general standards by which particular wastes will be assessed. The petitioners believe that particular determinations of how specific wastes will be characterized under these general standards can be left to individual adjudicative proceedings.

The petitioners believe that the amendments suggested by their petition would protect human health and the environment, would facilitate meaningful Commission involvement in the ultimate disposal and/or long term storage of Hanford double-shell tank waste, and would support implementation of the Hanford Federal Facility Agreement and Consent Order.

The petitioners believe rulemaking procedures are appropriate to provide the maximum degree of public involvement and scrutiny to HLW treatment and disposal decisions. They note that the controversial evolution of the defense waste program and the equally controversial history of the deep geologic repository program demonstrate a keen public sensitivity and awareness of HLW issues. Therefore, the petitioners encourage the Commission to use rulemaking as the optimal vehicle to satisfy the public that treatment and disposal of HLW in tanks is being carefully scrutinized in a protective manner.

Dated at Rockville, Maryland, this _____ day of _____ 1990.

For the Nuclear Regulatory Commission.

_____

Samuel J. Chilk,
Secretary of the Commission.

DOCKET NUMBER
PETITION RULE PRM 60-4
(55 FR 51732)

(1)

M. J. Plodinec DOE/NRC
14 Caw Caw Court
Aiken, SC 29803

91 MAR -7 P2:22

United States Nuclear Regulatory Commission
Docketing and Service Branch
Washington, DC 20555

Re: **Definition of the Term "High-Level Radioactive Waste"**
Docket Number PRM-60-4

Dear Sirs:

As noted in 55 FR 51732, the states of Oregon and Washington have petitioned the Commission to alter the definition of high-level waste (HLW), to establish a process to determine whether particular defense reprocessing wastes fit that definition, and to place certain restrictions on the solidification of wastes which do not meet the proposed definition. The purpose of these comments is to urge the Commission to reject the petitioners' proposal because it is unnecessary, and, indeed, is not in the best interests of the petitioners' constituents.

SUMMARY OF PETITIONERS' PROPOSAL

The petitioners' propose that the Commission do the following:

1) Redefine HLW so that removal of the largest technically achievable amount of radioactivity from any waste will render it non-HLW.

2) Establish a process to determine whether defense HLW meets that definition, specifically:

> One year before processing waste from any tank, DOE must provide data on the physical characteristics of the waste, its radiochemistry (e.g., determination of the radionuclide inventory), its volume and the anticipated change in volume due to processing, a flowsheet for each treatment process, and any formulations for grouting residues from treatment.
>
> Then, at least six months before processing of waste in any tank is to begin, DOE must either obtain a license for processing, or a waiver from the Commission based on DOE's demonstrating that it will remove the greatest amount of radioactivity from the waste which is technically achievable. The Commission must agree that the separation processes to be used are technically correct, proven, cost effective, and state of the art. Shallow land disposal shall

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be allowed only for the residues of such processing.

3) Establish a limit on the heat from residual activity in the waste plus the heat of grouting to ensure that grout meets the long-term stability criteria for Low-Level Waste.

GENERAL CONSIDERATIONS

The specific comments below reflect the following general considerations.

• Many of the waste tanks in the DOE complex are nearing or have exceeded their design life. Thus, any proposed changes to disposal regulations should not inhibit the expeditious immobilization these wastes.

• While the plethora of panels and committees now looking at all aspects of DOE's waste management programs may prevent mistakes, they are also impeding progress. The Commission should decide the worth of the petitioners' proposals by balancing any incremental safety factor added by the additional review against the delay in stabilizing the waste. Review of the proposed procedural steps indicates that the only thing certain to be accomplished is further aging of the waste tanks, and thus further diminution of their safety.

SPECIFIC COMMENTS ON PROPOSED REDEFINITION OF HLW

• The proposed redefinition is unnecessary.
The Commission has already taken a substantial step in the right direction by deciding that any waste with activity greater than that defined as the upper limit for Class C must be disposed of in a repository, or in another manner acceptable to the Commission. This salutary approach looks toward the risk associated with the waste, rather than the source. This forces DOE to allocate resources to handle the hazards, rather than to waste further time fruitlessly searching for ways to remove more and more activity from one part of the waste. As the Commission noted in its amendment of 10 CFR 61 (53 FR 17710), "the Commission sees little practical importance or significance in proceeding with a precise definition of HLW."

• The proposed definition will not increase the safety of disposal of the waste.
Some of the wastes of concern to the petitioners appear to have been converted to mineral forms in the storage tanks at Hanford. It may well be that the only possible method to mobilize and reduce the activity of this material is to treat it with strong acids. However, this would compromise the containment afforded by the waste tanks. Therefore, strict application of the proposed definition would potentially force DOE to perform extremely dangerous actions, with potentially grave consequences to the petitioners' constituents.

The proposed definition also could be counterproductive in another way. In order to comply with the "as low as technically achievable" standard, DOE might be forced to treat the waste with chemicals which would not be compatible with immobilization processes for the radionuclides. As an example, arsenophosphates are excellent complexing agents for technetium, and are capable of removing even trace amounts from wastes. However, phosphates are not compatible with borosilicate glasses. As another example, alkali tetraphenylborate salts are excellent means of removing cesium from even concentrated alkaline wastes; however, they are not compatible with crystalline ceramic waste forms.

SPECIFIC COMMENTS ON PROPOSED PROCESS

• The waste tanks at Hanford have already exceeded their design lifetime.

There are major concerns about the safety of the waste in the tanks at Hanford. Several panels have been established to look at different facets of the problem. Although no single concern may be reason enough for decisive action, the citizens of Washington and Oregon are ill-served by any process which needlessly delays the immobilization of the waste. And yet, the petitioners propose to add two new steps to the tortuous path being followed toward eliminating this hazard to their constituents, which will not add to the safety of disposal.

• Is the information on the radionuclide inventory of the waste in the tanks at Hanford inadequate?

One of the reasons the petitioners advance as motivation for their proposal is their opinion that the radionuclide inventory of the waste in the tanks at Hanford is inadequately known. Unfortunately, the petitioners never come to grips with the question of "inadequate for what?". It is a fact that the contents of the waste tanks at Hanford have not been as thoroughly characterized as those at Savannah River. However, the contents of those tanks can be bounded well enough to judge the relative safety of various disposal options, and to direct DOE toward an environmentally safe solution. The petitioners would do better for their constituents if they attempted to move DOE to take this approach and then implement the solution adopted in a conservative manner, one which would be relatively immune to the effects of the uncertainties in waste characterization.

SPECIFIC COMMENTS ON LIMITS ON HEAT OF FORMATION OF GROUT

While I disagree with the petitioners about the definition of HLW, it appears that the concept of limits on the heat of formation of grouts are good. However, it appears that the appropriate place for this limit would be in a plan for a solid waste processing facility, and, thus, should be included in its "Process Control Plan." I suggest that the Commission consider inclusion of this concept in its guidelines for preparation of the "Process Control Plan."

In closing, I strongly urge the Commission to serve the citizens of Oregon and Washington better than those who should be representing them. The proposals advanced will not benefit those citizens, and by slowing progress toward immobilization of the wastes at Hanford, actually places those citizens at greater risk.

Respectfully,

M. John Plodinec

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SUBJECT: Comment opposing petition for rulemaking PRM-60-4 re definition of term "high level radwaste."

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DOCKET NUMBER
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(55 FR 51732)

(2)

HEAL
Hanford Education Action League

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To Emil Julian	From James Thomas
Co. NRC	Co. HEAL
Dept.	Phone # (509) 326-3370
Fax # (301) 492-1672	Fax # (509) 326-2932

March 15, 1991

91 MAR 18 P3:40

Samuel J. Chilk
Secretary
U.S. Nuclear Regulatory Commission
Attn.: Docketing and Services Branch
Washington, DC 20555

Re: Docket No. PRM-60-4, Definition of High-Level Radioactive Waste

Dear Secretary Chilk,

I have enclosed the comments of the Hanford Education Action League on the Petition for Rulemaking by the states of Washington and Oregon (Docket No. PRM-60-4). This concerns the creation of a new waste category, "incidental waste," and has an important bearing on the cleanup of the contamination present at the Hanford Nuclear Reservation.

Thank you for your serious consideration of HEAL's comments. If you have any questions concerning them, please contact me directly (the address and telephone number are printed below). I look forward to the Commission keeping HEAL informed as to the progress of your deliberations concerning this important matter.

Sincerely,

James Thomas

James Thomas
Research Director

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PDR PRM
60-4 PDR

enclosure

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1720 N. Ash • Spokane, Washington 99205 • (509) 326-3370 • FAX (509) 326-2932

Comments on
Nuclear Regulatory Commission
10 CFR Part 60
Petition for Rulemaking
[Docket No. PRM-60-4]
Definition of the Term "High-Level Radioactive Waste"

by
Hanford Education Action League
1720 North Ash Street
Spokane, WA 99205
March 15, 1991

The Hanford Education Action League (HEAL) is a nonprofit, research and public education organization concerned with the Department of Energy's operations at Hanford. Established in 1984, HEAL has approximately 400 members dedicated to public openness and a government which is accountable to its citizens.

As HEAL reviewed the petition for rulemaking submitted by Washington and Oregon, it was frustrating that the petitioners included scant information to support their many broad claims. Two of their claims caused HEAL particular concern.

First, Washington and Oregon alleged in their petition to the Commission that "the proposed amendment is essential to provide protection of the future health and safety of the citizens of the Pacific Northwest."[1] The states have failed to provide any scientific or objective rationale to support this claim. More importantly, the states have failed to establish why their proposed procedure is any better than the current NRC licensing process.

Given that the petitioners' proposed amendment is based on the ALARA principle (best technology that is cost effective), the public has no

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[1] Enclosure with letter from Dennis R. Grimsley, NRC, to Terry Husseman, dated December 18, 1990, p. 5.

assurance that this will be an adequate protection of their health and safety or of the environment. The Commission must keep in mind that the Hanford grout is not a proven waste form. Even if the grout facility is certified as meeting RCRA requirements, it is not at all clear whether it will be able to sufficiently prevent the migration of radionuclides, especially those which are water soluble (e.g. I-129 and Tc-99).

By only proposing best available technology and cost effectiveness as the criteria, the public has no assurance that any comments it might submit based on environmental or health criteria would have to be considered by the Commission. Additionally, the states' petition is not at all clear on how the public should be involved nor if the public would have any rights to appeal a decision by the Commission.

While the tank-by-tank basis has some technical and practical merit, there is the danger that the public will not be presented with sufficient information to understand the total potential impact and risk associated with the aggregate amount of radiation (from all the tanks) disposed of to grout.

In their petition, the states have failed to present any information to support their claim that the proposed amendment will "provide protection of the future health and safety of the citizens of the Pacific Northwest."[2] This information needs to be supplied before the public will be able to evaluate whether the proposed amendment or the existing licensing process is better at protecting the Northwest.

The second claim about which HEAL is concerned is that the Commission's rulemaking procedure would be the best way to involve the public. Nowhere do the states offer any justification that their proposal

[2] ibid., p. 5.

would grant the citizens of the Pacific Northwest a greater access to the decision-making process. The states only dismiss the current licensing procedure with the following disparaging remark: "the rule amendment ... would allow ... the avoidance of the admittedly cumbersome licensing process."[3] HEAL regrets that the states of Washington and Oregon consider effective public involvement as "cumbersome." Upon this basis, HEAL is extremely skeptical that the proposed amendment will lead to effective involvement by the public in the decisions affecting Hanford tank wastes.

HEAL finds it a gross deficiency that the proposed amendment only mentions the double-shell tanks at Hanford. If the Commission adopts the petition, it would affect the high-level radioactive wastes in Hanford's single-shell tanks. It is quite possible that a significant proportion of these wastes will also be grouted in the future. The petitioners' serve only the interests of the Department of Energy by not considering the impacts to public health and the environment from the possible grouting of all these other high-level radioactive wastes.

HEAL must also take exception to the petitioners' claim that NWPA, 42 USC 10101 (12)(A), enables the Commission to create an incidental waste category.[4] HEAL contends that the NWPA is not applicable to Hanford's grout situation. The NWPA introduces the concept of a concentration-based definition. Whereas this is applicable to the deep-geologic repository and the regulations governing the repository take it into account, the Commission would be in direct contradiction with the Energy Reorganization Act (ERA) of 1974 if it adopted this as a basis for "incidental waste" concerning the Hanford grout vaults.

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[3] Petition for Rulemaking, July 27, 1990, p. 7.
[4] ibid., p. 8.

The petitioners' proposal is contrary to the intent of Congress when it drafted the ERA in 1974. The reason Congress adopted a source-based definition was to prevent the Department of Energy and others from diluting high-level radioactive wastes so as to meet a concentration-based definition. The proposed grouting of tank wastes at Hanford will significantly dilute the tank wastes.

At this point, it is important to state for the record that there is some agreement between HEAL and the states of Washington and Oregon. HEAL agrees with the petitioners that "under existing law, defense reprocessing waste, including Hanford double-shell tank waste, is HLW ... Consequently, long-term storage or disposal of such tank waste is currently subject to licensing by the Commission."[5]

There are enormous complexities involved with this issue. More information is needed (perhaps the only point that all parties acknowledge). More public involvement is a necessity. The current federal law does not provide a sufficient process to address the Hanford situation. However, the petitioners' amendment is perhaps even more problematic than the current situation. Therefore, HEAL urges in the strongest terms that the Commission seriously consider the following recommendation.

HEAL's Recommendation to the Commission

In order to have an informed citizenry effectively participate in the decision of how to properly dispose of the low-activity wastes from the Hanford underground high-level nuclear waste storage tanks, HEAL urges the Commission to undertake a public decision-making process that would include (at a minimum):

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[5] ibid., p. 6.

1) A series of public information workshops to educate interested citizens as to the issues at stake; including, but not limited to, the proper role of the Commission and other regulatory agencies, the limited knowledge of the tank wastes, and the possible safety, health, and environmental consequences of each of the options.

2) After a short amount of time to allow the public to reflect on the information presented at the workshops (2-4 weeks), the Commission should hold a series of official hearings to receive public comment on the proposal.

3) The series of informational workshops and official hearings should be held in at least the four major metropolitan areas of the Pacific Northwest (i.e. Seattle, Portland, Spokane, and the Tri-Cities).

Conclusion

Even though HEAL has numerous problems with the current petition, HEAL is reticent to recommend that the Commission totally reject it. This would leave the citizens of the Pacific Northwest right back where we were several years ago when the Commission's staff were meeting secretly with the Department of Energy and looking for ways of skirting the law to allow the disposal of high-level radioactive waste in the grout vaults at Hanford.

HEAL is willing to consider that good and sufficient reasons do exist for uniquely addressing the disposal of low activity wastes to the Hanford grout. However, such reasons have not been presented in this petition. Therefore, HEAL urges the Commission to undertake our recommendation for an extensive public process that would develop an adequate basis upon which a wise decision can be based.

DOCKET NUMBER
PETITION RULE PRM 60-4
(55 FR 51732)

(3)

2552 Harris Avenue
Richland, Washington
March 12, 1991

DOCKETED
USNRC

'91 MAR 18 P4:07

Samuel J. Chilk Secretary,
U.S. NRC
Washington, DC 20555

Att: Docketing and Service Branch

SUBJECT: FR Vol 55, No. 242, 12/17/90, NRC Docket No. PRM 60-4, Definition of the Term "High-Level Radioactive Waste", Petition for Rulemaking.

Dear Sir:

INTRODUCTION

I am a Richland, WA resident, receiving drinking water from the Columbia River below the Hanford Reservation and living within 25 miles of existing high-level radioactive waste long-term storage facilities and disposal sites of the Department of Energy (DOE), as well as the proposed new high-level radioactive waste disposal facility, referred to as the "land-based grout vaults" by the petitioners in the subject petition for rulemaking.

BACKGROUND

It is my conclusion that the DOE is currently in violation of 10 CFR 30 requirements for a license since various near surface geologic repositories, referred to as cribs, ditches and single shell tanks, but meeting the definition of "geologic repository" in 10 CFR 60 have received and currently hold in "long-term storage" or "disposal" "high-level radioactive wastes." In some cases the specific activity of such wastes is low compared to much of the "high-level radioactive waste" at Hanford; however, the source of the wastes I refer to is consistent with the source-based definition intended by Congress in Section 202 of the Energy Reorganization Act (ERA) and reviewed by the petitioners. Definitions in Attachment A, a portion of the 1973 AEC Manual, further illuminate the source-based definition in use at the time the ERA was enacted. A key fact contributing to my conclusion is that DOE, ERDA or the AEC expressly authorized the "long-term storage" or "disposal" of

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1. It has been suggested that the Congress by Section 202 (4), regarding long-term storage facilities, in specifying "authorized for the express purpose" meant authorization by Congress. However, the more logical meaning is authorization by a Director of a Division of Waste Management and Transportation as provided by Chapter 0511.032 (c) of the AEC Manual in 1973--see Attachment A. It should be noted that Congress did not routinely authorize specific long-term storage facilities, but authorized general funding for waste management.

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these wastes by operations contractors. The operational definition of long-term storage, established by the AEC, is contained in ATTACHMENT A. This definition was being used by the AEC contemporaneously with the writing of the ERA and it can logically be concluded that this was the definition intended by Congress, consistent with the logic described by the petitioners in deducing the intent of Congress with respect to the source based definition for "high-level radioactive waste." As with the definition of "long-term storage", "storage" entails the capability to readily retrieve wastes. Disposal is defined as an operation that does not provide for recovery. (There was no concept of interim storage expressed in the AEC Manual in 1973.) (This can be seen from the definitions of Attachment A.)

The DOE and its predecessor entities have long recognized that the "stabilization" and "interim stabilization" of in-tank single shell wastes and the "storage" of waste in soil columns, and otherwise in non-retrievable earth and ground water <u>is</u> long-term storage and/or disposal. This can be seen from various historical documents concerning the decision in the early 1960's to proceed with solidification of wastes in single-shell tanks at Hanford in contrast to General Electric recommendations for a sound program of waste management at Hanford involving the calcination of tank wastes with storage in bins similar to the scheme currently used by the Idaho Chemical Reprocessing Facility.

The current immense problems associated with safely sampling, much less retrieving, waste, in single shell and some double shell tanks at Hanford attest to the "disposal" of the waste accomplished by DOE and its predecessor entities in the past.

COMMENTS

1. The NRC should not attempt to redefine the term "high-level radioactive waste" since this term was established by Congress. Only the courts can embellish this term in their roll of interpreting laws. The original source based definition should be maintained and compliance with the spirit and intent of the law achieved.

Therefore, the issue which NRC should be concerned with is the regulation and/or licensing of the Administration's (DOE's) long-term storage and/or disposal facilities. In this regard a definition of "long-term storage facility" should be incorporated into Part 60 or part 30 (see comments below) as a subcategory of "HLW facility". The definition of "long-term storage" in Attachment A should be used in developing the new term.

2. The <u>Purpose and Scope</u> of Part 60 does not apply to all DOE facilities for long-term storage of high-level radioactive waste, but only those subject to the Nuclear Waste Policy Act of 1982. Thus, if the subject petition is considered as a change to Part 60, the <u>Purpose and scope</u> must be changed. For example, this Section might be revised to the wording originally used in Part 60 to cover licensing at a geologic repository operations area. Other major changes would also be necessary.

3. Anticipating the modified scope indicated in comment 2. above, and reviewing the significant changes to Part 60 from the original version as a result of the NRC's action to implement the Nuclear Waste Policy Act, it appears unwarranted and potentially confusing to attempt to revise Part 60 to re-institute its previous general coverage for the licensing of DOE activities, stemming from authority of the Energy Reorganization Act alone.

4. The Purpose and Scope of 10 CFR 30 clearly applies to the licensing of DOE long-term storage (including disposal) facilities for high-level radioactive waste. Section 30.12 points out that such facilities are not exempt from the requirements of Part 30. It appears that modification of Part 30 and/or the addition of a new Part 36 pertinent to the near surface long-term storage and disposal facilities at Hanford and other DOE sites is more reasonable than modifying Part 60 to accommodate the subject petition request for regulation of DOE at Hanford. This conclusion reflects the limited scope of Part 60 to deep geological repositories as a result of changes to invoke the Nuclear Waste Policy Act, which applies only to deep geological repositories.*

5. A substantive standard for near surface disposal of waste is required, particularly for those long lived and short-lived mobile isotopes such as I-129, Tc-99, Se-79. C-14, Ca-135, Cs-137, Sr-90, Co-60 and the actinides. Even small quantities of I-129, if it pollutes ground water at concentrations of 10xE-12 ci/l or greater, would render the water resource useless. Much of the Hanford groundwater already exceeds this EPA limit for drinking water, and cleanup of the affected aquifers will be very expensive.

For example, for any given site out to the accessible environment or boundary of the site, the inventory of any given long-lived isotope disposed of in that site, if mixed with 1/10 of the volume of water determined to exist in the unconfined aquifer or first confined aquifer, whichever is highest, under the specified surface area of the site, should not exceed the drinking water standard for that isotope. For example, if the first aquifer under a disposal site were determined to have 10xE13 liters of water, then 1 curie of I-129 could be disposed of in that site, assuming the drinking water standard of 10xE-12 ci/l.

As an alternative, performance based criteria such as those specified in 10 CFR 60 for a deep geological repository could be specified for the near surface long-terms storage site or disposal

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2. The term "repository" as defined in the Nuclear Waste Policy Act includes systems for the permanent deep geological disposal of high-level radioactive wastes. Thus, shallow land disposal such as that accomplished and planned at Hanford and. are not covered by the Nuclear Waste Policy Act and hence outside the Purpose and Scope of Part 60.

site. In such a case the engineered barrier system would necessarily have long term performance requirements out to 10,000 years. Given the near surface disposal of the waste, substantial waste forms would be necessary and various land use scenarios, including nearby farming and other human activities, would necessarily have to be considered in determining hydrologic conditions for the wastes. Containment for a 1000 years or more would be indicated, since in contrast to a deep repository, geologic isolation is not provided with the near-surface placement of wastes.

I would agree with the petitioners desire to minimize the amount of waste to be incorporated in grout. However specific design requirements should be specified with an ALARA type criterion applied in addition to the specific requirements. If grout is an insufficient waste form to accomplished specified design requirements for the waste form performance, then a better waste form should be developed.

6. Licensing proceedings should be conducted to obtain public input and adjudication of technical issues as suggested by the petitioner in his conclusions. In addition, for existing facilities subject to licensing, DOE should submit license applications with all due haste, since they and some of their contractors are in violation of 10 CFR 30. The NRC should notify DOE of this requirement to submit license applications for existing facilities. NRC should establish licensing conditions that assure safety of the facilities and otherwise protect the environment, the public and the workers from undue risk. For critical safety issues such as those associated with single shell tank wastes that are not readily retrievable, an ongoing licensing proceeding should be conducted to allow for continued adjudication of design issues and access by the public of pertinent technical information.

All operations at the applicable facilities should be subject to NRC regulation. For example, the sampling of wastes and geologic media and the mitigation of existing radioactive pollution should be subject to licencing and subsequent NRC oversight. Implementation of other environmental laws, for example, RCRA, CERCLA and SARA should be a condition of the license.

7. Construction and operation activities, including design activities and site characterization, should be subject to NRC oversight and regulation. Therefore, the requirement for submitting a license application, or a separate construction permit before the initiation of any of these activities, should be established. Such formal interaction with DOE and its contractors will allow effective and timely resolution of technical issues associated with long-term storage and disposal.

8. I would point out that the petitioners conclusion that the definition of high-level radioactive waste must derive from NWPA is incorrect. In fact the operative definition of high-level radioactive waste pertinent to the DOE facilities at Hanford derives from the ERA as suggested above. The use of the term in the NWPA only applies to deep geologic repositories which are the subject of NWPA.

Thus, as suggested by foot note #4 on page 51732 of the Federal Register Notice, the petitioners discussion of the NWPA is not relevant to delimiting NRC's authority to license and otherwise regulate the DOE's long-term storage and disposal facilities at Hanford. The concept of "sufficient concentrations" although applying to the determination of waste for disposal in a deep repository, does not exempt dilute high-level radioactive wastes from NRC's regulatory authority.

Sincerely,

F. Robert Cook

F. Robert Cook
(509-375-3207)

ATTACHMENT: A U.S. Atomic Energy Commission AEC Manual, Chapter 0511, Radioactive Waste Management, September 19, 1973. (10 pages)

Chapter 0511 RADIOACTIVE WASTE MANAGEMENT

0511-01 POLICY

It is the policy of the AEC to manage radioactive waste in such a manner as to minimize the radiation exposure and associated risk, to man and his environment over the lifetime of the radionuclides.

0511-02 OBJECTIVE

To assure safe long-term management of all radioactive waste generated by AEC operations and of that radioactive waste which is delivered to the AEC by licensed operations as required by regulations.

0511-03 RESPONSIBILITIES AND AUTHORITIES

031 The General Manager approves the AEC radioactive waste management plan submitted by the Division of Waste Management and Transportation (WMT) and determines compatibility of field office waste management plans with the AEC plan if questions as to compatibility raised by WMT are not resolved by the Assistant General Managers concerned.

032 The Director, Division of Waste Management and Transportation:

a. is responsible for program direction and fiscal control of the long-term management of high-level radioactive wastes at AEC facilities.

b. is responsible for program direction and fiscal control of all near-surface radioactive solid waste burial grounds at AEC facilities, and of engineered storage vaults at AEC facilities for interim storage of solid radioactive wastes from licensed activities.

c. is responsible for program direction and fiscal control of operations of Federal repositories for the disposal or long-term storage of radioactive wastes, to include: developing, performing studies for, designing, constructing, demonstrating, and obtaining necessary external reviews and approvals.

d. coordinates the development and annual updating of an overall plan for the management of radioactive waste from AEC operations.

e. calls for field office waste management plans, reviews them with advice of program divisions, and determines their compatibility with the overall plan.

f. exercises overall cognizance, coordination, and review of waste management activities, including the degree of progress in meeting schedules and objectives, to assure compliance with AEC policies and requirements; coordinates with appropriate program divisions to assure that field office waste management planning and budgeting are consistent with the AEC overall plan.

g. develops, recommends, and promulgates policies, guides, and requirements for treatment and storage of liquid, solid, and gaseous wastes at AEC facilities, including the definition of categories of waste; assists the Division of Operational Safety in the development of safety policies, guides, standards, and requirements for the release of radioactive effluents to the environment.

h. determines or approves criteria and specifications, including those relating to packaging and transport, for wastes which are to be stored in near-surface land burial grounds or engineered storage vaults at AEC facilities, or are to be stored in Federal radioactive waste repositories.

i. prepares in cooperation with appropriate field offices and contractor staff, environmental assessments and statements for major AEC waste management facilities, in accordance with IAD-0510-29.

j. maintains: (1) central records of the capabilities and capacities of AEC facilities and Federal repositories for accepting, processing, storing, burying, and disposing of radioactive waste; and (2) central inventories of radioactive waste being stored, buried, or disposed of at AEC facilities and Federal repositories.

k. provides program direction and fiscal control of a research and development program for

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(1) techniques for long-term storage or disposal of commercial and AEC high-level waste; (2) compaction, incineration, or other improvements in handling practices for contaminated solid waste; and (3) improvements in air cleaning or liquid effluent treatment.

l. develops and defends budget estimates for its waste management responsibilities and activities, including facility requirements, and exercises fiscal control over such activities; provides staff assistance to other divisions in the budget submissions of waste management items for which they are responsible.

m. provides advice on applicability or interpretation of the provisions of this chapter and approves exceptions, where warranted, coordinating these actions with appropriate Headquarters divisions.

n. sponsors and coordinates testing and development of improved products and systems (such as High Efficiency Particulate Air Filters) for reducing to the lowest economically and technically practical[4] level radioactive material releases to the environment.

o. with regard to the above assigned responsibilities, acts as the General Manager's staff liaison and point of contact with the Office of Regulation and with other Federal, state, or local groups with regard to activities concerning (1) AEC-generated wastes and (2) commercially generated wastes to be delivered to the AEC as required by regulations.

033 The Director, Division of Operational Safety:

a. develops, recommends, and promulgates policy, standards, and requirements relevant to (1) the protection of man and the environment from radiation or contamination, and (2) safety of systems and system components used for controlling radioactive material discharge to the environment.

b. exercises overall surveillance, evaluation, and appraisal of AEC site effluent and environmental monitoring programs to assure compliance with AEC safety standards and policy relating to protection of man and his environment in accordance with AECM 0513, and coordinates such monitoring programs with comparable programs of other agencies.

c. in cooperation with WMT, evaluates radioactive waste management programs to assure that the AEC policy of controlling the release of radioactive materials to the lowest levels[5] technically and economically practical is being implemented.

d. appraises the safety aspects of field office waste management programs and activities.

e. reviews waste management plans in relation to their impact on man and the environment and recommends any appropriate modifications to the Director, Division of Waste Management and Transportation.

f. coordinates with appropriate directors of program divisions prior to establishing policy standards which may have a programmatic impact.

034 Directors of Program Divisions, Headquarters:[3]

a. consistent with programmatic responsibilities and the provisions of sections 032 above and 044 below, provide direction of operations involving radioactive waste generated in their programs.

b. within programmatic responsibilities, may provide direction and guidance consistent with appendix part II for the preparation of waste management plans to be submitted by field office managers under 038(e).

c. review waste management plans submitted by field office managers relative to each site at which they have programmatic responsibilities, including related comments of other program divisions which have activities at those same sites, and consult with the Director, WMT, concerning his review function described in 032(e).

d. as requested by the Director, WMT, review inquiries on the applicability or interpretation of the provisions of this chapter and requests for exemptions.

e. consult with the Director, OS, in matters relating to policy, standards, and requirements relevant to the protection of man and the environment from radiation or contamination.

035 The Director, Division of Naval Reactors, assumes the same responsibilities as managers of field offices for its respective program activities.

036 The Director, Office of Information Services, assumes responsibilities for waste generated in connection with nuclear exhibits not under direction of any field office manager.

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037 The Director, Division of Construction:

a. develops or approves in conjunction with WMT, and other concerned Headquarters divisions, design criteria for facilities to be constructed or modified for the purpose of processing or storing radioactive wastes or of controlling the release of radioactive wastes to the environment.

b. reviews waste management plans relative to their planned construction activities and advises the Director, Division of Waste Management and Transportation, on the estimated costs and schedules and conformance with design criteria.

038 Managers of Field Offices:

a. ensure that the relevant criteria in 044, below, are followed in developing practices for routine and emergency operations at AEC installations under their jurisdictions and that current practices, where differing, are revised to comply with the criteria.

b. refer questions as to applicability, interpretation, or exemption from the criteria (see 044, below) to the Director, Division of Waste Management and Transportation, through the appropriate program divisions.

c. prepare and submit to WMT, with copies to the appropriate program divisions, annually updated waste management plans for their sites, following the general guidance in appendix 0511, part II.

d. maintain suitable approval control over key waste management decisions of operating contractors, such as the establishment or major modification of:
   (1) operating limits for quantities or concentrations of radioactive materials released to the environment.
   (2) release locations and timing of releases.
   (3) methods of treatment of effluents to minimize release of radioactive materials.
   (4) methods of conversion of high-level liquid waste for interim storage or disposal.
   (5) process flowsheets, to the extent that they determine the quality or quantity of wastes.
   (6) methods of interim storage of solid wastes.

e. assure that for AEC operational situations, calculations related to burial/storage operations include full cost, exclusive of land, depreciation, added factor, and perpetual care costs. For purposes of comparative cost evaluations of solid waste burial or storage with and without additional processing for volume reduction, all costs are included, e.g., depreciation of facilities, cost of land, and present worth of perpetual care costs.

f. maintain records of radioactive waste stored or buried at their sites.

g. conduct a program of annual appraisals of contractor radioactive waste management activities.

0511-04 BASIC REQUIREMENTS

041 Applicability. This chapter applies to divisions and offices, Headquarters, field offices, and contractors who operate AEC-owned or -controlled facilities and whose contracts contain the Standard Safety, Health, and Fire Protection Clause (see AECPR 9-7.5006-47).

042 Coverage. This chapter and its appendix specify the responsibilities, requirements, and procedures which shall govern the management of radioactive wastes.

043 Appendix 0511. Appendix 0511 contains definitions (part I) and guidance (part II) for use in implementing the policies and responsibilities of this chapter. The detail of the appendix is not to be taken as all-inclusive nor should it preempt the use of good judgment by knowledgeable field office and contractor staff in the development of safe practices and controls in the management of radioactive waste.

044 Operating Criteria. To assure an effective program for the management of radioactive waste, the following criteria shall be observed:

a. General
   (1) Field offices and their contractors shall conduct their operations and dispose of and store radioactive waste in such a manner as to assure that present and future radiation exposures to individuals and population groups will be at the lowest levels technically and economically practical and not exceeding limits established in AECM 0524 appendix parts I and II.
   (2) Continuing efforts shall be made to develop and use improved technology for reducing the radioactivity released to

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the lowest technically and economically practical level.

(3) High-level liquid radioactive waste shall not be transported offsite.

(4) The extent and degree of radioactive contamination of land by AEC waste management activities shall be minimized.

b. High-Level Radioactive Waste

(1) High-level liquid wastes shall be converted to suitable physical and chemical forms and confined in a manner which shall provide high assurance of isolation from man's environment with minimal reliance on perpetual maintenance and surveillance by man under conditions of credible geologic, seismic, and other naturally occurring events.

(2) High-level liquid radioactive wastes may be initially stored in carefully engineered systems equipped with adequate provision for leak detection and control. Tanks and transfer systems shall be designed to resist credible internal and external forces. Technology shall be developed and employed as soon as practical to reduce the volume and mobility of the high-level liquid wastes placed in initial storage facilities.

(3) High-level liquid wastes in initial storage and high-level wastes in long-term storage, or in pilot plant facilities shall, in each case, be contained and emplaced so as to be retrievable for removal and transfer elsewhere. The method of storage and the physical and chemical forms of the stored waste shall be predicated on safety and not on possible retrieval for recovery of fission products for beneficial uses.

(4) The radioactivity and the chemical and physical characteristics of all high-level wastes in initial, long-term, or pilot plant storage shall be determined for each condition of storage.

(5) Spare tanks shall be maintained providing volume in excess of initial storage requirements for high-level liquid wastes. Each tank farm holding high-heat liquid waste shall have available, in tanks empty except for a residual heel, space equivalent to the largest volume of such wastes stored in any one tank. Each tank farm holding low-heat liquid waste shall have available reserve storage capacity to accommodate the contents of the largest tank in the system. Where interconnected tank farms are sufficiently close that the times required to transfer tank contents between farms are similar to the times required to transfer tank contents within a farm, such interconnected tank farms may be considered as a single tank farm for purposes of the above requirements.

c. Other Liquid Radioactive Waste

(1) Liquid radioactive waste not meeting the definition of "high-level waste" shall be converted into two fractions, one consisting of liquids which can be discharged to the environment pursuant to AECM 0524 (i.e., persons in uncontrolled areas will not be exposed to concentrations in excess of those prescribed in table II, annex A, appendix 0524) and the other consisting of either: (a) high-level liquid waste, which would be handled in accordance with the policies of b., above; or (b) solid waste which would be handled in accordance with the policies in d., below.

(2) As soon as technically and economically practical, the use of natural-soil columns (such as cribs, seepage ponds, and similar facilities) for liquid streams that exceed established standards for release of radioactivity to uncontrolled areas shall be replaced with other treatment systems. It should be recognized that liquid which meets established standards and is released to soil columns still may result in a buildup (at a slower rate) of radioactivity in the soil column. Thus, it would be advantageous to design soil column structures so either the soil can be retrieved and relocated or the points of release are separated to the extent that the buildup of radioactivity in the soil column will not exceed an acceptable level.

(3) Adequate diversion systems shall be provided to assure that normally releasable streams, which, as a consequence of accident or operational upset, exceed established standards (cited in AECM 0524) for releases to uncontrolled areas, are automatically

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detected and diverted to controlled holding areas and are recycled or processed to yield a releasable stream.

d. Radioactive Solid Waste Other Than That Generated by Solidification of High-Level Liquid Waste

(1) Technical and administrative efforts shall be directed toward a marked reduction of (a) the gross volume of solid waste generated in AEC operations and (b) the amount of radioactivity in such waste.

(2) Volume-reduction technology, such as compaction and incineration, shall be adapted for use with radioactive solid waste and placed in operation wherever practical.

(3) Except as directed by (4), below, solid radioactive waste may be stored in conventional burial grounds approved by the AEC.

(4) Solid waste generated at AEC sites and containing significant U-233 or transuranium nuclide contamination shall be stored at AEC sites, segregated from other radioactively contaminated solid waste and with combustible and noncombustible transuranium-contaminated waste packaged separately. The packaging and storage conditions shall be such that the packages can be readily retrieved in an intact, contamination-free condition for 20 years. The packages shall be suitably labeled so the waste they contain can be identified by cross-reference to permanent records.

e. Airborne Radioactive Effluents. Gaseous and other airborne radioactive effluents shall be controlled at the lowest level below the limits of AECM 0524 consistent with the state of the technology and economic practices.

f. Other. Radioactive waste generated by underground nuclear tests, and remaining underground shall be considered as a special case.

045 References

a. AECM 2401, "Physical Protection of Classified Matter and Information," for additional protection required for classified radioactive waste.
b. AECM 0510, "Prevention, Control, and Abatement of Air and Water Pollution."
c. AECM 0513, "Effluent and Environmental Monitoring and Reporting."
d. AECM 0524, "Standards for Radiation Protection."
e. AECM 0529, "Safety Standards for the Packaging of Fissile and Other Radioactive Materials."
f. AECM 0530, "Nuclear Criticality Safety."
g. AECM 0544, "Planning for Emergencies in AEC Operations."
h. AECM 6301, "General Design Criteria."
i. AECM 7401, "Safeguards Control and Management of Nuclear Materials."
j. WASH-1202, "Plan for the Management of AEC-Generated Radioactive Wastes."
k. AEC Property Management Instructions Subpart 109-45.50, "Excess and Surplus Radioactively Contaminated Personal Property."

0511-05 NATIONAL EMERGENCY APPLICATION

In the event of a national emergency, as defined in AECM 0601-04, the provisions of this chapter and its appendix shall continue in effect.

[1] In the context of the policy statement in AECM 0524-012.

[2] In the context of the policy statement in AECM 0524-012.

[3] For purposes of this chapter, program divisions are those Headquarters divisions that provide functional direction of activities which generate radioactive waste.

Approved: September 19, 1973

PART I

TERMINOLOGY

A. PURPOSE

This part provides terminology to be used in interpreting and implementing this chapter. For consistency, its use is recommended in other communications concerning radioactive waste management.

B. USAGE

1. Airborne Radioactive Effluents—Radioactive particulates, mists, vapors, fumes, and/or gases, contained or entrained in air effluents. (Note: The special case of materials such as Kr-85 removed from effluents and packaged for retention, should be described as "Compressed radioactive gases" or "Adsorbed radioactive gases.")

2. Combustible (for purposes of AECM 0511-044 d.(4)—Organic material capable of being burned, except that if the only combustible content of a package is plastic lining or wrapping used for contamination control purposes around incombustible objects or materials, the contents of the package as a whole may be considered noncombustible.

3. Contamination-Free (for purposes of AECM 0511-044 d.(4)—A condition of the outer surfaces of stored containers, as determined by appropriate swipe surveys or direct radiation instrument surveys, sufficiently free of contamination so that under standard radiation work procedures for the site in question respiratory protection will not be required during container handling.

4. Crib—An underground framework or structure into which liquid wastes are discharged, located so that the radioactivity (other than tritium) is sorbed on the soil before the liquid reaches groundwater.

5. Disposal—The planned release of radioactive waste in a manner that precludes recovery, or its placement in a manner which is considered permanent so that recovery is not provided for. (Note: If recovery is planned, or could be provided for easily as in the case of conventional surface burial grounds, the term "storage" should be used.)

6. Diversion—As applied to normally uncontaminated fluid streams, the capability of automatically detecting excessive radioactivity and diverting the stream to a retention system for treatment.

7. Effluents—Airborne and liquid streams discharged from a facility after all engineered process waste treatment and effluent controls have been effected. Releases offsite or into groundwater and surface streams which leave the site or go to the atmosphere from engineered systems such as stacks, lagoons, retention ponds, or injection wells are to be considered as effluents. The term does not include solid waste or other waste which is contained (e.g., underground nuclear test debris), stored (e.g., in lagoons, retention ponds, trenches, tanks), or shipped offsite.

8. Storage—Retention of radioactive waste in some type of man-made device, such as a tank or vault, in a manner permitting retrieval.

9. Long-Term Storage—The status of radioactive waste under control and surveillance, and readily retrievable, but in such a form and location that no further processing or manipulation is considered necessary for a period of time which is very long compared to other periods of time in the nuclear fuel cycle; an example would be storage in a high-quality man-surface storage vault with an expected durability of many decades.

10. Federal Repository—A Federally owned and operated facility for storage or disposal of specific types of radioactive waste from AEC sites and/or licensees.

11. Federal Reservation—An AEC site requiring long-term control and restrictions because of stored or buried waste or decommissioned facilities.

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12. **High-Heat Liquid Waste**—Liquid waste containing sufficient thermal energy to require some supplemental means of cooling, such as cooling coils.

13. **High-Level Liquid Waste**—The aqueous waste resulting from the operation of the first-cycle extraction system, or equivalent concentrated wastes from subsequent extraction cycles, or equivalent wastes from a process not using solvent extraction, in a facility for processing irradiated reactor fuels.

14. **High-Level Waste**—(a) high-level liquid waste, or (b) the products from solidification of high-level liquid waste, or (c) irradiated fuel elements if discarded without processing.

15. **Other Liquid Waste**—Liquid waste, not within the definitions of high-level liquid waste.

16. **Liquid Radioactive Waste**—Solutions, suspensions, and mobile sludges, contaminated with radioactive materials.

17. **Management (Waste)**—The planning (including design and process improvement), execution, and surveillance of essential functions related to control of radioactive waste, including treatment, solidification, initial or long-term storage, and disposal.

18. **Radioactive Waste**—Materials of no value consisting of, including, or contaminated with radioactive material in excess of the levels or concentrations permitted in AEC Property Management Instructions for unconditional release of excess property. This includes (a) stored liquid, solid, or gaseous residues from chemical or metallurgical processing of radioactive materials; (b) discarded items such as defective equipment and building rubble, not radioactive in themselves but contaminated with radioactive materials; and (c) discarded items containing induced radioactivity. Treated as a separate category are: (1) irradiated fuels stored for possible processing; (2) radioactive scrap stored for possible recovery of useful values; and (3) materials and equipment stored for possible future use following decontamination.

19. **Retention Basin**—A watertight basin in which liquid waste is held for any one or more of the following reasons: (a) the decay of short-lived radioactivity; (b) analysis to verify activity levels permitting release; (c) recycle for treatment; (d) evaporation.

20. **Seepage Basin**—A basin in permeable earth through which liquid percolates and in which radioactivity, except for tritium, is sorbed.

21. **Settling Basin**—A watertight basin designed for separating sludges and sediments as a layer on the bottom. The water is disposed of by overflow or solar evaporation.

22. **Solid Radioactive Waste**—Material that is essentially dry but may contain sorbed radioactive fluids in sufficiently small amounts to be immobile when buried in dry soil.

23. **Transuranium-Contaminated Solid Waste**—Those contaminated with certain alpha-emitting radionuclides of long half-life and high specific radioactivity to greater than 10 nanocuries/gram (10 microcuries/kilogram), subject to the following conditions and understandings:
    a. The radionuclides included are U-233 (with its daughter products), plutonium, and transplutonium nuclides except Pu-238 and Pu-241. (Note that Pu-238 and Pu-241 waste should be handled as transuranium-contaminated waste when so indicated by Pu-239 impurities or when required by local burial criteria.)
    b. The value of 10 nCi/g is derived from the upper range of concentrations of radium-226 in the earth and is subject to modification based on long-term studies of nuclide migration in soil.
    c. The activity density may be averaged over the contents of individual shipping containers, such as 55-gallon drums, including materials added for shielding or sorption of liquids. Late discovery (for example, on reconciliation of data) that an individual container is above this level will not be considered as necessitating its retrieval provided there is reasonable assurance that the average of the container and the balance of the associated containers is below the level.

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d. For typical Pu-239 waste at this activity density, it is recognized that indirect measurements or estimates and administrative controls must be used instead of direct external measurements. An example of such administrative controls is the establishment of specific in-plant working areas from which typical wastes have been established by suitable studies as being either above or below the control value.

e. It is recognized that under present technology certain wastes, primarily bulky discarded process equipment, with transuranium content above this value may not lend themselves to practical storage in full compliance with AECM 0511-044 d(4). However, these items should be recorded as transuranium wastes.

f. Requests for exception for applying the 10 nCi/g value on a package-by-package basis, with substitution of an equivalent quantity limit applicable to a burial facility, or requests for exemption for specific short half-lived transplutonium wastes, will be considered on a case-by-case basis, as per AECM 0511-032(m).

g. The 10 nCi/g value is a criterion for choosing different methods of handling different kinds of radioactive waste; it should not be confused with a value below which excess materials may be unconditionally released, as per AEC Property Management Instructions 109-45.30.

PART II

WASTE MANAGEMENT PLANS

A. PURPOSE

This part provides guidance on the development of a radioactive waste management plan for each site, as required by AECM 0511-038c.

B. DISCUSSION

Existing conditions at the various facilities will require different types and degrees of effort to meet the operating criteria of AECM 0511-044. Accordingly, the plans submitted under AECM 0511-038c need not be identical in degree of detail. Appropriate references to supplement or substantiate the information or conclusions stated in the plan should be provided. The outline of a waste management plan in C, below, is to be followed.

C. FORMAT FOR THE SITE WASTE MANAGEMENT PLANS

1. Program Administration
   - 1.1 Site
   - 1.2 Office Responsible
   - 1.3 Contractors
   - 1.4 Lead Responsibility for Site Plans
   - 1.5 Source of FY 1972 Funds for Waste Management
2. Description of Waste Generating Processes
   - 2.1 Process Flowcharts
3. Description of Waste Management Facilities
   - 3.1 Identification and Location of Facilities
   - 3.2 Description of Waste Treatment Facilities
   - 3.3 Description of Waste Storage Facilities
   - 3.4 Description of Effluent Control Systems
   - 3.5 Site Administrative Limits on Effluents
4. Radioactive Waste Stored
   - 4.1 High-Level Waste From Chemical Processing Operations
   - 4.2 Solid Radioactive Waste Other Than Solidified High-Level Waste
   - 4.3 Other Radioactive Materials
5. Plans and Budget Projections
   - 5.1 Interim Storage of High-Level Liquid Waste
     - 5.1.1 Milestone Charts
     - 5.1.2 Expected Accomplishments in FY 1972
     - 5.1.3 Proposed Program for FY 1973
     - 5.1.4 Proposed Program for FY 1974 and Beyond
     - 5.1.5 Five-Year Budget Projects for FY 1974 and Beyond
   - 5.2 Long-Term Storage of High-Level Waste
   - 5.3 Management of Low- and Intermediate-Level Liquid Waste
   - 5.4 Management of Solid Waste Contaminated With Radioactivity
   - 5.5 Management of Airborne Radioactive Waste
   - 5.6 Recapitulation of Budget Projection

Detailed instructions for site waste management plans will be forwarded periodically to field office managers.

DOCKET NUMBER
PETITION RULE PRM 60-4
(56FR51732)

(4)

March 10, 1991

'91 MAR 18 P4:27

To whom it may concern;

I am appalled at attempts by Washington and Oregon to change the definition of high-level radioactive waste. It is what it is, and calling it "incidental waste" is a lie and a blatant attempt to distort.

The deceit involved in this distorting of what it is called so those entrusted with disposing of these toxins can continue to weasel out of their responsibility without regard to human or planetary degradation, is sad and sick. It is an attempt to perpetrate a ruse on the public, for the same purpose as any con man, to make a buck.

I think there should be criminal negligence charges filed against those who have dumped radioactive wastes in the ground, and those who wrote regulations allowing it, and those who seek to continue this egregious and irresponsible act till 1995.

There should be a halt to anything which generates nuclear waste until the problem of disposal is solved, and the present level of blatant poisoning of land and water has been eradicated.

Attempts by the federal government to delay the vitrification plant, show a gross lack of awareness and concern for the enormity and seriousness of the problem.

I am totally opposed to any exemption from NRC licensing for the DOE grout vaults.

Further, I am opposed to the DOE disposing of waste water in Z-20 cribs. This totally perpetuates every problem which currently exists.

The government has lost its credibility with the public over its history of deception, stonewalling, and grossly ineffective management, problem-solving, and prioritizing. There has been no accountability to date.

I am very concerned.

Sincerely,

J. Cohen
East 1010 20th
Spokane WA 99203

DOCKET NUMBER
PETITION RULE PRM 60-4
(55 FR 51732)

(5)

March 9, 1991

SUPPLIED
USNRC

'91 MAR 18 P4:28

OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH

Nuclear Regulatory Commission
attn: Docketing and Service Branch
Washington, DC. 20555

The necessity for public involvment is essential concerning the change of definition of high-level radioactive waste.

Exempting high level waste from being taken out before grouting waste would have to redefine high-level waste. This would exempt it from NRC licening of the grout vaults.

Input allowed by the states petition could be of great value.

It is essential to have decisions that include more than the financial aspect. Considering past experience it is really important to hold formal hearings in the Northwest to hear the voice of the people.

Sincerely,
Orin Thor Eng Floyd E Orton
W. 3210 Valerie Dr
Spokane Wa 99208

DS10

DOCKET NUMBER
PETITION RULE PRM 60-4
(55 FR 51732)

6

MARCH 13, 1990

91 MAR 18 P4:28

OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH

TO: SECRETARY
NUCLEAR REGULATORY COMMISSION
WASHINGTON D.C. 20555
ATTN: DOCKETING & SERVICE BRANCH

RE: DEFINITION OF HIGH-LEVEL WASTE

FORMAL HEARINGS IN THE NORTHWEST SHOULD BE HELD TO SEEK FURTHER PUBLIC COMMENT REGARDING THE CHANGE OF DEFINITION OF HIGH-LEVEL WASTE.

PUBLIC INVOLVEMENT IS NECESSARY ON AN ISSUE AS DANGEROUS AS THIS.

LEILANI SCOTT
1411 E. McANDREWS
MEDFORD OR 97504

D510

PROPOSED RULE PRM 60-4
(55FR51732)
DOCKETED

(7)

Westinghouse
Electric Corporation

'91 MAR 20 P4:10

Westinghouse Building
Gateway Center
Pittsburgh Pennsylvania 15222

March 15, 1991

Secretary, U.S. Nuclear Regulatory Commission
Washington, DC 20555

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

RE: NRC Docket No. PRM-60-4

Dear Sir:

Enclosed herewith are an original and two copies of the Westinghouse Electric Corporation's comments on the Petition for Rulemaking regarding the definition of the term "High Level Radioactive Waste".

We appreciate this opportunity to comment on this important petition for rulemaking. If you have any questions on this information, please call Jim Bearden at 412-642-3990 or me at 412-642-2455.

S. A. Green, Manager
GOCO ES&H Programs
Environmental Affairs
Westinghouse Electric Corporation

PDR

9103220139

WESTINGHOUSE ELECTRIC CORPORATION
COMMENTS ON THE
PETITION FOR RULEMAKING TO THE
NUCLEAR REGULATORY COMMISSION
CONCERNING THE DEFINITION OF THE TERM
"HIGH-LEVEL RADIOACTIVE WASTE"
10 CFR PART 60.2

Introduction

On December 17, 1990, the Nuclear Regulatory Commission (NRC) published and requested comments on a petition, submitted by the States of Washington and Oregon (Petitioners), to amend the definitions of "high-level radioactive waste" (HLW) and "HLW facility" as defined in 10 CFR 60.2. The following are Westinghouse Electric Corporation's (Westinghouse) comments on the petition for rulemaking.

Comments

The Petitioners' concern appears to be with the Hanford Site, yet the request is to clarify the NRC definition of HLW for "defense reprocessing waste in tanks". The petition should be assessed for its national ramifications rather than the sole affect on Hanford waste management programs. The petition would could impact not only the reprocessing of HLW at Hanford but similar efforts at the Idaho National Engineering Laboratory, the West Valley Demonstration Project and Savannah River. The waste management programs at these sites are at different stages of implementation, and therefore the proposal would have varying impacts. At no site will the proposal measurably increase safety if adopted, however it would delay waste treatment and disposal, increase costs and potentially hamper safe management of tank wastes.

The Petitioners propose to add to the definition of HLW in 10 CFR 60.2 the statement "provided that if, prior to disposal, defense reprocessing . . . remove the largest technically achievable amount . . . and therefore not HLW." Because reprocessing tank wastes are not defined and HLW is not clearly separated from other low-level waste, adding this statement, along with the new proposed Appendix A, would have the net effect of defining all defense "tank waste" as HLW regardless of the level of radioactivity. The waste could only be classified as non-HLW after being treated by the approved method and meeting established criteria for each tank of defense waste.

The procedures for determining "largest technically achievable amount" outlined in the proposed Appendix A would require, at least one year before a tank of defense reprocessing waste is treated, pre-treated or blended, that DOE publish in the Federal Register all data concerning that waste. Also, the NRC would be required to license DOE, under section 202(4) of the Energy Reorganization Act 42 U.S.C. 5842 (4), at least six months prior to any processing of any waste unless the NRC determines on a tank-by-tank basis the following:

"1) The DOE has demonstrated that the largest technically achievable amount of activity from the tank will be isolated for vitrification prior to permanent disposal; and

2) That the use of permanent shallow land disposal for the tank waste will be limited to the incidental waste portion, which is the activity remaining after the largest technically achievable amount of activity has been removed; and

3) That the treatment, pretreatment and blending processes described in the DOE submittal will achieve the stated separation and/or recovery efficiencies: and

4) That the treatment, pretreatment and blending processes described in the DOE submittal are proven, cost effective, state-of-the art processes, which are capable of removing the largest technically achievable amount of activity."

This process of publishing data in the Federal Register and making treatment determinations on a tank-by-tank basis is not compatible with efficiently selecting, designing and constructing treatment facilities due to the extraordinary cost of these facilities and the time required to implement any modifications or construct new facilities. In addition, many of the tanks of waste are scheduled to continue to receive waste for a number of years; consequently they are not presently ready for the proposed tank-by-tank evaluation process. Determining treatment required on a tank-by-tank basis could require setting aside tanks of waste for several years until treatment is provided and possibly requiring the construction of additional waste storage tanks which otherwise would not be necessary.

Presently HLW is managed in tanks which are interconnected to minimize storage volumes by evaporation or calcination, thereby reducing the potential for migration of liquid wastes into the environment. These management practices would potentially have to be stopped until a detailed characterization of the waste is conducted and approval is obtained from the NRC because they could be considered blending or pre-treatment of HLW.

The definition of HLW and the subsequent classification of defense "tank waste" have been the subject of extensive rulemakings as well as correspondence with the NRC. As a result of comments received on an Advance Notice of Proposed Rulemaking and Notice of Proposed Rulemaking published in the Federal Register (51 FR 5992 and 53 FR 17709 respectively), the NRC rejected any attempt to define "sufficient concentrations" numerically or otherwise. This was based on the concern that a definition would be an invitation to dilute or fractionate waste solely to alter its classification. The NRC has already acted within its authority to determine which defense reprocessing tank wastes at the Savannah River site, the West Valley site and in the double shell tanks at Hanford are incidental wastes (not HLW) per the definition in 10 CFR 50 Appendix F, (54 FR 22581, May 25, 1989, and a letter from R. M. Bernero, NRC to A. J. Rizzo, DOE, dated September 16, 1989).

Westinghouse supports the concept of a risk-based quantitative definition of HLW since such a definition would distinguish HLW from non-HLW. However, the Petitioners' proposal to define "sufficient concentrations" in terms of the largest technically achievable amount of radioactivity which may be removed from each tank is not a "concentration" definition and is not quantitative. It does not clarify the definition of HLW, nor does it provide an objective basis to distinguish HLW from non-HLW. The Petitioner's proposal would also require that technology development and implementing processes be subject to regulatory evaluation by the NRC, the Petitioners and others. In fact, the Petitioners have stated that determinations of how specific wastes will be characterized under the standards proposed by them would be left to ". . . individual adjudicative proceedings." This process is neither technically feasible nor consistent with the statutory responsibilities and authorities of the NRC and the DOE.

The Petitioners also request that the public be given adequate opportunity to comment on the disposition of these wastes. Savannah River, West Valley and Hanford have prepared Environmental Impact Statements (EIS) for these waste management programs. Also, an EIS is being prepared which will address changes proposed at the Idaho National Engineering Laboratory. These EISs received extensive public review and comment before they were issued. Additional public review would be redundant and would unnecessarily delay waste treatment. As these programs proceed, large amounts of data and information on waste composition, treatment and disposal will continue to be made available to the public.

Conclusions

While Westinghouse appreciates and is fully aware of the concerns of the Petitioners, the proposed rulemaking is inconsistent with the statutory responsibilities of the NRC and DOE, and the proposed change to the definition of HLW and HLW Facility would not add any significant measure of protection of

public health and safety or the environment. The proposed rule would instead delay waste treatment and disposal, increase costs and potentially hamper safe management of tank wastes. The NRC has previously considered, through extensive rulemaking processes, the appropriate definition of HLW and concluded that its current definition of HLW is satisfactory for the purposes of 10 CFR 60.2. Public participation as to the final disposition of the waste has been facilitated through the various rulemakings as well as the EIS process.

bc: S. R. Pitts
J. L. Gallagher
J. S. Moore - WSRC
T. M. Anderson - WHC
J. J. Buggy - WVNS
W. C. Moffitt - WINCO
J. R. Bearden
R. J. Bliss - WHC
C. L. Dalcanton
V. A. Franklin
J. P. Hogan - WINCO
D. K. Ploetz - WVNS
E. L. Wilhite - WSRC
B. D. Williamson - WHC
D. D. Wodrich - WHC

HEAL
Hanford Education Action League

DOCKET NUMBER
PETITION RULE PRM 60-4
(55 FR 51732)

(8)

'91 MAR 22 A11:04

March 15, 1991

Samuel J. Chilk
Secretary
U.S. Nuclear Regulatory Commission
Attn: Docketing and Services Branch
Washington, DC 20555

Re: Docket No. PRM-60-4, Definition of High-Level Radioactive Waste

Dear Secretary Chilk,

I have enclosed the comments of the Hanford Education Action League on the Petition for Rulemaking by the states of Washington and Oregon (Docket No. PRM-60-4). This concerns the creation of a new waste category, "incidental waste," and has an important bearing on the cleanup of the contamination present at the Hanford Nuclear Reservation.

Thank you for your serious consideration of HEAL's comments. If you have any questions concerning them, please contact me directly (the address and telephone number are printed below). I look forward to the Commission keeping HEAL informed as to the progress of your deliberations concerning this important matter.

Sincerely,

James Thomas per

James Thomas
Research Director

enclosure

9103210471

1720 N. Ash • Spokane, Washington 99205 • (509) 326-3370 • FAX (509) 326-2932

Comments on
Nuclear Regulatory Commission
10 CFR Part 60
Petition for Rulemaking
[Docket No. PRM-60-4]
Definition of the Term "High-Level Radioactive Waste"

by
Hanford Education Action League
1720 North Ash Street
Spokane, WA 99205
March 15, 1991

The Hanford Education Action League (HEAL) is a nonprofit, research and public education organization concerned with the Department of Energy's operations at Hanford. Established in 1984, HEAL has approximately 400 members dedicated to public openness and a government which is accountable to its citizens.

As HEAL reviewed the petition for rulemaking submitted by Washington and Oregon, it was frustrating that the petitioners included scant information to support their many broad claims. Two of their claims caused HEAL particular concern.

First, Washington and Oregon alleged in their petition to the Commission that "the proposed amendment is essential to provide protection of the future health and safety of the citizens of the Pacific Northwest."[1] The states have failed to provide any scientific or objective rationale to support this claim. More importantly, the states have failed to establish why their proposed procedure is any better than the current NRC licensing process.

Given that the petitioners' proposed amendment is based on the ALARA principle (best technology that is cost effective), the public has no

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[1] Enclosure with letter from Donnie H. Grimsley, NRC, to Terry Husseman, dated December 10, 1990, p. 5.

assurance that this will be an adequate protection of their health and safety or of the environment. The Commission must keep in mind that the Hanford grout is not a proven waste form. Even if the grout facility is certified as meeting RCRA requirements, it is not at all clear whether it will be able to sufficiently prevent the migration of radionuclides, especially those which are water soluble (e.g. I-129 and Tc-99).

By only proposing best available technology and cost effectiveness as the criteria, the public has no assurance that any comments it might submit based on environmental or health criteria would have to be considered by the Commission. Additionally, the states' petition is not at all clear on how the public should be involved nor if the public would have any rights to appeal a decision by the Commission.

While the tank-by-tank basis has some technical and practical merit, there is the danger that the public will not be presented with sufficient information to understand the total potential impact and risk associated with the aggregate amount of radiation (from all the tanks) disposed of to grout.

In their petition, the states have failed to present any information to support their claim that the proposed amendment will "provide protection of the future health and safety of the citizens of the Pacific Northwest."[2] This information needs to be supplied before the public will be able to evaluate whether the proposed amendment or the existing licensing process is better at protecting the Northwest.

The second claim about which HEAL is concerned is that the Commission's rulemaking procedure would be the best way to involve the public. Nowhere do the states offer any justification that their proposal

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[2] ibid., p. 5.

would grant the citizens of the Pacific Northwest a greater access to the decision-making process. The states only dismiss the current licensing procedure with the following disparaging remark: "the rule amendment ... would allow ... the avoidance of the admittedly cumbersome licensing process."[3] HEAL regrets that the states of Washington and Oregon consider effective public involvement as "cumbersome." Upon this basis, HEAL is extremely skeptical that the proposed amendment will lead to effective involvement by the public in the decisions affecting Hanford tank wastes.

HEAL finds it a gross deficiency that the proposed amendment only mentions the double-shell tanks at Hanford. If the Commission adopts the petition, it would affect the high-level radioactive wastes in Hanford's single-shell tanks. It is quite possible that a significant proportion of these wastes will also be grouted in the future. The petitioners' serve only the interests of the Department of Energy by not considering the impacts to public health and the environment from the possible grouting of all these other high-level radioactive wastes.

HEAL must also take exception to the petitioners' claim that NWPA, 42 USC 10101 (12)(A), enables the Commission to create an incidental waste category.[4] HEAL contends that the NWPA is not applicable to Hanford's grout situation. The NWPA introduces the concept of a concentration-based definition. Whereas this is applicable to the deep-geologic repository and the regulations governing the repository take it into account, the Commission would be in direct contradiction with the Energy Reorganization Act (ERA) of 1974 if it adopted this as a basis for "incidental waste" concerning the Hanford grout vaults.

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[3] Petition for Rulemaking, July 27, 1990, p. 7.
[4] ibid., p. 5.

The petitioners' proposal is contrary to the intent of Congress when it drafted the ERA in 1974. The reason Congress adopted a source-based definition was to prevent the Department of Energy and others from diluting high-level radioactive wastes so as to meet a concentration-based definition. The proposed grouting of tank wastes at Hanford will significantly dilute the tank wastes.

At this point, it is important to state for the record that there is some agreement between HEAL and the states of Washington and Oregon. HEAL agrees with the petitioners that "under existing law, defense reprocessing waste, including Hanford double-shell tank waste, is HLW ... Consequently, long-term storage or disposal of such tank waste is currently subject to licensing by the Commission."[5]

There are enormous complexities involved with this issue. More information is needed (perhaps the only point that all parties acknowledge). More public involvement is a necessity. The current federal law does not provide a sufficient process to address the Hanford situation. However, the petitioners' amendment is perhaps even more problematic than the current situation. Therefore, HEAL urges in the strongest terms that the Commission seriously consider the following recommendation.

HEAL's Recommendation to the Commission

In order to have an informed citizenry effectively participate in the decision of how to properly dispose of the low-activity wastes from the Hanford underground high-level nuclear waste storage tanks, HEAL urges the Commission to undertake a public decision-making process that would include (at a minimum):

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[5] ibid., p. 6.

1) A series of public information workshops to educate interested citizens as to the issues at stake, including, but not limited to, the proper role of the Commission and other regulatory agencies, the limited knowledge of the tank wastes, and the possible safety, health, and environmental consequences of each of the options.

2) After a short amount of time to allow the public to reflect on the information presented at the workshops (2-4 weeks), the Commission should hold a series of official hearings to receive public comment on the proposal.

3) The series of informational workshops and official hearings should be held in at least the four major metropolitan areas of the Pacific Northwest (i.e. Seattle, Portland, Spokane, and the Tri-Cities).

Conclusion

Even though HEAL has numerous problems with the current petition, HEAL is reticent to recommend that the Commission totally reject it. This would leave the citizens of the Pacific Northwest right back where we were several years ago when the Commission's staff were meeting secretly with the Department of Energy and looking for ways of skirting the law to allow the disposal of high-level radioactive waste in the grout vaults at Hanford.

HEAL is willing to consider that good and sufficient reasons do exist for uniquely addressing the disposal of low activity wastes to the Hanford grout. However, such reasons have not been presented in this petition. Therefore, HEAL urges the Commission to undertake our recommendation for an extensive public process that would develop an adequate basis upon which a wise decision can be based.

DOCKET NUMBER
PETITION RULE PRM 60-4
(55FR51732)

(9)

March 15, 1991

COMMENTS OF OHIO CITIZENS FOR RESPONSIBLE ENERGY, INC. ("OCRE") ON PRM-60-4, "DEFINITION OF THE TERM 'HIGH-LEVEL RADIOACTIVE WASTE,'" 55 FED. REG. 51732 (DECEMBER 17, 1990)

'91 MAR 25 P3:55

OCRE is not taking a position in favor of or in opposition to PRM-60-4. With regard to the definition of "high-level radioactive waste," it is OCRE's position that the current definitions of "high-level" and "low-level" wastes are arbitrary and artificial. In particular, the term "low-level" waste implies "low-hazard," which may not be the case for many "low-level" waste streams.

The protection of the public health and safety and the environment would be enhanced by abandoning the current terms "high-level" and "low-level" and devising different radioactive waste classification schemes which are commensurate with the risks posed by the waste materials. The goal of radioactive waste management must be the isolation of radioactive wastes from the biosphere for the duration of their hazardous lives. This can be done in the most cost-effective manner if waste streams are segregated, as they are generated, as much as possible.

It is not clear that PRM-60-4 will achieve the goals stated above. It may be more appropriate to classify the entire contents of the tank wastes as "high-level" wastes than to declare a portion of them as "low-level." However, the waste characterization requirements in the petitioners' proposed Appendix A to Part 60 are essential for beginning to solve the legacy of poor waste management practices at the DOE's Hanford, Washington site. OCRE also believes that NRC oversight and regulation of the DOE facilities, both for their cleanup and operation, is essential. The lack of any independent regulation of the DOE facilities is the root cause of their vast environmental contamination and general poor performance.

Respectfully submitted,

Susan L. Hiatt

Susan L. Hiatt
OCRE Representative
8275 Munson Road
Mentor, OH 44060
(216) 255-3158

Template: DOE-136

DOCKET NUMBER
PETITION RULE PRM 60-4
(55FR51732)

(10)

'91 MAR 25 P4:35

Secretary
Nuclear Regulatory Commission
Washington, DC 20555
Attn: Docketing and Service Brance

March 14, 1991

Dear Secretary:

This letter is in regard to Washington state trying to change the definition of high-level radioactive waste around some of its disposal at Hanford. Basically, I feel this would be an injustice to the people of our state to label as "incidental waste" the waste going into the grout vaults if it included high-level radioactive waste. Liquid from high-level radioactive waste has to be treated differently from low-level radioactive waste. The DOE at Hanford is perhpas afraid or doesn't want to take the time to separate them for proper treatment. Maybe if we hadn't spent and are continually spending so much money on our war in the Middle East we wouldn't even be considering this question. And, we do need to be licensing these processes (for example, grout vaults). The public has a right to know when and what is being dumped in their state.

Also, in this decision, we need to be considering the effects of increased radioactive levels of cesium and other elements getting into the ground water around Hanford and contaminating it and the Columbia River.

Please keep me on your mailing list.

Sincerely,

Pat Herbert

Pat Herbert
P.O. Box 95966
Seattle, WA 98145

PPL

PETITION RULE PRM 60-4
(55FR51732)

(11)

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

APR 1 P3:38
'91 ~~MAR~~ -1

MAR 15 1991

OFFICE OF ENFORCEMENT

Mr. Michael T. Lesar
Regulatory Publications Branch
Office of the Administration
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Lesar:

In accordance with Section 309 of the Clean Air Act and the National Environmental Policy Act (NEPA), the U.S. Environmental Protection Agency (EPA) has reviewed the petition for rulemaking on the definition of the term "high level radioactive waste" and has no comments.

Thank you for the opportunity to review the petition. Should you have further need to contact EPA regarding this rulemaking, please have your staff contact Ms. Susan Offerdal of my staff at (202) 382-5059.

Sincerely,

Richard E. Sanderson
Director
Office of Federal Activities

9104110140

DOCKET NUMBER
PROPOSED RULE PRM 60-4 (55FR 51732)

(12)

Department of Energy
Washington, DC 20585

April 25, 1991

'91 MAY -8 A11

Mr. Samuel Chilk
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, DC 20555
(Attn.: Docketing and Service Branch)

Dear Secretary Chilk:

In a Federal Register notice dated December 17, 1990 (55 FR 51732), the Nuclear Regulatory Commission (NRC) announced a petition from the States of Washington and Oregon requesting that NRC amend its regulations to establish a procedure for determining whether treated defense reprocessing tank waste is high-level radioactive waste (HLW) (Docket No. PRM-60-4). The proposed amendments would affect the Department of Energy's (DOE) environmental restoration and waste management programs.

For the following reasons, we recommend that NRC deny the petition, which is contrary to law and impracticable:

1. The amendments would involve NRC in regulation of DOE's predisposal waste treatment and processing activities. Therefore, we believe that the proposed amendments are inconsistent with NRC's limited authority to license specific DOE facilities under the Energy Reorganization Act of 1974 (ERA).

2. The proposed amendments neither constitute a definition of HLW nor provide useful guidance for determining if waste is high-level.

3. The requirement to remove the "largest technically achievable amount of radioactivity on a tank-by-tank basis" does not provide a means for balancing and optimizing considerations such as impacts from waste disposal, public and worker exposures, and costs.

PDL

Beyond the specific matter of the petition, DOE recognizes the need to ensure that possible short-and long-term impacts from management of high-level and incidental wastes are reduced to levels as low as reasonably achievable (ALARA). To this end, DOE will ensure that plans for separation of tank waste into high-level and incidental waste are developed on the basis of an ALARA analysis that considers public health and safety, environmental impacts, worker exposures, technology, costs, and other factors. DOE will continue to provide information to the NRC, the

petitioners, and others to ensure full public disclosure of its activities involving the disposal of all radioactive waste.

As the Department looks forward to future plans and decisions for other DOE wastes, we continue to believe that the best approach for establishing standards for waste management would be one that is based on risk. NRC development of a risk-based definition of HLW would assist DOE in developing future programs and procedures for managing wastes contain ng wide ranges of radioactivity.

We would be happy to provide more detailed comments if you require additional information about any of these issues. The contact on my staff is Mr. Gary Roles (202-586-0289).

Paul L. Ziemer, Ph.D.
Assistant Secretary
Environment, Safety and Health

DOCKET NUMBER
PETITION RULE PRM 60-4
(55FR5,732)

DOCKETED
DOCKETING & SERVICE BRANCH
SECY-NRC

Secretary
Nuclear ~~Regulatory~~ Commission
Washington, D.C. 20555

Attn: Docketing & Service Branch

To Whom It May Concern RE: DEFINITION OF RADIATION:

I hereby request you hold public comment hearings in Washington, Oregon and Idaho and especially in areas within the "downwind" and "downriver" areas therein of Hanford in order to seek and use such comment in your upcoming re-definition decision of high-level radioactive waste.

Sincerely
Judith L Mace

P.O. 34 Lincoln City, Or. 97367

9107110167

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SEP 24 1986

Mr. R. A. Holten
U. S. Department of Energy
Richland Operations Office
Waste Management Division
Richland, WA 99352

Dear Mr. Holten:

The U. S. Nuclear Regulatory Commission (NRC) staff has reviewed the U. S. Department of Energy's (DOE) draft environmental impact statement (DEIS) entitled Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes, DOE/EIS-0113. On the basis of our review, the NRC offers the enclosed general and detailed comments. Although not part of our comments on the draft EIS, the NRC also wishes to express its concerns regarding other legal and institutional issues related to the concept of in situ disposal of high-level wastes (HLW) at Hanford.

First, as you are aware, under Section 202(4) of the Energy Reorganization Act of 1974, any facilities expressly authorized for disposal of defense high-level wastes are subject to the licensing and related regulatory authority of the Commission. Whether the express authorization for particular facilities is legislative or administrative in our judgment has no bearing upon the concerns that led Congress to provide for licensing by NRC. Also, it appears that the Hanford "tank wastes," which from the information presented in the draft EIS would have been regarded as HLW when the Energy Reorganization Act was passed, remain HLW for purposes of determining whether or not NRC has such jurisdiction. If DOE believes that subsequent processing of the "tank wastes" may have altered the classification of some of the materials being stored, more detailed waste characterization information would be necessary to support that view.

Second, licensing of Hanford waste tanks for HLW disposal will be procedurally complex because of the need to develop appropriate standards and procedures, the existing fait accompli status of the waste tanks, and the difficulty in reasonably evaluating alternatives (e.g., alternative sites) as required by the National Environmental Policy Act. Other statutes would also need to be considered, including one provision (42 U.S.C. § 7272) which could be read to bar the expenditure of funds for purposes related to the licensing of defense waste management activities such as those that might be undertaken at Hanford.

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COMMENTS

OF THE

U. S. NUCLEAR REGULATORY COMMISSION

ON THE

U. S. DEPARTMENT OF ENERGY'S

DRAFT ENVIRONMENTAL IMPACT STATEMENT

RELATED TO

DISPOSAL OF HANFORD

DEFENSE HIGH-LEVEL, TRANSURANIC

AND TANK WASTES

(DOE/EIS-0113)

PUBLISHED MARCH 1986

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GENERAL COMMENTS

It is stated in the DEIS (p. i) that the purpose of the EIS is "to provide environmental input into the selection and implementation of the final disposal actions for high-level, transuranic and tank wastes located at the Hanford Site." The document goes on to state that the DEIS is "both a programmatic EIS intended to support broad decisions with respect to the disposal strategies for the Hanford waste" and "an implementation EIS intended to provide project specific environmental input for decisions on moving forward with certain disposal activities" (p. xiii). The DEIS further indicates that following publication of the Final EIS, the DOE "will begin selection of a Hanford Defense Waste final disposal strategy which will be documented in one or more Records of Decision. The DOE may decide to proceed with implementing certain parts of the strategy while delaying final decision on other parts pending further research and development" (p. xiii). This approach makes the review of the document difficult because it is unclear which areas will receive additional research and development and how the results of these research and development efforts will be factored into the decision-making process. The DEIS indicates that further NEPA review is anticipated to support certain other specific activities prior to their implementation but the document does not indicate which activities this would apply to, what the additional review would consist of, or when it would occur. The NRC staff recommends that the Final EIS clearly identify which decisions will be postponed pending completion of additional research and development, when these activities are likely to be completed, and the type of NEPA review that is anticipated.

The NRC agrees with DOE that several areas require additional research and development prior to making decisions concerning the disposal of the Hanford wastes. These include: (1) characterization of the wastes in the single-shell tanks; (2) long-term performance of the protective barrier system; (3) geochemical characteristics of the site; and (4) development of analytical capabilities for projecting waste transport. Each of these is discussed below.

Characterization of single-shell tank wastes

The DEIS notes (p. 3.5), and the NRC staff agrees, that additional characterization of wastes in the single-shell tanks will be necessary to provide more detailed information about waste inventories. The NRC recommends that the wastes also be characterized, to the extent practicable, by their sources in fuel reprocessing operations. If, for example, certain tanks contain wastes from the operation of the first cycle solvent extraction system, then these wastes would clearly be considered as high-level wastes. However, if some of the tanks contain predominantly incidental wastes such as cladding removal wastes or organic wash wastes, and if the radionuclide concentrations in these wastes are comparable to other low-level wastes, these wastes might not be properly classified as high-level wastes.

After the completion of the waste characterization program, the NRC recommends that the selection of a disposal alternative be made on a tank-by-tank basis. Information presented in Appendix A (Tables A.4 and A.5) of the DEIS suggests that a large fraction of the total curie inventory of single-shell tank wastes may be contained in only a few tanks. If this is accurate, a substantial fraction of the total radionuclide inventory could be retrieved at only a small fraction of the cost presented in the DEIS. Furthermore, if some or all of the tanks with large inventories are in sound condition and do not leak, wastes could be retrieved by sluicing, further reducing the cost of waste retrieval.

In summary, the NRC agrees that additional waste characterization should be completed in order to (1) properly classify wastes as high-level or non-high-level, and (2) permit selection of a disposal alternative which is most appropriate for each tank of waste.

Long-term performance of protective barrier system

As noted in the DEIS (p. 1.14), the protective barrier and marker system is the key to effectively isolating from the environment wastes that are disposed of near-surface. Two of the three disposal alternatives that are considered in the DEIS (i.e., the in-place stabilization alternative and the reference alternative) rely heavily on the capability of the proposed protective barrier system to minimize water infiltration and to reduce the likelihood of plant, animal, and human intrusion. Indeed, it is the view of the NRC that near-surface disposal of many of the Hanford wastes would likely pose unacceptable risks to public health and safety unless substantial protection is provided by such barriers. The DOE acknowledges (DEIS, p. M.2) that a specific barrier design has not yet been determined. The DEIS further notes that the DOE will conduct a NEPA review of the final specific barrier to evaluate its anticipated performance as designed and its performance under perturbed conditions. This review is to be based on actual laboratory and field data. The NRC encourages the DOE to conduct these further studies to resolve uncertainties with respect to the effectiveness of the barriers. Our detailed comments list some of the aspects of barrier design and performance which should be addressed in these studies.

Geochemical characteristics of the site

The DEIS is replete with statements that indicate a lack of geochemical data for the site. The DOE acknowledges (DEIS, p. 0.7) that the absence of this data precludes a more rigorous analysis of the environmental effects of the proposed alternatives. It is recommended that sufficient data be available to support the analyses of environmental impacts presented in the DEIS before decisions are implemented.

Development of analytical capabilities for projecting waste transport

The DEIS recognizes that the linear distribution coefficient (Kd) modeling approach is a potential technical limitation in modeling efforts because it combines several geochemical processes into a single empirical parameter. The DOE indicates that additional development work is being pursued on the models. As indicated above with regard to the geochemical characteristics of the site, it is recommended that sufficient model development be completed to support the estimates of environmental impacts set forth in the DEIS before decisions are implemented.

Finally, the NRC agrees with the position stated in the DEIS (p. 6.11) that to the extent that any decision based on the DEIS (and subsequent final environmental statement) requires defense high-level waste to be placed in a facility which is authorized for the express purpose of subsequent long-term storage, such a facility would have to comply with any applicable licensing requirements of the NRC. Notwithstanding any comments presented here, NRC may (1) incorporate into any license that may be issued at a later date conditions that may reflect a more restrictive position than that taken in these comments; or (2) deny a license for activities at a proposed facility.

DETAILED COMMENTS

DISPOSAL 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 SYSTEM

Appendix 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.

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.

It is noted that overall deterioration of the capillary barrier would be accelerated by any physical rupture of the barrier, as perhaps induced by vibratory ground motions or by the intrusion of man. Such a physical rupture would allow direct influx of runoff and precipitation through and beneath the barrier. In that event, contaminant transport within the vadose zone beneath the protective cover could be increased significantly.

In summary, the NRC staff considers that many uncertainties remain unresolved regarding long-term performance of a capillary barrier. Substantial additional research and development of barrier concepts must be completed before a preferred alternative can be selected for actual disposal of wastes.

Volume 2, Foreword, page xxxiv, paragraph 2

The assumption that the single-shell tanks remain integral for 165 years is both arbitrary and unsubstantiated. As stated in the DEIS: "an arbitrary assumption has been made that none of the tanks provides a barrier after the year 2150. This is equivalent to assuming the tanks provide a barrier to significant levels of vapor-phase transport of moisture for another 165 years."

The DEIS goes on to state that there are "no data to suggest that significant releases from the solid waste form are currently occurring." This may indeed be correct. However, there are data which show that releases have occurred from these tanks in the past. Based on historical difficulties with the integrity of the single-wall tanks, the highly soluble waste form they contain, and the lack of data supporting the integral tank assumption, it would be prudent to assume that properly backfilled tanks will provide only the structural stability necessary to inhibit slumping, collapse, or other failure of the disposal site. While the proper backfilling of tanks is necessary for structural stability, it will not significantly inhibit water infiltration or radionuclide release.

Appendix M, Section M.4, Reduction in Risk of Inadvertent Intrusion Through Passive Institutional Controls, page M.12, paragraph 1

The Final Environmental Impact Statement on 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste" (NUREG-0945, 1982), indicates intruder pathways dominate the potential health effects from commercial low-level radioactive waste disposal. Appendix R (p. R.1) of the DEIS recognizes a similar effect, in that "scenarios involving contact with or intrusion into waste...predict significant adverse or fatal consequences to those ignoring warnings and intruding into the wastes." However, the DEIS puts considerable reliance in the passive institutional controls described in Appendix M to avoid the intruder problem. The arguments supporting reduction in the risk of inadvertent intrusion are very weak: "The risk reduction factors presented here are based solely on the author's judgment; at present there are neither empirical nor theoretical models upon which these risk reduction factors can be based."

The Final EIS should provide a stronger basis to support the effectiveness of the proposed barriers as a deterrent to inadvertent intrusions.

Appendix M, Section M.4, Reduction In Risk of Inadvertent Intrusion Through Passive Institutional Controls, page M.11

This section presents factors by which the risk of human intrusion into wastes is estimated to be reduced by different protective means. When more than one means is present, these factors are then multiplied together to obtain an overall risk reduction factor.

The NRC staff considers that failure of some of the protective means (e.g., boundary markers and monuments) might result from the same primary cause (e.g., evolution of the language so that the meaning of the markers and monuments would no longer be understood). The potential for such "common-mode failures" indicates that multiplication of the individual protective factors to obtain an overall risk reduction factor is not appropriate. The method for combining the individual protective factors should accommodate the possibility that a single primary cause might render two or more of the protective mechanisms ineffective.

REGULATORY

Volume 1, Foreword, page v, paragraph 7

The NRC staff is concerned about the long-term cumulative effects of all ongoing and reasonably foreseeable waste disposal activities at the Hanford Reservation. The defense wastes, which include high-level and transuranic wastes, are already present and in need of permanent disposal. As stated on page v of the Foreword, the scope of the DEIS excludes low-level radioactive wastes in liquid and solid disposal sites at Hanford. Also excluded are wastes generated by the decontamination and decommissioning of surplus or retired facilities (post-1983). It is stated that those operations will be the subject of other National Environmental Policy Act (NEPA) reviews.

It is not clear why the DOE evaluated the environmental impacts of defense waste disposal alternatives without consideration of the cumulative effects of all existing and reasonably foreseeable activities. On page vii of the Foreword it is stated that, if the BWIP site were to be selected as a candidate site for repository development, a corresponding EIS would be written to support that site and to address cumulative impacts of that and other reasonably foreseeable activities on the Hanford Site. Why does the Defense Waste DEIS differ in that cumulative effects of all current waste disposal activities at Hanford are not addressed?

Section 3.4, Comparison of Impacts From Alternatives, pages 3.33-3.65

The DOE's proposals for permanent disposal of defense wastes at Hanford may pose special problems with respect to the NRC's current and future reviews and licensing decisions involving BWIP as a candidate site for the high-level waste geologic repository. For example, the DOE is required to develop a Performance Confirmation Program for BWIP to provide data that indicate, where practicable, whether subsurface conditions encountered and changes resulting from construction and waste emplacement are within limits assumed in the licensing review and that natural and engineered systems and components are functioning as intended.

Some of the actions proposed in this DEIS could potentially make a BWIP Performance Confirmation Program more difficult to design and carry out. For example, the barriers proposed for in-place stabilization of wastes may reduce infiltration to the unconfined aquifer system, potentially altering groundwater flow conditions. The Final EIS should include, in the discussion of impacts, possible effects of the proposed alternatives on licensability of a high-level waste repository at the BWIP site.

Section 6.6, Resource Conservation and Recovery Act, pages 6.10 and 6.11

In this section the DOE suggests that all of the waste covered in the DEIS is byproduct material and therefore not subject to subtitle C of the Resource Conservation and Recovery Act (RCRA). Throughout the text, however, the DOE acknowledges in numerous instances that the waste contains materials that are considered hazardous, dangerous and/or toxic by the EPA. In section 6.6 the DOE appears to be relying on a legal interpretation of authority rather than a technical analysis of hazard to make the conclusion that RCRA does not apply. Since no final determination has been made concerning the EPA and/or primary state authority regarding the disposal of this material, it would seem prudent that the DOE at least consider the impacts of the prescriptive disposal and monitoring requirements that would be mandated by RCRA.

HYDROLOGY

Section 4.4.1, Surface Waters, page 4.12, paragraph 2

The flood analyses and information provided in the DEIS indicate that facilities may be exposed to a potential flood threat from Cold Creek, since portions of the site may be flooded by a 100-year flood. It therefore appears that the requirements of Executive Order (E. O.) 11988, "Floodplain Management", have not been addressed. This E. O. requires, among other considerations, that the hazards and impacts associated with siting in a floodplain be identified and evaluated. Accordingly, an outline of the procedures involved in this decision-making process should be provided, and compliance with E. O. 11988 should be discussed.

Section 4.4.1, Surface Waters, page 4.12, paragraph 2

Results of flood studies in the Cold Creek watershed (Skaggs and Walters, 1981) indicate that a potential for flooding of portions of the site exists. As proposed, it appears that several facilities may be placed in an area of the Cold Creek floodplain, which could be inundated by several feet of water.

Based on an examination of the Skaggs and Walters report, it appears that the magnitude of flooding on Cold Creek may be underestimated. The Probable Maximum Flood (PMF) was estimated in the report to have a magnitude of 55,000 cubic feet per second (cfs) at the site where the drainage area is about 86 square miles. Review of historic flood data for arid regions of Washington and Oregon with similar climates and weather patterns indicates that a flood of this magnitude has occurred on a stream with a drainage area of about 13 square miles, located less than 150 miles from the site.

In recognition of the fact that the Cold Creek basin could have different flood-producing characteristics from the stream that produced the historic maximum discharge, it is nevertheless important that the PMF represent an upper bound of flood potential for a particular stream. It appears that this upper bound is not well-defined for Cold Creek.

In addition, maximum water levels will be increased as a result of increased PMF discharge and may also be increased by site location in the flood plain. The amount of increase in water level due to flood plain constriction has not been discussed in the DEIS. On the basis of topographic and cross-sectional examination of the site area, surface facilities may be subject to flooding and may constrict the flow area in the flood plain. This may increase the water levels associated with major floods; this increased level and its potential impacts should be discussed in the Final EIS.

Section 4.4.2, Groundwater, page 4.18, Figure 4.8

Isoheads indicate a potential for migration of waste from the 200-W area to the existing commercial low-level waste facility situated near the southwest corner of the 200-E area. This may adversely impact groundwater monitoring activities associated with that facility.

Appendix R, Section R.7, Other Surface Flooding, page R.92, paragraph 1

Disposal alternative #2, and in some respects alternatives #1 and #3 (page ix, Executive Summary), present disposal scenarios similar to the burial of high-level waste in a shallow land disposal site. All or some of the high-level and low-level wastes would remain at shallow depths below the ground surface. Consequently, the waste may be subject to near-surface natural phenomena.

The draft EA for the proposed disposal of high-level wastes at Hanford concluded, and the NRC agreed, that proglacial catastrophic flooding associated with the melting phase of glaciation would not likely occur during the 10,000-year isolation period. However, other consequences of either significantly warmer or cooler climatic trends could result in adverse environmental conditions at the Hanford Site. For example, future climatic

variations may cause increased sediment loads in the Columbia River and its tributaries, resulting in possible channel migrations. These possible adverse conditions are discussed in major comment #2 of NRC's comments on the draft EA for Hanford (NRC, 1985a) and should be considered in the defense waste Final EIS.

Appendix S, Section S.2, Radionuclide Releases to Accessible Environment, page S.6, paragraph 2

From discussions in the DEIS, it is unclear whether the drier-climate scenario is considered representative of either the Holocene (recent) climate at Hanford or of conditions drier than at present. Assumed log-normal probability density functions for annual groundwater recharge were described for both drier and wetter climate scenarios over the next 10,000 years. The drier climate scenario was assumed to have a median annual recharge of 1.5 cm, whereas the value for the wetter climate scenario was assumed to be 5.0 cm.

If it is intended that the drier climate scenario is representative of recent conditions, what is the basis for the assumed median annual recharge of 1.5 cm? On pages 4.19 and 4.20 it is stated that the annual average recharge from precipitation on the 200 Areas plateau has not been established to date, but two sets of lysimeter measurements are expected to resolve this question within 4 to 5 years. It was also stated that DOE expects that the value will lie within the range of 0.5 to 5.0 cm/yr based on data to date.

In summary, with regard to future climate scenarios, the Final EIS should contain a discussion that more clearly defines and differentiates between the terms "drier" versus "wetter." Also, more information should be included about uncertainties in assumed values for ranges and median values of future annual recharge for the Hanford Site.

Appendix S, Section S.5 Results, page S.24, paragraph 3

It is stated that the composite release-ratio/probability curves show that the in-place stabilization and disposal alternative and the reference alternative meet the EPA standard at the 99.9 percentile. This conclusion is not adequately supported.

Specifically, over the next 10,000 years, it is assumed that a drier climate scenario is nine times more probable than a wetter climate scenario (0.9 vs. 0.1; combined probability = 1.0). No basis for this assumption is given and no relevant references are cited in the appendix. This assumption biases the results of the composite release curves (Figure S.10) in favor of a drier climate with its implications of reduced recharge, infiltration, and contaminant transport. The rationale for assigning such a high probability to dryer climate scenarios should be explained in greater detail.

GEOCHEMISTRY

Appendices O, P and Q, Transport and Attenuation Modeling

The DOE recognizes that the total K_d (distribution coefficient) modeling approach is a "potential technical limitation" in modeling efforts (DEIS, Vol. 3, p. O.15) which has "come under severe criticism recently" (DEIS, Vol. 2, p. xxxii) because it combines complex geochemical processes into a single empirical parameter. This methodology is used, however, because of the "limited data base" at Hanford (DEIS, Vol. 2, p. xxxii). It is the NRC staff's position that the lack of data for more complex models and codes is not, by itself, a sufficient basis for using simplifying models and assumptions. Rather, the DOE should also demonstrate that the simplified models and assumptions are sufficiently realistic (or conservative) to support the decisions to be made using them. The DEIS states that the DOE is developing more complete and advanced transport and attenuation models (DEIS, Vol. 3, pp. O.15, P.3). The DOE should use these new models to evaluate the accuracy of the simpler Kd modeling approach.

Areas of concern pertaining to the DEIS modeling methodology include the following. The DOE does not show that the Delegard and Barney (1983) K_d values are directly applicable to the transport and attenuation models in the DEIS. The Delegard and Barney (1983) study illustrated the effects of certain waste components on the sorption properties of Hanford soils under specific laboratory conditions, but did not attempt to duplicate the ambient and expected site geochemical conditions at the Hanford Site. Delegard and Barney (1983) state that their K_d values are valid only within the range of their test conditions and that slight changes in waste composition can change migration rates by a factor of 13 to 40. Kelmers (1984) notes that in measuring laboratory K_d values it is "essential that test materials and conditions duplicate those to be encountered in the field situation being evaluated." It appears that this criterion is not met.

The contaminant transport assessment calculations do not account for all factors which can influence contaminant retardation. Changing site geochemical conditions due to spatial variation in groundwater or soil chemistry (DEIS, Vol. 3, pp. O.35, Q.9, V.9) or to the introduction of contaminants (DEIS, Vol. 3, p. O.37) will change the sorption characteristics of the Hanford Site. Kinetics of sorption-desorption reactions are not accounted for, nor is mass action competition for sorption sites. Additionally, the effect of naturally occurring organic material, which may be important in sorption and transport processes at Hanford (Toste and Myers, 1986), has not been examined. To perform a thorough transport assessment at the Hanford Site, the DOE should examine the impact of changing geochemical conditions on contaminant retardation and assess the effect of those geochemical processes not accounted for by their current methodology.

Limitations in the Hanford geochemical data base also limit the DOE to the use of contaminant release models that do not explicitly account for solubility limits as dictated by the current and expected site geochemical conditions

(DEIS, Vol. 2, pp. xxxi and xxxii; Vol. 3, pp. P.1, P.11). Release concentrations used in the DEIS are described by the DOE as being conservative estimates on the basis of data available in the literature (DEIS, Vol. 2, p. xxxii). Future release models, which the DOE states will take into account waste form release characteristics (DEIS, Vol. 3, p. P.18), should be incorporated into future impact assessment calculations.

Appendices O and U, Hanford Site Geochemical Conditions

The DEIS does not demonstrate that the ambient geochemical conditions and the composition of the tank waste have been adequately characterized to allow realistic transport assessments of contaminants at the Hanford site. To develop valid transport models and use accurate values for parameters in these models, the site geochemistry must be carefully examined and characterized. Since the DOE repeatedly cites the lack of site geochemical data (DEIS, Vol. 3, pp. O.7, O.8, O.15, U.4, and others) and uncertainty as to the composition and speciation of the tank waste (DEIS, Vol. 2, p. xxxv), the DOE should demonstrate that the site geochemical conditions are known well enough to ensure that the models and model parameters used in the impact assessment calculations are reasonable and conservative.

Appendix P, Section P.1.4, Diffusion-Controlled Release Beneath a Protective Barrier, page P.7, bullet 4

The DOE states that prior releases of contaminants (e.g., tank leaks, crib disposals, well injection) are not included in transport simulations because "most are not categorized as high-level or transuranic (TRU) waste," and those that are high-level or TRU are of negligible quantity. The DOE should take into consideration prior releases of contaminants in the transport calculations since these wastes are components of the current site geochemical conditions. Because these wastes will continue to be transported, their effects on the transport and attenuation of other contaminants (i.e., future releases of defense wastes) and their contribution to waste concentrations at site boundaries should be assessed.

Appendix V, Site-Monitoring Experience

The DEIS includes a brief discussion of current and former environmental monitoring activities at Hanford. Examples of localized contamination problems (cribs, trenches, etc.) are discussed in detail, while larger-scale contaminant plumes receive little mention. The large-scale movement of these plumes has been studied at Hanford for decades, and much has been learned about contaminant migration in the unconfined aquifer system. Some of this valuable information should be incorporated in the Final EIS. At a minimum, additions to the Final EIS should include available maps that show, for various times, the shapes and movements of various contaminant plumes known to exist in the unconfined aquifer system. This would include constituents like nitrate, tritium, I-129, Ru-106, Co-60, and Tc-99. These types of mobile contaminants show considerable promise in the continued study of flow paths for contaminant migration in the unconfined aquifer system at Hanford. The Final EIS should include a discussion of the role of large-scale contaminant plume behavior in evaluating the environmental impacts of future defense waste disposal operations.

Appendix V, Section V.5, Reverse Wells, page V.29, paragraph 2

The DEIS states that "the zone of [radiologic] contamination around the 216-B-5 reverse [injection] well appears to be [chemically] stable, with no apparent further migration of radionuclides." Results are shown for Cs-137, Sr-90, and Pu-239,240. However, a previous DOE investigation indicated that there was some evidence of contaminant migration beneath the well site, the source of which was uncertain. The following was reported by Smith (1980):

> Gamma logging showed that sediments distributed over a broad area and located just above the basalt surface were contaminated with low-level gamma contamination. Examination of previously collected gamma logs indicated that a possible source of this contamination could be the BY cribs located [approximately] 900 m north of the reverse well. This work also indicates that the contamination may be moving in a southeasterly direction.

Smith (1980) also recommended that the broad contamination plume at the basalt surface should be investigated as to its distribution, source or sources, radionuclide identity and concentrations, and that a monitoring plan be developed if required. This study showed that the position of the water table and the type of sediment to which waste solutions are discharged are important factors for controlling radionuclide distributions. The study also recommended the use of stainless steel well screens for monitoring wells. Anomalous beta activity was present on rusted portions of corroded well casings and was believed to have produced some erroneous radionuclide analyses.

This is the only reverse well for which contaminant migration has been characterized, and one could not thereby conclude that the results are statistically significant. Because of aquifer heterogeneities and the chemical variability of fluids originally injected into various reverse wells, it may not be reasonable to extrapolate these results to other reverse well locations. It is noted that zones of contamination appear to extend beyond the maximum depth of penetration of the monitoring wells. It would be useful to know to what depth contaminants may have penetrated basalts at the base of the unconfined aquifer. Previous researchers at Hanford have presented some evidence for deeper contamination. Brauer and Rieck (1973) noted the presence of I-129 in groundwater obtained from well 699-10-E12 P. The sampled aquifer was believed to be confined, and it was suggested that there had been some contamination of the groundwater since the early 1940's.

The presence of varying concentrations of contaminants that were released to the unconfined aquifer system over the last four decades provides a unique opportunity to better understand in situ solute behavior and geochemical retardation processes. Given this unique opportunity, the DOE should plan additional in situ characterization studies of this type as a means of better supporting modeling studies of contaminant transport in the unconfined aquifer system.

GEOLOGY

Section 3.3.2.5, In-Place Stabilization and Disposal Applied to Previously Disposed-of TRU-Contaminated Soil Sites, page 3.24, paragraph 1

This section states that a geophysical survey of the liquid waste sites with high subsidence potential will be completed to characterize them and to identify grout-injection points. Further discussion of the feasibility and adequacy of subsidence control should be provided in the Final EIS.

Section 4.0, Affected Environment, page 4.2, Figure 4.1

Figure 4.1 provides the general locations of the defense high-level and transuranic wastes. Figure 4.1 indicates that waste disposal occurred in the 200-W, 200-E, and 300 Areas and in the Wye Burial Ground. The DEIS should more precisely identify all waste locations at Hanford. It is further recommended that the Final EIS include additional information regarding the geohydrology, geochemistry, and geology (e.g., geomorphology, stratigraphy, and structure) of specific waste disposal areas to better characterize these sites. For example, the potential for contaminant migration in the vadose zone beneath a given disposal site cannot be reliably determined without an evaluation of actual, site-specific soil moisture characteristics and curves of pressure head versus hydraulic conductivity.

Section 4.3, Seismicity, page 4.10, paragraph 4

The existence of faulting and the possibility of fault reactivation in the waste disposal areas has not been adequately addressed. The general guideline in 10 CFR 61.50(a)(9) may be of use in discussing the potential and significance of faulting in these areas.

The referenced draft EA for Hanford (DOE, 1984) presented a generally favorable view of the tectonic setting and possible effects of tectonics on waste isolation. In the NRC's major comment #4 on the draft EA (NRC, 1985a), this view was considered to be inadequately supported by the data and analyses presented. The statements made by the NRC staff regarding the reference repository also apply to the waste disposal alternatives of this DEIS.

Section 4.3, Seismicity, page 4.10, paragraph 4

A series of sub-vertical clastic dikes has been observed (NRC, 1985b) in the trench walls at the U.S. Ecology Low-Level Waste Disposal Area, which is located in close proximity to the 200-E Area. The dikes cut across, but do not appear to offset the sand and silt strata in the trenches. They taper upward and extend from below the base of the trench to within 8 to 10 feet of the surface. They are approximately 2 to 3 feet wide at the base and several inches wide where they are truncated or pinch out near the ground surface. The dikes, which occur in other areas of the Hanford Reservation, may be related to fissuring caused by ground motion resulting from seismic activity. The

fissures were apparently filled by movement of water-saturated sediments under hydrostatic pressure, which are susceptible to liquefaction.

The presence of these clastic dikes may have significant implications for shallow land burial of low-level and high-level wastes. In the 500 to 10,000 year periods of isolation required for low-level and high-level wastes, respectively, there is a possibility that fissuring may again occur or that existing fissures may be reopened as a result of seismic activity. Existing fissures may also provide avenues for groundwater migration. The probability of occurrence as well as the significance of these fissures should be addressed. Additionally, the possible existence of these dikes within the waste disposal areas should be determined.

Section 4.7, Land Use, page 4.30

The DEIS does not address nor does it provide information on the potential for the existence of natural resources in the defense waste areas. 10 CFR 61.50 (4) requires that, for the near-surface disposal of low-level wastes, areas known to contain natural resources should be avoided. While the disposal of defense wastes is not subject to 10 CFR Part 61, the reasons for avoiding such areas remain valid. The Final EIS should provide an evaluation of natural resources, including hydrocarbon and mineral resource potential at the proposed site. This is particularly relevant in view of a natural gas discovery within sediments underlying the basalts in the Saddle Mountains area of the Hanford Reservation by Shell Oil Company (NRC, 1985a).

Appendix O, Section O.1, Stratigraphy Beneath The Hanford 200 Areas, pages O.2-O.5

The principal units that comprise the unconfined aquifer system at Hanford are discussed in Appendix O. Little information is provided on the topic of paleogeomorphology at Hanford. This topic may be of importance in developing a better understanding of flow and transport in the unconfined aquifer system.

Brown et al. (1962) provided geologic interpretations that accounted for the apparently rapid dispersal of tritium in the unconfined aquifer system at Hanford. They noted that the contaminants appear to be following old Columbia River channels incised into the eroded upper surface of the low-permeability Ringold Formation sediments. These channels are filled with more recent deposits (Hanford Formation) that have permeabilities approximately two orders of magnitude greater than in the underlying Ringold strata. It appears that the relative subcrop elevation of the Ringold Formation with respect to the water table thereby exerts considerable influence over groundwater flow paths. This may account for the observed branching (anomalous macrodispersion) of contaminant plumes migrating away from the 200 East Area. This information should be considered when interpreting the results of groundwater surveillance at Hanford and in the continued development of a groundwater monitoring program.

ENVIRONMENTAL

Several of the NRC's detailed environmental comments on the DOE's draft Environmental Assessment are applicable to the DEIS. The comment numbers are E-1, 3-30, 4-3, 4-5, 5-10, 5-11 and 6-38. These comments should be considered in preparing the Final EIS.

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Mr. R. A. Holten
U. S. Department of Energy
Richland Operations Office
Waste Management Division
Richland, WA 99352

Dear Mr. Holten:

The U. S. Nuclear Regulatory Commission (NRC) staff has reviewed the U. S. Department of Energy's (DOE) draft environmental impact statement (DEIS) entitled Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes, DOE/EIS-0113. On the basis of our review, the NRC offers the enclosed general and detailed comments. Although not part of our comments on the draft EIS, the NRC also wishes to express its concerns regarding other legal and institutional issues related to the concept of in situ disposal of high-level wastes (HLW) at Hanford.

First, as you are aware, under Section 202(4) of the Energy Reorganization Act of 1974, any facilities expressly authorized for disposal of defense high-level wastes are subject to the licensing and related regulatory authority of the Commission. Whether the express authorization for particular facilities is legislative or administrative in our judgment has no bearing upon the concerns that led Congress to provide for licensing by NRC. Also, it appears that the Hanford "tank wastes," which from the information presented in the draft EIS would have been regarded as HLW when the Energy Reorganization Act was passed, remain HLW for purposes of determining whether or not NRC has such jurisdiction. If DOE believes that subsequent processing of the "tank wastes" may have altered the classification of some of the materials being stored, more detailed waste characterization information would be necessary to support that view.

Second, licensing of Hanford waste tanks for HLW disposal will be procedurally complex because of the need to develop appropriate standards and procedures, the existing fait accompli status of the waste tanks, and the difficulty in reasonably evaluating alternatives (e.g., alternative sites) as required by the National Environmental Policy Act. Other statutes would also need to be considered, including one provision (42 U.S.C. § 7272) which could be read to bar the expenditure of funds for purposes related to the licensing of defense waste management activities such as those that might be undertaken at Hanford.

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Although NRC staff does not prejudge the disposal of HLW, in situ, in the Hanford tanks, we believe establishing the feasibility of such disposal as technically adequate to protect the public health and the environment will be exceedingly difficult and may not be achievable. Consequently, nothing in our comments should be read as NRC agreement or endorsement of such disposal. In addition, our comments at this stage do not restrict NRC from making additional comments in the future, when or as appropriate.

Thank you for providing the opportunity to comment on the Hanford Defense Waste DEIS. We hope that these comments will be of assistance in preparing the final environmental statement. We would be pleased to discuss the comments with you and members of your staff if you desire.

Sincerely,

Robert E. Browning, Director
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure:
NRC's General and Detailed Comments
on the DEIS

*See previous concurrence.

OFC	WMRP	WMRP	WMRP	WMRP	OGC	DWM	DWM
NAME	CGlenn*	DFehringer*	RBoyle*	JLinehan*	WOlmstead	MBell	RBrowning
DATE	86/ /	86/ /	86/ /	86/ /	86/9/26	86/ /	86/9/24

By phone 9/23

Because the NRC is barred from expending funds for licensing of DOE defense waste management activities, no significant evaluation of licensing issues related to the DEIS may be or has been undertaken. Nevertheless, we consider the observations above to be important matters which DOE should take into account, in addition to our enclosed comments on the draft EIS, when evaluating the feasibility of in situ disposal of HLW at Hanford.

Although NRC staff does not prejudge the disposal of HLW, in situ, in the Hanford tanks, we believe establishing the feasibility of such disposal as technically adequate to protect the public health and the environment will be exceedingly difficult and may not be achievable. Consequently, nothing in our comments should be read as NRC agreement or endorsement of such disposal. In addition, our comments at this stage do not restrict NRC from making additional comments in the future, when or as appropriate.

Thank you for providing the opportunity to comment on the Hanford Defense Waste DEIS. We hope that these comments will be of assistance in preparing the final environmental statement. We would be pleased to discuss the comments with you and members of your staff if you desire.

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OFC	:WMRP	:WMRP	:WMRP	:WMRP	:ELD	:DWM	:DWM
NAME	:CGlenn	:DFehringer	:RBoyle	:JBunnenberg	:WOlmstead	:MBell	:RBrowning
DATE	:86/8/14	:86/8/14	:86/8/14	:86/8/14	:86/ /	:86/ /	:86/ /

COMMENTS

OF THE

U. S. NUCLEAR REGULATORY COMMISSION

ON THE

U. S. DEPARTMENT OF ENERGY'S

DRAFT ENVIRONMENTAL IMPACT STATEMENT

RELATED TO

DISPOSAL OF HANFORD

DEFENSE HIGH-LEVEL, TRANSURANIC

AND TANK WASTES

(DOE/EIS-0113)

PUBLISHED MARCH 1986

GENERAL COMMENTS

It is stated in the DEIS (p. i) that the purpose of the EIS is "to provide environmental input into the selection and implementation of the final disposal actions for high-level, transuranic and tank wastes located at the Hanford Site." The document goes on to state that the DEIS is "both a programmatic EIS intended to support broad decisions with respect to the disposal strategies for the Hanford waste" and "an implementation EIS intended to provide project specific environmental input for decisions on moving forward with certain disposal activities" (p. xiii). The DEIS further indicates that following publication of the Final EIS, the DOE "will begin selection of a Hanford Defense Waste final disposal strategy which will be documented in one or more Records of Decision. The DOE may decide to proceed with implementing certain parts of the strategy while delaying final decision on other parts pending further research and development" (p. xiii). This approach makes the review of the document difficult because it is unclear which areas will receive additional research and development and how the results of these research and development efforts will be factored into the decision-making process. The DEIS indicates that further NEPA review is anticipated to support certain other specific activities prior to their implementation but the document does not indicate which activities this would apply to, what the additional review would consist of, or when it would occur. The NRC staff recommends that the Final EIS clearly identify which decisions will be postponed pending completion of additional research and development, when these activities are likely to be completed, and the type of NEPA review that is anticipated.

The NRC agrees with DOE that several areas require additional research and development prior to making decisions concerning the disposal of the Hanford wastes. These include: (1) characterization of the wastes in the single-shell tanks; (2) long-term performance of the protective barrier system; (3) geochemical characteristics of the site; and (4) development of analytical capabilities for projecting waste transport. Each of these is discussed below.

Characterization of single-shell tank wastes

The DEIS notes (p. 3.5), and the NRC staff agrees, that additional characterization of wastes in the single-shell tanks will be necessary to provide more detailed information about waste inventories. The NRC recommends that the wastes also be characterized, to the extent practicable, by their sources in fuel reprocessing operations. If, for example, certain tanks contain wastes from the operation of the first cycle solvent extraction system, then these wastes would clearly be considered as high-level wastes. However, if some of the tanks contain predominantly incidental wastes such as cladding removal wastes or organic wash wastes, and if the radionuclide concentrations in these wastes are comparable to other low-level wastes, these wastes might not be properly classified as high-level wastes.

After the completion of the waste characterization program, the NRC recommends that the selection of a disposal alternative be made on a tank-by-tank basis. Information presented in Appendix A (Tables A.4 and A.5) of the DEIS suggests that a large fraction of the total curie inventory of single-shell tank wastes may be contained in only a few tanks. If this is accurate, a substantial fraction of the total radionuclide inventory could be retrieved at only a small fraction of the cost presented in the DEIS. Furthermore, if some or all of the tanks with large inventories are in sound condition and do not leak, wastes could be retrieved by sluicing, further reducing the cost of waste retrieval.

In summary, the NRC agrees that additional waste characterization should be completed in order to (1) properly classify wastes as high-level or non-high-level, and (2) permit selection of a disposal alternative which is most appropriate for each tank of waste.

Long-term performance of protective barrier system

As noted in the DEIS (p. 1.14), the protective barrier and marker system is the key to effectively isolating from the environment wastes that are disposed of near-surface. Two of the three disposal alternatives that are considered in the DEIS (i.e., the in-place stabilization alternative and the reference alternative) rely heavily on the capability of the proposed protective barrier system to minimize water infiltration and to reduce the likelihood of plant, animal, and human intrusion. Indeed, it is the view of the NRC that near-surface disposal of many of the Hanford wastes would likely pose unacceptable risks to public health and safety unless substantial protection is provided by such barriers. The DOE acknowledges (DEIS, p. M.2) that a specific barrier design has not yet been determined. The DEIS further notes that the DOE will conduct a NEPA review of the final specific barrier to evaluate its anticipated performance as designed and its performance under perturbed conditions. This review is to be based on actual laboratory and field data. The NRC encourages the DOE to conduct these further studies to resolve uncertainties with respect to the effectiveness of the barriers. Our detailed comments list some of the aspects of barrier design and performance which should be addressed in these studies.

Geochemical characteristics of the site

The DEIS is replete with statements that indicate a lack of geochemical data for the site. The DOE acknowledges (DEIS, p. 0.7) that the absence of this data precludes a more rigorous analysis of the environmental effects of the proposed alternatives. It is recommended that sufficient data be available to support the analyses of environmental impacts presented in the DEIS before decisions are implemented.

Development of analytical capabilities for projecting waste transport

The DEIS recognizes that the linear distribution coefficient (Kd) modeling approach is a potential technical limitation in modeling efforts because it combines several geochemical processes into a single empirical parameter. The DOE indicates that additional development work is being pursued on the models. As indicated above with regard to the geochemical characteristics of the site, it is recommended that sufficient model development be completed to support the estimates of environmental impacts set forth in the DEIS before decisions are implemented.

Finally, the NRC agrees with the position stated in the DEIS (p. 6.11) that to the extent that any decision based on the DEIS (and subsequent final environmental statement) requires defense high-level waste to be placed in a facility which is authorized for the express purpose of subsequent long-term storage, such a facility would have to comply with any applicable licensing requirements of the NRC. Notwithstanding any comments presented here, NRC may (1) incorporate into any license that may be issued at a later date conditions that may reflect a more restrictive position than that taken in these comments; or (2) deny a license for activities at a proposed facility.

DETAILED COMMENTS

DISPOSAL 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 SYSTEM

Appendix M, Preliminary Analysis Of The Performance of 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.

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.

It is noted that overall deterioration of the capillary barrier would be accelerated by any physical rupture of the barrier, as perhaps induced by vibratory ground motions or by the intrusion of man. Such a physical rupture would allow direct influx of runoff and precipitation through and beneath the barrier. In that event, contaminant transport within the vadose zone beneath the protective cover could be increased significantly.

In summary, the NRC staff considers that many uncertainties remain unresolved regarding long-term performance of a capillary barrier. Substantial additional research and development of barrier concepts must be completed before a preferred alternative can be selected for actual disposal of wastes.

Volume 2, Foreword, page xxxiv, paragraph 2

The assumption that the single-shell tanks remain integral for 165 years is both arbitrary and unsubstantiated. As stated in the DEIS: "an arbitrary assumption has been made that none of the tanks provides a barrier after the year 2150. This is equivalent to assuming the tanks provide a barrier to significant levels of vapor-phase transport of moisture for another 165 years."

The DEIS goes on to state that there are "no data to suggest that significant releases from the solid waste form are currently occurring." This may indeed be correct. However, there are data which show that releases have occurred from these tanks in the past. Based on historical difficulties with the integrity of the single-wall tanks, the highly soluble waste form they contain, and the lack of data supporting the integral tank assumption, it would be prudent to assume that properly backfilled tanks will provide only the structural stability necessary to inhibit slumping, collapse, or other failure of the disposal site. While the proper backfilling of tanks is necessary for structural stability, it will not significantly inhibit water infiltration or radionuclide release.

Appendix M, Section M.4, Reduction in Risk of Inadvertent Intrusion Through Passive Institutional Controls, page M.12, paragraph 1

The Final Environmental Impact Statement on 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste" (NUREG-0945, 1982), indicates intruder pathways dominate the potential health effects from commercial low-level radioactive waste disposal. Appendix R (p. R.1) of the DEIS recognizes a similar effect, in that "scenarios involving contact with or intrusion into waste...predict significant adverse or fatal consequences to those ignoring warnings and intruding into the wastes." However, the DEIS puts considerable reliance in the passive institutional controls described in Appendix M to avoid the intruder problem. The arguments supporting reduction in the risk of inadvertent intrusion are very weak: "The risk reduction factors presented here are based solely on the author's judgment; at present there are neither empirical nor theoretical models upon which these risk reduction factors can be based."

The Final EIS should provide a stronger basis to support the effectiveness of the proposed barriers as a deterrent to inadvertent intrusions.

Appendix M, Section M.4, Reduction In Risk of Inadvertent Intrusion Through Passive Institutional Controls, page M.11

This section presents factors by which the risk of human intrusion into wastes is estimated to be reduced by different protective means. When more than one means is present, these factors are then multiplied together to obtain an overall risk reduction factor.

The NRC staff considers that failure of some of the protective means (e.g., boundary markers and monuments) might result from the same primary cause (e.g., evolution of the language so that the meaning of the markers and monuments would no longer be understood). The potential for such "common-mode failures" indicates that multiplication of the individual protective factors to obtain an overall risk reduction factor is not appropriate. The method for combining the individual protective factors should accommodate the possibility that a single primary cause might render two or more of the protective mechanisms ineffective.

REGULATORY

Volume 1, Foreword, page v, paragraph 7

The NRC staff is concerned about the long-term cumulative effects of all ongoing and reasonably foreseeable waste disposal activities at the Hanford Reservation. The defense wastes, which include high-level and transuranic wastes, are already present and in need of permanent disposal. As stated on page v of the Foreword, the scope of the DEIS excludes low-level radioactive wastes in liquid and solid disposal sites at Hanford. Also excluded are wastes generated by the decontamination and decommissioning of surplus or retired facilities (post-1983). It is stated that those operations will be the subject of other National Environmental Policy Act (NEPA) reviews.

It is not clear why the DOE evaluated the environmental impacts of defense waste disposal alternatives without consideration of the cumulative effects of all existing and reasonably foreseeable activities. On page vii of the Foreword it is stated that, if the BWIP site were to be selected as a candidate site for repository development, a corresponding EIS would be written to support that site and to address cumulative impacts of that and other reasonably foreseeable activities on the Hanford Site. Why does the Defense Waste DEIS differ in that cumulative effects of all current waste disposal activities at Hanford are not addressed?

Section 3.4, Comparison of Impacts From Alternatives, pages 3.33-3.65

The DOE's proposals for permanent disposal of defense wastes at Hanford may pose special problems with respect to the NRC's current and future reviews and licensing decisions involving BWIP as a candidate site for the high-level waste geologic repository. For example, the DOE is required to develop a Performance Confirmation Program for BWIP to provide data that indicate, where practicable, whether subsurface conditions encountered and changes resulting from construction and waste emplacement are within limits assumed in the licensing review and that natural and engineered systems and components are functioning as intended.

Some of the actions proposed in this DEIS could potentially make a BWIP Performance Confirmation Program more difficult to design and carry out. For example, the barriers proposed for in-place stabilization of wastes may reduce infiltration to the unconfined aquifer system, potentially altering groundwater flow conditions. The Final EIS should include, in the discussion of impacts, possible effects of the proposed alternatives on licensability of a high-level waste repository at the BWIP site.

Section 6.6, Resource Conservation and Recovery Act, pages 6.10 and 6.11

In this section the DOE suggests that all of the waste covered in the DEIS is byproduct material and therefore not subject to subtitle C of the Resource Conservation and Recovery Act (RCRA). Throughout the text, however, the DOE acknowledges in numerous instances that the waste contains materials that are considered hazardous, dangerous and/or toxic by the EPA. In section 6.6 the DOE appears to be relying on a legal interpretation of authority rather than a technical analysis of hazard to make the conclusion that RCRA does not apply. Since no final determination has been made concerning the EPA and/or primary state authority regarding the disposal of this material, it would seem prudent that the DOE at least consider the impacts of the prescriptive disposal and monitoring requirements that would be mandated by RCRA.

HYDROLOGY

Section 4.4.1, Surface Waters, page 4.12, paragraph 2

The flood analyses and information provided in the DEIS indicate that facilities may be exposed to a potential flood threat from Cold Creek, since portions of the site may be flooded by a 100-year flood. It therefore appears that the requirements of Executive Order (E. O.) 11988, "Floodplain Management", have not been addressed. This E. O. requires, among other considerations, that the hazards and impacts associated with siting in a floodplain be identified and evaluated. Accordingly, an outline of the procedures involved in this decision-making process should be provided, and compliance with E. O. 11988 should be discussed.

Section 4.4.1, Surface Waters, page 4.12, paragraph 2

Results of flood studies in the Cold Creek watershed (Skaggs and Walters, 1981) indicate that a potential for flooding of portions of the site exists. As proposed, it appears that several facilities may be placed in an area of the Cold Creek floodplain, which could be inundated by several feet of water.

Based on an examination of the Skaggs and Walters report, it appears that the magnitude of flooding on Cold Creek may be underestimated. The Probable Maximum Flood (PMF) was estimated in the report to have a magnitude of 55,000 cubic feet per second (cfs) at the site where the drainage area is about 86 square miles. Review of historic flood data for arid regions of Washington and Oregon with similar climates and weather patterns indicates that a flood of this magnitude has occurred on a stream with a drainage area of about 13 square miles, located less than 150 miles from the site.

In recognition of the fact that the Cold Creek basin could have different flood-producing characteristics from the stream that produced the historic maximum discharge, it is nevertheless important that the PMF represent an upper bound of flood potential for a particular stream. It appears that this upper bound is not well-defined for Cold Creek.

In addition, maximum water levels will be increased as a result of increased PMF discharge and may also be increased by site location in the flood plain. The amount of increase in water level due to flood plain constriction has not been discussed in the DEIS. On the basis of topographic and cross-sectional examination of the site area, surface facilities may be subject to flooding and may constrict the flow area in the flood plain. This may increase the water levels associated with major floods; this increased level and its potential impacts should be discussed in the Final EIS.

Section 4.4.2, Groundwater, page 4.18, Figure 4.8

Isoheads indicate a potential for migration of waste from the 200-W area to the existing commercial low-level waste facility situated near the southwest corner of the 200-E area. This may adversely impact groundwater monitoring activities associated with that facility.

Appendix R, Section R.7, Other Surface Flooding, page R.92, paragraph 1

Disposal alternative #2, and in some respects alternatives #1 and #3 (page ix, Executive Summary), present disposal scenarios similar to the burial of high-level waste in a shallow land disposal site. All or some of the high-level and low-level wastes would remain at shallow depths below the ground surface. Consequently, the waste may be subject to near-surface natural phenomena.

The draft EA for the proposed disposal of high-level wastes at Hanford concluded, and the NRC agreed, that proglacial catastrophic flooding associated with the melting phase of glaciation would not likely occur during the 10,000-year isolation period. However, other consequences of either significantly warmer or cooler climatic trends could result in adverse environmental conditions at the Hanford Site. For example, future climatic

variations may cause increased sediment loads in the Columbia River and its tributaries, resulting in possible channel migrations. These possible adverse conditions are discussed in major comment #2 of NRC's comments on the draft EA for Hanford (NRC, 1985a) and should be considered in the defense waste Final EIS.

Appendix S, Section S.2, Radionuclide Releases to Accessible Environment, page S.6, paragraph 2

From discussions in the DEIS, it is unclear whether the drier-climate scenario is considered representative of either the Holocene (recent) climate at Hanford or of conditions drier than at present. Assumed log-normal probability density functions for annual groundwater recharge were described for both drier and wetter climate scenarios over the next 10,000 years. The drier climate scenario was assumed to have a median annual recharge of 1.5 cm, whereas the value for the wetter climate scenario was assumed to be 5.0 cm.

If it is intended that the drier climate scenario is representative of recent conditions, what is the basis for the assumed median annual recharge of 1.5 cm? On pages 4.19 and 4.20 it is stated that the annual average recharge from precipitation on the 200 Areas plateau has not been established to date, but two sets of lysimeter measurements are expected to resolve this question within 4 to 5 years. It was also stated that DOE expects that the value will lie within the range of 0.5 to 5.0 cm/yr based on data to date.

In summary, with regard to future climate scenarios, the Final EIS should contain a discussion that more clearly defines and differentiates between the terms "drier" versus "wetter." Also, more information should be included about uncertainties in assumed values for ranges and median values of future annual recharge for the Hanford Site.

Appendix S, Section S.5 Results, page S.24, paragraph 3

It is stated that the composite release-ratio/probability curves show that the in-place stabilization and disposal alternative and the reference alternative meet the EPA standard at the 99.9 percentile. This conclusion is not adequately supported.

Specifically, over the next 10,000 years, it is assumed that a drier climate scenario is nine times more probable than a wetter climate scenario (0.9 vs. 0.1; combined probability = 1.0). No basis for this assumption is given and no relevant references are cited in the appendix. This assumption biases the results of the composite release curves (Figure S.10) in favor of a drier climate with its implications of reduced recharge, infiltration, and contaminant transport. The rationale for assigning such a high probability to dryer climate scenarios should be explained in greater detail.

GEOCHEMISTRY

Appendices O, P and Q, Transport and Attenuation Modeling

The DOE recognizes that the total K_d (distribution coefficient) modeling approach is a "potential technical limitation" in modeling efforts (DEIS, Vol. 3, p. O.15) which has "come under severe criticism recently" (DEIS, Vol. 2, p. xxxii) because it combines complex geochemical processes into a single empirical parameter. This methodology is used, however, because of the "limited data base" at Hanford (DEIS, Vol. 2, p. xxxii). It is the NRC staff's position that the lack of data for more complex models and codes is not, by itself, a sufficient basis for using simplifying models and assumptions. Rather, the DOE should also demonstrate that the simplified models and assumptions are sufficiently realistic (or conservative) to support the decisions to be made using them. The DEIS states that the DOE is developing more complete and advanced transport and attenuation models (DEIS, Vol. 3, pp. O.15, P.3). The DOE should use these new models to evaluate the accuracy of the simpler Kd modeling approach.

Areas of concern pertaining to the DEIS modeling methodology include the following. The DOE does not show that the Delegard and Barney (1983) K_d values are directly applicable to the transport and attenuation models in the DEIS. The Delegard and Barney (1983) study illustrated the effects of certain waste components on the sorption properties of Hanford soils under specific laboratory conditions, but did not attempt to duplicate the ambient and expected site geochemical conditions at the Hanford Site. Delegard and Barney (1983) state that their K_d values are valid only within the range of their test conditions and that slight changes in waste composition can change migration rates by a factor of 13 to 40. Kelmers (1984) notes that in measuring laboratory K_d values it is "essential that test materials and conditions duplicate those to be encountered in the field situation being evaluated." It appears that this criterion is not met.

The contaminant transport assessment calculations do not account for all factors which can influence contaminant retardation. Changing site geochemical conditions due to spatial variation in groundwater or soil chemistry (DEIS, Vol. 3, pp. O.35, Q.9, V.9) or to the introduction of contaminants (DEIS, Vol. 3, p. O.37) will change the sorption characteristics of the Hanford Site. Kinetics of sorption-desorption reactions are not accounted for, nor is mass action competition for sorption sites. Additionally, the effect of naturally occurring organic material, which may be important in sorption and transport processes at Hanford (Toste and Myers, 1986), has not been examined. To perform a thorough transport assessment at the Hanford Site, the DOE should examine the impact of changing geochemical conditions on contaminant retardation and assess the effect of those geochemical processes not accounted for by their current methodology.

Limitations in the Hanford geochemical data base also limit the DOE to the use of contaminant release models that do not explicitly account for solubility limits as dictated by the current and expected site geochemical conditions

(DEIS, Vol. 2, pp. xxxi and xxxii; Vol. 3, pp. P.1, P.11). Release concentrations used in the DEIS are described by the DOE as being conservative estimates on the basis of data available in the literature (DEIS, Vol. 2, p. xxxii). Future release models, which the DOE states will take into account waste form release characteristics (DEIS, Vol. 3, p. P.18), should be incorporated into future impact assessment calculations.

Appendices O and U, Hanford Site Geochemical Conditions

The DEIS does not demonstrate that the ambient geochemical conditions and the composition of the tank waste have been adequately characterized to allow realistic transport assessments of contaminants at the Hanford site. To develop valid transport models and use accurate values for parameters in these models, the site geochemistry must be carefully examined and characterized. Since the DOE repeatedly cites the lack of site geochemical data (DEIS, Vol. 3, pp. O.7, O.8, O.15, U.4, and others) and uncertainty as to the composition and speciation of the tank waste (DEIS, Vol. 2, p. xxxv), the DOE should demonstrate that the site geochemical conditions are known well enough to ensure that the models and model parameters used in the impact assessment calculations are reasonable and conservative.

Appendix P, Section P.1.4, Diffusion-Controlled Release Beneath a Protective Barrier, page P.7, bullet 4

The DOE states that prior releases of contaminants (e.g., tank leaks, crib disposals, well injection) are not included in transport simulations because "most are not categorized as high-level or transuranic (TRU) waste," and those that are high-level or TRU are of negligible quantity. The DOE should take into consideration prior releases of contaminants in the transport calculations since these wastes are components of the current site geochemical conditions. Because these wastes will continue to be transported, their effects on the transport and attenuation of other contaminants (i.e., future releases of defense wastes) and their contribution to waste concentrations at site boundaries should be assessed.

Appendix V, Site-Monitoring Experience

The DEIS includes a brief discussion of current and former environmental monitoring activities at Hanford. Examples of localized contamination problems (cribs, trenches, etc.) are discussed in detail, while larger-scale contaminant plumes receive little mention. The large-scale movement of these plumes has been studied at Hanford for decades, and much has been learned about contaminant migration in the unconfined aquifer system. Some of this valuable information should be incorporated in the Final EIS. At a minimum, additions to the Final EIS should include available maps that show, for various times, the shapes and movements of various contaminant plumes known to exist in the unconfined aquifer system. This would include constituents like nitrate, tritium, I-129, Ru-106, Co-60, and Tc-99. These types of mobile contaminants show considerable promise in the continued study of flow paths for contaminant migration in the unconfined aquifer system at Hanford. The Final EIS should include a discussion of the role of large-scale contaminant plume behavior in evaluating the environmental impacts of future defense waste disposal operations.

Appendix V, Section V.5, Reverse Wells, page V.29, paragraph 2

The DEIS states that "the zone of [radiologic] contamination around the 216-B-5 reverse [injection] well appears to be [chemically] stable, with no apparent further migration of radionuclides." Results are shown for Cs-137, Sr-90, and Pu-239,240. However, a previous DOE investigation indicated that there was some evidence of contaminant migration beneath the well site, the source of which was uncertain. The following was reported by Smith (1980):

> Gamma logging showed that sediments distributed over a broad area and located just above the basalt surface were contaminated with low-level gamma contamination. Examination of previously collected gamma logs indicated that a possible source of this contamination could be the BY cribs located [approximately] 900 m north of the reverse well. This work also indicates that the contamination may be moving in a southeasterly direction.

Smith (1980) also recommended that the broad contamination plume at the basalt surface should be investigated as to its distribution, source or sources, radionuclide identity and concentrations, and that a monitoring plan be developed if required. This study showed that the position of the water table and the type of sediment to which waste solutions are discharged are important factors for controlling radionuclide distributions. The study also recommended the use of stainless steel well screens for monitoring wells. Anomalous beta activity was present on rusted portions of corroded well casings and was believed to have produced some erroneous radionuclide analyses.

This is the only reverse well for which contaminant migration has been characterized, and one could not thereby conclude that the results are statistically significant. Because of aquifer heterogeneities and the chemical variability of fluids originally injected into various reverse wells, it may not be reasonable to extrapolate these results to other reverse well locations. It is noted that zones of contamination appear to extend beyond the maximum depth of penetration of the monitoring wells. It would be useful to know to what depth contaminants may have penetrated basalts at the base of the unconfined aquifer. Previous researchers at Hanford have presented some evidence for deeper contamination. Brauer and Rieck (1973) noted the presence of I-129 in groundwater obtained from well 699-10-E12 P. The sampled aquifer was believed to be confined, and it was suggested that there had been some contamination of the groundwater since the early 1940's.

The presence of varying concentrations of contaminants that were released to the unconfined aquifer system over the last four decades provides a unique opportunity to better understand in situ solute behavior and geochemical retardation processes. Given this unique opportunity, the DOE should plan additional in situ characterization studies of this type as a means of better supporting modeling studies of contaminant transport in the unconfined aquifer system.

GEOLOGY

Section 3.3.2.5, In-Place Stabilization and Disposal Applied to Previously Disposed-of TRU-Contaminated Soil Sites, page 3.24, paragraph 1

This section states that a geophysical survey of the liquid waste sites with high subsidence potential will be completed to characterize them and to identify grout-injection points. Further discussion of the feasibility and adequacy of subsidence control should be provided in the Final EIS.

Section 4.0, Affected Environment, page 4.2, Figure 4.1

Figure 4.1 provides the general locations of the defense high-level and transuranic wastes. Figure 4.1 indicates that waste disposal occurred in the 200-W, 200-E, and 300 Areas and in the Wye Burial Ground. The DEIS should more precisely identify all waste locations at Hanford. It is further recommended that the Final EIS include additional information regarding the geohydrology, geochemistry, and geology (e.g., geomorphology, stratigraphy, and structure) of specific waste disposal areas to better characterize these sites. For example, the potential for contaminant migration in the vadose zone beneath a given disposal site cannot be reliably determined without an evaluation of actual, site-specific soil moisture characteristics and curves of pressure head versus hydraulic conductivity.

Section 4.3, Seismicity, page 4.10, paragraph 4

The existence of faulting and the possibility of fault reactivation in the waste disposal areas has not been adequately addressed. The general guideline in 10 CFR 61.50(a)(9) may be of use in discussing the potential and significance of faulting in these areas.

The referenced draft EA for Hanford (DOE, 1984) presented a generally favorable view of the tectonic setting and possible effects of tectonics on waste isolation. In the NRC's major comment #4 on the draft EA (NRC, 1985a), this view was considered to be inadequately supported by the data and analyses presented. The statements made by the NRC staff regarding the reference repository also apply to the waste disposal alternatives of this DEIS.

Section 4.3, Seismicity, page 4.10, paragraph 4

A series of sub-vertical clastic dikes has been observed (NRC, 1985b) in the trench walls at the U.S. Ecology Low-Level Waste Disposal Area, which is located in close proximity to the 200-E Area. The dikes cut across, but do not appear to offset the sand and silt strata in the trenches. They taper upward and extend from below the base of the trench to within 8 to 10 feet of the surface. They are approximately 2 to 3 feet wide at the base and several inches wide where they are truncated or pinch out near the ground surface. The dikes, which occur in other areas of the Hanford Reservation, may be related to fissuring caused by ground motion resulting from seismic activity. The

fissures were apparently filled by movement of water-saturated sediments under hydrostatic pressure, which are susceptible to liquefaction.

The presence of these clastic dikes may have significant implications for shallow land burial of low-level and high-level wastes. In the 500 to 10,000 year periods of isolation required for low-level and high-level wastes, respectively, there is a possibility that fissuring may again occur or that existing fissures may be reopened as a result of seismic activity. Existing fissures may also provide avenues for groundwater migration. The probability of occurrence as well as the significance of these fissures should be addressed. Additionally, the possible existence of these dikes within the waste disposal areas should be determined.

Section 4.7, Land Use, page 4.30

The DEIS does not address nor does it provide information on the potential for the existence of natural resources in the defense waste areas. 10 CFR 61.50 (4) requires that, for the near-surface disposal of low-level wastes, areas known to contain natural resources should be avoided. While the disposal of defense wastes is not subject to 10 CFR Part 61, the reasons for avoiding such areas remain valid. The Final EIS should provide an evaluation of natural resources, including hydrocarbon and mineral resource potential at the proposed site. This is particularly relevant in view of a natural gas discovery within sediments underlying the basalts in the Saddle Mountains area of the Hanford Reservation by Shell Oil Company (NRC, 1985a).

Appendix O, Section O.1, Stratigraphy Beneath The Hanford 200 Areas, pages O.2-O.5

The principal units that comprise the unconfined aquifer system at Hanford are discussed in Appendix O. Little information is provided on the topic of paleogeomorphology at Hanford. This topic may be of importance in developing a better understanding of flow and transport in the unconfined aquifer system.

Brown et al. (1962) provided geologic interpretations that accounted for the apparently rapid dispersal of tritium in the unconfined aquifer system at Hanford. They noted that the contaminants appear to be following old Columbia River channels incised into the eroded upper surface of the low-permeability Ringold Formation sediments. These channels are filled with more recent deposits (Hanford Formation) that have permeabilities approximately two orders of magnitude greater than in the underlying Ringold strata. It appears that the relative subcrop elevation of the Ringold Formation with respect to the water table thereby exerts considerable influence over groundwater flow paths. This may account for the observed branching (anomalous macrodispersion) of contaminant plumes migrating away from the 200 East Area. This information should be considered when interpreting the results of groundwater surveillance at Hanford and in the continued development of a groundwater monitoring program.

ENVIRONMENTAL

Several of the NRC's detailed environmental comments on the DOE's draft Environmental Assessment are applicable to the DEIS. The comment numbers are E-1, 3-30, 4-3, 4-5, 5-10, 5-11 and 6-38. These comments should be considered in preparing the Final EIS.

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Record Note:

Commission Letter releasing transmittal letter and staff comments on Hanford Defense Waste DEIS. This is final package (excluding Secy-86-266 letter 9/24) that was forwarded to DOE 9/24.

Attached is also concurrence copy of package that obviously was ~~not~~ forwarded to DOE.

* Fax'd DOE copy 10/7 to Kitty Rising