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April 24, 1995

9552169

Mr. G. H. Sanders, Acting Director
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Dear Mr. Sanders:

DOCUMENT TRANSMITTAL, WHC-SD-WM-ES-331, "IDENTIFICATION OF POTENTIAL
TRANSURANIC WASTE TANKS AT THE HANFORD SITE," MILESTONE T3C-95-127

Reference: Letter, L. Erickson, RL, to President, WHC, "RL Review of
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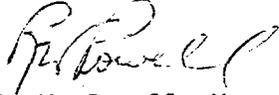
Transmittal of the attached document, WHC-SD-WM-ES-331, "Identification of
Potential Transuranic Waste Tanks at the Hanford Site," completes
Milestone T3C-95-127. A draft of this document has been reviewed by
Messrs. R. Carreon, D. D. Button, and D. D. Wodrich (U.S. Department of
Energy, Richland Operations Office) and the attached document reflects the
dispositioned comments. The document also includes a disclaimer of review
and acceptance by Waste Isolation Pilot Plant (WIPP), as recommended by
Mr. S. Schneider (U.S. Department of Energy-Headquarters).

Mr. G. H. Sanders
Page 2
April 24, 1995

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If you have any questions regarding this report, please direct them to Messrs. R. P. Colburn (509) 376-6148 of Tank Waste Remediation System Disposal Engineering or P. S. Schaus (509) 372-1149 of my staff.

Very truly yours,



R. W. Powell, Manager
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lap

Attachment

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AT THE HANFORD SITE

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7. Abstract

A group of 10 of the Hanford Site waste tanks, 3 double-shell tanks and 7 single-shell tanks, were identified for classification as potential transuranic (TRU) waste. These tanks represent an estimated 6,500 m³ of sludge material. The identification of these tanks was based on a conservative interpretation of the definitions for TRU and high-level waste (HLW) classifications and historical records of the tank wastes. A cost/benefit analysis will be required to evaluate the merits for disposal of this material as TRU waste in the Waste Isolation Pilot Plant as opposed to disposal in the HLW repository.

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ATTACHMENT 1

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IDENTIFICATION OF POTENTIAL TRANSURANIC WASTE TANKS
AT THE HANFORD SITE

Consisting of 49 pages

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EXECUTIVE SUMMARY

The wastes in some of the Hanford Site single-shell tanks (SST) and double-shell tanks (DST) have been identified as potential transuranic (TRU) wastes for segregation, vitrification, and disposal at the Waste Isolation Pilot Plant (WIPP) as a possible alternative to blending these TRU wastes with the high-level waste (HLW) for disposal in the HLW repository. The identified tanks include three DSTs: AW-103, AW-105 (neutralized cladding removal waste), and SY-102 (Plutonium Finishing Plant); and six SSTs: T-201 to T-204, T-110, and T-111 (BiPO_4 -2C, 224). The three DSTs contain about 75% ($2,900 \text{ m}^3$) of the projected volume of DST sludge material but less than 2% of the DST fission product inventory. Similarly, the seven SSTs contain about 8% ($3,600 \text{ m}^3$) of the SST sludge volume but less than 0.1% of the SST fission product inventory. The identification of these tank wastes as potential TRU material was based on a conservative interpretation of the definitions of the TRU and HLW classifications and the historical records of the waste tanks. The classification included consideration of previous U.S. Nuclear Regulatory Commission guidance for distinction between HLW and "incidental" non-HLW as applied to Hanford Site tank waste.

The ability of the WIPP program to accept this waste from a regulatory, institutional, economic, and technical viewpoint has not been evaluated.

A cost/benefit analysis will be required to evaluate the merits for disposal of this material as TRU waste in WIPP prior to any recommendation for action. This analysis should include consideration of the impacts of TRU waste segregation on waste processing operations, the additional amount of

total waste glass produced, comparative waste disposal costs at WIPP and the HLW repository, and the compatibility of this additional waste with WIPP operating strategy.

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IDENTIFICATION OF POTENTIAL TRANSURANIC WASTE TANKS AT THE HANFORD SITE

1.0 PURPOSE

The purpose of this document is to identify potential transuranic (TRU) material among the Hanford Site tank wastes for possible disposal at the Waste Isolation Pilot Plant (WIPP) as an alternative to disposal in the high-level waste (HLW) repository. Identification of such material is the initial task in a trade study suggested in WHC-EP-0786, *Tank Waste Remediation System Decisions and Risk Assessment* (Johnson 1994). The scope of this document is limited to the identification of those tanks that might be segregated from the HLW for disposal as TRU, and the bases for that selection. It is assumed that the tank waste will be washed to remove soluble inert material for disposal as low-level waste (LLW), and the washed residual solids will be vitrified for disposal. The actual recommendation of a disposal strategy for these materials will require a detailed cost/benefit analysis and is beyond the scope of this document.

2.0 BACKGROUND

The HLW disposal mission at the Hanford Site has committed to vitrification of the high-level defense waste currently stored in 177 underground storage tanks (UST). The USTs consist of 149 single-shell tanks (SST) and a set of 28 double-shell tanks (DST). The SSTs were built from 1943 to 1964 and removed from active service in 1980. The DSTs have been used to accumulate subsequently generated waste and pumpable supernate from the SSTs. The current physical form of the waste in these tanks is typically characterized in three categories: (1) sludge, consisting of insoluble oxide precipitates; (2) salt cake, consisting of soluble salts precipitated by evaporation; and (3) supernate liquid. The current reference plan is to retrieve the wastes from the tanks by sluicing and to chemically separate the waste into HLW and LLW fractions for disposal in a geologic repository or surface storage onsite, respectively (Ecology et al. 1994).

The classification and segregation of some portions of the Hanford Site tank wastes as TRU waste for vitrification and disposal at WIPP have been proposed as an alternative to blending these wastes with the other HLWs for disposal in the HLW repository. An evaluation of this alternative was designated as a trade study in WHC-EP-0786 (Johnson 1994).

A major element in the identification of potential TRU waste among the Hanford Site tank wastes is the requirement to ensure that the material is not subject to U.S. Nuclear Regulatory Commission (NRC) HLW licensing. The classification of a given tank waste as either TRU or HLW requires interpretation of the definitions of these waste classes as applied to each waste tank. This includes consideration of the waste source, projected composition of the wastes from historical records, and sampling of the tank

contents. The incentive for segregating a portion of the waste as TRU waste is the potential for reduced repository disposal costs. A trade study to evaluate the advantages and disadvantages of this option will be required before a recommendation for disposal can be made.

3.0 CLASSIFICATION DEFINITIONS

3.1 HLW

The basis for classification of a material as HLW by the NRC is contained in 10 CFR 50, Appendix F, which defines HLW as

"those aqueous wastes resulting from the operation of the first cycle solvent extraction system, or equivalent, in a facility for reprocessing irradiated reactor fuels."

Some indications of the NRC's interpretation of this definition were given in the advanced notice of proposed rule-making for the definition of "High-Level Radioactive Waste" by the NRC in 52 FR 5992. In these proceeding records, the NRC noted that the Appendix F definition for HLW is "in terms of the source of the material rather than its hazardous characteristics." The proposed rule-making record continued, "As used in Appendix F, 'high-level waste' thus refers to the highly concentrated (and hazardous) waste containing virtually all the fission product and transuranic elements (except plutonium) present in irradiated reactor fuel. The term does not include incidental wastes resulting from reprocessing operations such as ion exchange beds, sludges, and contaminated laboratory items, clothing, tools, and equipment. Neither are radioactive hulls and other contaminated fuel structural hardware within the Appendix F definition." The NRC also noted that the *Nuclear Waste Policy Act of 1982* defines the term "high-level radioactive waste" on the basis of two criteria: "(A) The highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly from reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and (B) Other highly radioactive material that the Commission, consistent with existing law, determines by rule requires permanent isolation."

The NRC considered numerically specifying the "sufficient concentrations" of fission products in the waste material to be used to identify those wastes from reprocessing that require disposal in a geologic repository. They proposed, for comment, a criteria to: "consider a material 'highly radioactive' if it contains concentrations of short-lived radionuclides in excess of the Class C limits of Table 2 of 10 CFR Part 61." The NRC has not adopted the proposed numerical specification for fission product concentrations in the definition of HLW, and the current definition remains source-based.

More recent guidance from the NRC on the classification of Hanford Site wastes was provided in a letter from R. M. Bernero (NRC) to A. J. Rizzo (U.S. Department of Energy [DOE]) (see Appendix A), and in a response to a petition for rule-making presented to the NRC by Oregon and Washington States

(55 FR 51732), which requested the NRC to revise the definition of HLW with respect to the Hanford Site tank wastes. Although the NRC denied the petition, its response provided additional guidance for the definition of HLW for classification of Hanford Site tank wastes primarily to distinguish HLW from "incidental" or LLW (55 FR 51732). The text of this response is shown in Appendix B of this document.

The classification of waste types by the DOE is described in DOE Order 5820.2A, *Radioactive Waste Management* (DOE 1988), which defines three classes of waste: HLW, TRU, and LLW. These class definitions are not explicitly, mutually exclusive.

The definition for HLW given in DOE Order 5820.2A is as follows.

High-Level Waste. The highly radioactive waste material that results from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid waste derived from the liquid, that contains a combination of transuranic waste and fission products in concentrations requiring permanent isolation."

Both the NRC and DOE definitions are primarily source-based, linking the waste classification to its history rather than to some characteristic property limits for the waste. A lower-bound property limit for HLW is implied in the DOE Order 5820.2A definition: "highly radioactive waste material...in concentrations requiring permanent isolation."

As noted above, the NRC rule-making record specifically recognizes incidental, non-HLW streams associated with reprocessing plants. These streams include cladding hulls, ion-exchange media, sludge, and miscellaneous trash generated during reprocessing operations. The question of waste classification at the Hanford Site was complicated by the mixing of wastes from various sources which made it difficult to distinguish between HLW and LLW using the source-based definition in Appendix F (10 CFR 50). The NRC suggested a basis for determining whether such wastes were incidental rather than HLW, which was related to the degree of separation of key radionuclides (strontium, cesium, and TRUs) from the residual non-HLW fraction. In response to a DOE-proposed separation, leaving only 3 to 5% of the original inventories of those radionuclides in the LLW fraction for near-surface disposal, the NRC concurred with "incidental waste" classification for this fraction of Hanford Site DST waste on the following bases: (1) the waste fraction has been processed to remove key radionuclides to the maximum extent that is technically and economically practical, (2) the waste fraction will be incorporated into a solid physical form that does not exceed the applicable concentration limits for Class C LLW as set forth in 10 CFR 61, and (3) the waste fraction be managed so that safety requirements comparable to the performance objectives in 10 CFR 61 are satisfied. The NRC specifically noted that the appropriate classification of single-shell wastes will require a case-by-case determination (55 FR 51732).

Although both the NRC and DOE definitions for HLW are source-based, a subtle difference between these definitions exists. For example, the NRC definition is in reference to "operation of the first cycle solvent extraction system, or equivalent" and the DOE Order 5820.2A definition, "The highly

radioactive waste material that results from the reprocessing of spent nuclear fuel," is in reference explicitly to the solvent extraction cycle in 10 CFR 50, Appendix F. The neutralized cladding removal waste (NCRW) in tanks AW-103 and AW-105 contains radioactive waste from the Plutonium-Uranium Extraction (Facility at Hanford Site) (PUREX) cladding removal, which was the initial operation associated with fuel reprocessing but not actually part of the first-cycle solvent extraction system.

For classification of a waste as TRU, clear distinction from HLW is necessary. For the purposes of this document the NRC definition for HLW, which precludes classification as TRU and governs disposal licensing considerations, was used for the selection of the potential TRU tanks.

3.2 TRU WASTE

The classification of waste as TRU is based on the definition in DOE Order 5820.2A, with no comparable classification by the NRC. This class is understood to apply only to materials not subject to NRC regulation, i.e., determined not to be HLW. The definition of TRU in the *Waste Isolation Pilot Plant Land Withdrawal Act* explicitly excludes HLW, but defines HLW only by reference to the definition in the *Nuclear Waste Policy Act of 1982*.

The definition for TRU given in DOE Order 5820.2A is as follows.

Transuranic Waste. Without regard to source or form, waste that is contaminated with alpha-emitting transuranium radionuclides with half-lives greater than 20 years and concentrations greater than 100 nCi/g at time of assay. Heads of Field Elements can determine that other alpha contaminated wastes, peculiar to a specific site, must be managed as transuranic waste.

This waste class is divided into two subclasses: remotely handled transuranic (RH-TRU) and contact-handled transuranic (CH-TRU). The definitions of these subclasses are as follows.

Remotely Handled Transuranic Waste. Packaged transuranic waste whose external surface dose rate exceeds 200 mrem per hour. Test specimens of fissionable material irradiated for research and development purposes only and not for the production of power or plutonium may be classified as remote-handled transuranic waste.

Contact-Handled Transuranic Waste. Packaged transuranic waste whose external dose rate does not exceed 200 mrem per hour.

Although the TRU definition is explicitly source independent, specified source limits are placed on the subclass RH-TRU. The distinction of TRU waste from HLW, like the distinction of HLW from LLW, involves consideration of both the waste source and the extent of fission product separation.

The acceptance requirements for RH-TRU, specified in WIPP/DOE-069, *Waste Acceptance Criteria for the Waste Isolation Pilot Plant* (WIPP 1991), include a limit on radionuclide activity concentration not to exceed 23 Ci/L and a surface dose rate less than 1,000 rem/h, which corresponds to the limits set

forth in the *Waste Isolation Pilot Plant Land Withdrawal Act*. If these limits, by themselves, were an indication of the bases for distinguishing TRU from HLW, then a potentially large fraction of the Hanford Site tank waste might be considered TRU. However, when the source-based definition of HLW is also considered, the waste material designated exclusively as TRU is much more limited. The designation of a given tank waste as TRU must include consideration of both the history of the tank waste as well as the actual composition of the partitioned waste.

The classification of a given tank waste as either HLW or TRU waste is closely related to the definitions of these classifications and requires their interpretation with respect to the waste tank history and contents. The current NRC guidance for determining a non-HLW fraction in the tank waste was used as a basis for this interpretation.

Beyond the mere classification of a given waste as TRU, the feasibility of segregating any potential TRU tank waste will also require an evaluation of its impact on the process treatments, including retrieval, pretreatment, and vitrification operations, and the additional amounts of waste glass product resulting from the more limited waste blending options. A cost benefit analysis for this option will be needed before a disposal strategy can be recommended.

4.0 DESCRIPTION OF HANFORD SITE TANK WASTES

The Hanford Site tank wastes resulted largely from the reprocessing of irradiated fuel from the plutonium production reactors and subsequent treatments of the process streams. The reprocessing operation evolved through three general processes: (1) bismuth phosphate (BiPO_4) process (1944 to 1956), (2) reduction oxidation (REDOX) process (1952 to 1966), and (3) PUREX (1956 to 1972, 1983-88). Many of the initial wastes were reworked to recover by-products, such as uranium recovery from the metal waste, associated with the BiPO_4 process (1952-57) and removal of the cesium-137 (^{137}Cs) and strontium-90 (^{90}Sr) from waste for encapsulation (1965 to 1976). Each of these major processes had a number of associated operations including fuel decladding, ferrocyanide scavenging, fission product recovery, and several other minor operations. To conserve waste tank space, some wastes were concentrated by evaporation either in-tank or in external evaporators (242-T evaporator or 242-S evaporator/crystallizer) with condensates routed to cribs and trenches and the evaporator bottoms returned to the tanks. These processes gradually converted the waste into the mixed sludge and salt cake.

The inter-tank transfers, evaporation, chemical alterations, and ongoing in-tank chemical processes have changed the nature of the waste; the current compositions of the tank wastes are not well known. Several attempts have been made to predict the tank contents based on historical tank transfer records, flowsheets for standard waste processes, and the measured waste volumes in the tanks. An early estimate of the compositions of Hanford Site tank wastes provided by G. K. Allen in ARH-CD-610 B, *Estimated Inventory of Chemicals Added to Underground Waste Tanks, 1944 Through 1975* (Allen 1976) were based on estimates of total chemicals used in each of several standard

waste processes. An improved estimate of the waste tank compositions by J. D. Anderson in WHC-MR-0132, *A History of the 200 Area Tank Farms* (Anderson 1990) used quarterly summaries of tank levels and defined additional waste types. Jungfleisch (1984) used an elaborate tank fill history program known as track radionuclide components (TRAC) based on fuel element tonnages for each process, compositions for each process waste stream, and the fill histories for each waste tank. Further improvements in the quantitative estimates of the tank contents are being developed by S. F. Agnew (1994).

A program (Sort on Radioactive Waste Type [SORWT]) was recently developed to qualitatively classify the SSTs into groups expected to contain wastes with similar physical characteristics and chemical compositions (Hill and Simpson 1994). This model did not attempt to predict the actual composition in a given tank but instead concentrated on tracking different waste types in each waste tank based on historical records. Then tank groups were designated based on a qualitative judgment about tanks expected to have similar contents. The model used the tank history information from Anderson (1990) and Hanlon (1994). The grouping method only qualitatively sorted the tanks on the basis of similar overall waste types. A list of various waste streams used for this sort and their acronyms are given in Table 1. Each tank's contents were characterized by primary and secondary solid forming waste types. The waste volumes contained in each tank were estimated in terms of salt cake, sludge, supernate, and total volume based on data from Hanlon (1994). The program output defined 30 groups, which, together with the primary waste types and volumes of salt cake and sludge, are summarized in Table 2. The individual tanks included in these groups, their major waste types, and individual tank waste volumes are listed in Table 3.

Of the waste types listed in Table 1, the BiPO_4 second-cycle decontamination waste (2C) and the lanthanum fluoride decontamination waste (224) may be considered sufficiently far removed from the first-cycle reprocessing to be potential non-HLW. Anderson (1990) estimated that the BiPO_4 first-cycle decontamination (1C) waste contained 10% of the fission products while the 2C waste contained only 0.1% of the fission products. The 224 waste associated with decontamination of the plutonium product, performed downstream from 2C, was estimated to contain about 0.001% of the initial fission product activity (Anderson 1990).

Inspection of Table 3 indicates three tank groups (V, XIV, and XX) nominally containing 2C, 224, or cladding waste (CW) may be considered as potential non-HLW based on the SORWT qualitative assessment. However, closer inspection of the transfer records in Anderson (1990) shows the B-201 to B-204 tanks in Group V received high-level metal waste during their first year of operation prior to receiving the 224 waste. The remaining Group V tanks, T-201 to T-204, received only 224 waste. Similarly, transfer records for the Group XX tanks, nominally containing CW, indicate they received high-level REDOX waste during their first year of operation. The T-112 tank from Group XIV had miscellaneous waste additions besides 2C and 224 waste but none specifically identified as HLW. Based on this conservative source-based criteria, the four tanks from Group V, T-201 to T-204, and three tanks from Group XIV, T-110 to T-112, which contain essentially waste related only to later stages of cleaning the plutonium product from the BiPO_4 process, may be considered potential TRU waste. These seven SSTs, selected as potential TRU waste, contain about 9% of the total SST sludge material.

Table 1. List of Waste Types and Abbreviations.

Waste acronym	Meaning of acronym
R	High-level REDOX waste
EB	Evaporator bottoms
TBP	Tributyl phosphate waste
1C	First-cycle decontamination waste
2C	Second-cycle decontamination waste
224	Lanthanum fluoride decontamination waste
CW	Cladding waste
HS	Hot semiworks waste
SRS	Strontium-leached sludge
5-6	High-level B Plant waste
ITS	In-tank solidification
RIX	REDOX ion-exchange waste
DIA	Diatomaceous earth
DSSF	Double-shell slurry feed
CCPLX	Complex concentrate
F	Ferrocyanide-scavenged waste
NCPLX	Noncomplexed waste
SR-WASH	Particulates from strontium wash of PUREX wastes in the AR-vault
MIX	Mixture of several miscellaneous wastes
IX	Ion exchange waste
UK	Unknown waste type
OWW	Organic wash waste

PUREX = Plutonium-Uranium Extraction (Facility at Hanford Site)
REDOX = Reduction oxidation

Table 2. Summary of Single-Shell Tank Groups from Sort on Radioactive Waste Type.

Group number	Primary and secondary waste group type		Number of tanks in group	Volume salt cake all tanks (%)	Volume sludge all tanks (%)	Total volume all tanks (%)
I.	R	EB	22	38	11	28
II.	EB	1C	10	20	0	13
III.	TBP-F	EB-ITS	10	14	5	11
IV.	TBP	CW	9	0	5	2
V.	224	--	8	0	2	1
VI.	R	--	7	0	7	2
VII.	EB	R	5	8	1	6
VIII.	TBP-F	1C	5	0	4	1
IX.	DSSF	NCPLX	4	7	3	6
X.	EB	CW	4	6	1	5
XI.	1C	TBP	4	0	6	2
XII.	1C	EB	4	0	4	2
XIII.	HS	--	4	0	0	0
XIV.	2C	224	3	0	7	2
XV.	2C	5-6	3	0	4	1
XVI.	R	RIX	3	0	3	1
XVII.	1C	CW	3	0	2	1
XVIII.	CW	EB	3	0	2	1
XIX.	CW	MIX	3	0	1	1
XX.	CW	--	3	0	0	0
XXI.	TBP	EB-ITS	2	3	1	2
XXII.	EB	TBP	2	2	0	1
XXIII.	SRS	SLUICE	2	0	3	1
XXIV.	1C	EB-ITS	2	1	2	1
XXV.	TBP	--	2	0	2	1
XXVI.	TBP	EB	2	0	2	1
XXVII.	TBP	1C-F	2	0	2	1
XXVIII.	CCPLX	DSSF	2	0	0	0
XXIX.	R	DIA	2	0	1	0
Total			135	100	81	93
XXX.	Ungrouped tanks		14	0	19	7

Table 3. Sort on Radioactive Waste Type Model Results. (sheet 1 of 10)

Group no.	Tank name	Primary waste type	Secondary waste type	Tertiary waste type	Other waste types	Volume of salt cake (kgal)	Volume of sludge (kgal)	Total waste volume (kgal)	
I.		R	EB	22 tanks					
	Gas-generating subgroup								
		SX-101	R	EB	RIX	--	343	112	456
		SX-105	R	EB	RIX	HLO	610	73	683
		S-111	R	EB	--	--	447	139	596
		S-112	R	EB	--	--	631	6	637
		SX-104	R	EB	RIX	--	478	136	614
		SX-103	R	EB	CW	OWW	523	112	667
		SX-102	R	EB	RIX	--	426	117	543
	Organic tank subgroup								
		TX-105	R	EB	MIX	--	609	0	609
		SX-106	R	EB	RIX	HLO-MX	465	12	538
		S-102	R	EB	DSSF	--	545	4	549
	Non-Public Law 101-510* subgroup								
		S-110	R	EB	MIX	--	561	131	692
		S-108	R	EB	--	--	600	4	604
		S-107	R	EB	CW	IX-MIX	69	293	368
		S-106	R	EB	--	--	511	32	543
		S-105	R	EB	--	--	454	2	456
		S-103	R	EB	DSSF	--	221	10	248
	S-101	R	EB	IX	MIX	171	244	427	
	S-109	R	EB	--	--	555	13	568	
	TX-106	R	EB	MIX	--	453	0	453	
	TX-104	R	EB	MIX	--	64	0	65	
	TX-107	R	EB	--	--	35	0	36	
	TX-102	R	EB	MIX	--	113	0	113	
Group subtotal						8,884	1,440	10,465	

Table 3. Sort on Radioactive Waste Type Model Results. (sheet 2 of 10)

Group no.	Tank name	Primary waste type	Secondary waste type	Tertiary waste type	Other waste types	Volume of salt cake (kgal)	Volume of sludge (kgal)	Total waste volume (kgal)
II.		EB	IC	10 tanks				
		EB	IC	--		626	0	626
		EB	IC	--		631	0	631
		EB	IC	MIX		64	0	64
		EB	IC	--		607	0	607
		EB	IC	--		266	40	306
		EB	IC	--		649	0	649
		EB	IC	TBP		370	0	370
		EB	IC	--		535	0	535
		EB	IC	TBP		462	0	462
		EB	IC	TBP		384	0	384
	Group subtotal				4,594	40	4,634	
III.		TBP-F	EB-ITS	10 tanks				
		TBP-F	EB-ITS	CW	--	459	44	503
		TBP-F	EB-ITS	CW	IX	366	40	406
		TBP-F	EB-ITS	P	CW-OWW	395	5	400
		TBP-F	EB-ITS	CW	--	547	95	642
		TBP-F	EB-ITS	IC	CW	74	154	228
		TBP-F	EB-ITS	IC	CW	295	103	398
		TBP-F	EB-ITS	CW	IC	278	109	387
		TBP-F	EB-ITS	CW	--	206	60	266
		TBP-F	EB-ITS	CW	--	286	5	291
		TBP-F	EB-ITS	OWW	CW	438	21	459
	Group subtotal				3,344	636	3,980	

Table 3. Sort on Radioactive Waste Type Model Results. (sheet 3 of 10)

Group no.	Tank name	Primary waste type	Secondary waste type	Tertiary waste type	Other waste types	Volume of salt cake (kgal)	Volume of sludge (kgal)	Total waste volume (kgal)	
IV.		TBP	CW	9 tanks					
	Non-Public Law 101-510 subgroup								
		BX-102	TBP	CW	BL	DIA	0	96	96
		BX-106	TBP	CW	EB-IX	BL	0	31	46
		BX-101	TBP	CW	BL	IX	0	42	43
		BX-104	TBP	CW	IX	R	0	96	99
		C-101	TBP	CW	P	OWW	0	88	88
		BX-103	TBP	CW	OWW	MIX	0	62	66
		BX-105	TBP	CW	IX	EB	3	43	51
		BX-109	TBP	CW	IC	IX	0	193	193
		BX-108	TBP	CW	IC	IX	0	5	5
	Group subtotal					3	656	687	
V.		224		8 tanks					
		T-201				0	28	29	
		T-203				0	35	35	
		T-202				0	21	21	
		B-201				0	28	28	
		B-202				0	28	28	
		B-203				0	50	51	
		B-204				0	49	50	
		T-204				0	38	38	
		Group subtotal					0	277	280

Table 3. Sort on Radioactive Waste Type Model Results. (sheet 4 of 10)

Group no.	Tank name	Primary waste type	Secondary waste type	Tertiary waste type	Other waste types	Volume of salt cake (kgal)	Volume of sludge (kgal)	Total waste volume (kgal)	
VI.		R		7 tanks					
	High heat subgroup								
		SX-112	R			0	92	92	
		SX-108	R			0	115	115	
		SX-107	R			0	104	104	
		Gas-generating subgroup							
		SX-109	R			0	250	250	
	Non-Public Law 101-510 subgroup								
		SX-115	R			0	12	12	
		U-101	R			0	22	25	
	S-104	R			0	293	294		
	Group subtotal								
		EB	R	5 tanks		0	888	892	
VII.	Gas-generating subgroup								
		U-103	EB	R	MIX	423	32	468	
	Organic tank subgroup								
		U-106	EB	R	BL	PL	185	26	226
		U-111	EB	R	1C	--	303	26	329
	Non-Public Law 101-510 subgroup								
		U-102	EB	R	--	--	313	43	374
		TX-115	EB	R	CW	DW	640	0	640
		Group subtotal							
							1,864	127	2,037

Table 3. Sort on Radioactive Waste Type Model Results. (sheet 5 of 10)

Group no.	Tank name	Primary waste type	Secondary waste type	Tertiary waste type	Other waste types	Volume of salt cake (kgal)	Volume of sludge (kgal)	Total waste volume (kgal)
VIII.		TBP-F	IC	5 tanks				
	C-111	TBP-F	IC	CW	HS	0	57	57
	C-112	TBP-F	IC	CW	IX	0	109	109
	T-107	TBP-F	IC	CW	IX	0	171	180
	C-109	TBP-F	IC	CW	IX	0	62	66
	C-108	TBP-F	IC	CW	OWW	0	66	66
	Group subtotal					0	465	478
IX.		DSSF	NCPLX	4 tanks				
	A-101	DSSF	NCPLX	EVAP		950	3	953
	AX-101	DSSF	NCPLX	EVAP		745	3	748
	A-103	DSSF	NCPLX	EVAP		0	366	371
	A-102	DSSF	NCPLX	EVAP		22	15	41
	Group subtotal					1,717	387	2,113
X.		EB	CW	4 tanks				
	U-105	EB	CW	R		349	32	418
	U-108	EB	CW	MIX		415	29	468
	U-109	EB	CW	R		396	48	463
	U-107	EB	CW	MIX		360	15	406
	Group subtotal					1,520	124	1,755
XI.		IC	TBP	4 tanks				
	C-110	IC	TBP	OWW	EB-IX	0	196	201
	BX-107	IC	TBP	CW	IX	0	348	348
	T-108	IC	TBP	EB	HLO	0	44	44
	B-106	IC	TBP	HLO	MIX	0	116	117
	Group subtotal					0	704	710

Table 3. Sort on Radioactive Waste Type Model Results. (sheet 6 of 10)

Group no.	Tank name	Primary waste type	Secondary waste type	Tertiary waste type	Other waste types	Volume of salt cake (kgal)	Volume of sludge (kgal)	Total waste volume (kgal)	
XII.		1C	EB	4 tanks					
	B-108	1C	EB	CW	IX-TBP	0	94	94	
	B-107	1C	EB	CW	TBP	0	164	165	
	B-109	1C	EB	CW	IX	0	127	127	
	BX-112	1C	EB	CW	IX	0	167	167	
	Group subtotal					0	552	553	
XIII.		HS		4 tanks					
	C-204	HS				0	3	3	
	C-202	HS				0	1	1	
	C-201	HS				0	2	2	
	C-203	HS				0	5	5	
	Group subtotal					0	11	11	
XIV.		2C	224	3 tanks					
	T-110	2C	224	--	--	0	376	379	
	T-112	2C	224	DW	MIX	0	60	67	
		Organic tank subgroup							
	T-111	2C	224			0	456	458	
	Group subtotal					0	892	904	
XV.		2C	5-6	3 tanks					
	B-112	2C	5-6	FP	EB-ITS	0	30	33	
	B-110	2C	5-6	FP	IX	0	245	246	
	B-111	2C	5-6	FP	IX	0	236	237	
		Group subtotal					0	511	516

Table 3. Sort on Radioactive Waste Type Model Results. (sheet 7 of 10)

Group no.	Tank name	Primary waste type	Secondary waste type	Tertiary waste type	Other waste types	Volume of salt cake (kgal)	Volume of sludge (kgal)	Total waste volume (kgal)
XVI.		R	RIX	3 tanks				
	SX-110	R	RIX	MIX		0	62	62
	SX-111	R	RIX	--		0	125	125
	SX-114	R	RIX	EB		0	181	181
	Group subtotal					0	368	368
XVII.		1C	CW	3 tanks				
	U-110	1C	CW	R	LW	0	186	186
	T-105	1C	CW	2C	BL-IX	0	98	98
	T-106	1C	CW	2C	MIX	0	19	21
	Group subtotal					0	303	305
XVIII.		CW	EB	3 tanks				
	B-102	CW	EB	BL	IX	10	18	32
	B-101	CW	EB	BL	--	0	113	113
	B-103	CW	EB	IX	MIX	0	59	59
	Group subtotal					10	190	204
XIX.		CW	MIX	3 tanks				
	T-101	CW	MIX	TBP-F	EVAP	0	103	133
	T-103	CW	MIX	--	--	0	23	27
	T-102	CW	MIX	IX	--	0	19	32
	Group subtotal					0	145	192

Table 3. Sort on Radioactive Waste Type Model Results. (sheet 8 of 10)

Group no.	Tank name	Primary waste type	Secondary waste type	Tertiary waste type	Other waste types	Volume of salt cake (kgal)	Volume of sludge (kgal)	Total waste volume (kgal)
XX.		CW		3 tanks				
	U-201	CW				0	4	5
	U-203	CW				0	2	3
	U-202	CW				0	4	5
	Group subtotal					0	10	13
XXI.		TBP	EB-ITS	2 tanks				
	BY-102	TBP	EB-ITS	CW	IC	417	0	432
	BY-109	TBP	EB-ITS	CW	MW	354	87	475
	Group subtotal					771	87	907
XXII.		EB	TBP	2 tanks				
	TX-118	EB	TBP	CW	IC	347	0	347
	TX-108	EB	TBP	R	--	134	0	134
	Group subtotal					481	0	481
XXIII.		SRS	SLUICE	2 tanks				
	C-106	SRS	SR-WASH	P	TBP	0	197	229
	C-103	SRS	SR-WASH	P	TBP-CW	0	175	200
	Group subtotal					0	372	429
XXIV.		IC	EB-ITS	2 tanks				
	BX-111	IC	EB-ITS	CW	IX	143	68	230
	BX-110	IC	EB-ITS	CW	IX	9	189	199
	Group subtotal					152	257	429

Table 3. Sort on Radioactive Waste Type Model Results. (sheet 9 of 10)

Group no.	Tank name	Primary waste type	Secondary waste type	Tertiary waste type	Other waste types	Volume of salt cake (kgal)	Volume of sludge (kgal)	Total waste volume (kgal)
XXV.		TBP		2 tanks				
	TY-106	TBP				0	17	17
	TY-105	TBP				0	231	231
	Group subtotal					0	248	248
XXVI.		TBP	EB	2 tanks				
	T-109	TBP	EB	MIX		0	58	58
	TX-103	TBP	EB	--		0	157	157
	Group subtotal					0	215	215
XXVII.		TBP	IC-F	2 tanks				
	TY-104	TBP	IC-F	DW	MIX-R	0	43	46
	TY-103	TBP	IC-F	CW	R-MIX	0	162	162
	Group subtotal					0	205	208
XXVIII.		CCPLX	DSSF	2 tanks				
	AX-103	CCPLX	DSSF	EVAP		11	2	112
	AX-102	CCPLX	DSSF	EVAP		29	7	39
	Group subtotal					40	9	151
XXIX.		R	DIA	2 tanks				
	U-104	R	DIA			0	122	122
	SX-113	R	DIA			0	26	26
	Group subtotal					0	148	148

Table 3. Sort on Radioactive Waste Type Model Results. (sheet 10 of 10)

Group no.	Tank name	Primary waste type	Secondary waste type	Tertiary waste type	Other waste types	Volume of salt cake (kgal)	Volume of sludge (kgal)	Total waste volume (kgal)
XXX.	Solitary tanks (ungrouped) 14 tanks							
	T-104	IC	--	--	--	0	442	445
	C-107	IC	SRS	CW	IX	0	337	337
	TY-101	IC-F	EB	TBP	R	0	118	118
	B-104	2C	EB	TBP	IC	69	301	371
	A-106	CCPLX	NCPLX	EVAP	B	0	125	125
	C-104	CW	OWW	SR-WASH	--	0	295	295
	C-102	CW	TBP	OWW	--	0	424	427
	AX-104	EVAP	NCPLX	P	--	0	7	7
	A-105	P	IX	--	--	0	19	19
	A-104	SLUICE	P	H2O	B	0	28	28
	U-204	R	2C	CW	--	0	2	3
	TX-101	R	MIX	MIX	--	0	84	87
	C-105	TBP	SR-WASH	CW	P	0	150	150
U-112	UK	--	--	--	0	45	49	
	Ungrouped subtotal				69	2,377	2,461	
	Grand total				23,449	12,644	36,744	

*"Safety Measures for Waste Tanks at Hanford Nuclear Reservation," Section 3137 of National Defense Authorization Act for Fiscal Year 1991, Public Law 101-510, November 5, 1990.

Analyses of core samples taken from tank T-111 show very low levels of fission product activity associated with the 2C and 224 waste solids (Simpson 1994). The dominant fission products were ^{90}Sr at $5.4 \mu\text{Ci/g}$ and ^{137}Cs at $0.166 \mu\text{Ci/g}$. The alpha activity in this waste was about $0.3 \mu\text{Ci/g}$, also above the TRU lower limit.

Core samples from tank B-201 indicated extremely low fission product activity associated with the waste solids (Heasler et al. 1994). The dominant fission products were ^{90}Sr at $2.09 \mu\text{Ci/g}$ and ^{137}Cs at $0.8 \mu\text{Ci/g}$. The alpha activity was greater than $1 \mu\text{Ci/g}$, well above the $0.1 \mu\text{Ci/g}$ TRU lower limit, precluding its disposal as LLW. However, the indication of HLW addition to the B-201 to B-204 tanks in the transfer records prevents their designation as potential TRU using the conservative source-based definition of HLW.

4.1 DSTs

Historically, the DST wastes have been grouped into five categories: double-shell slurry feed (DSSF), neutralized current acid waste (NCAW), complexant concentrate (CC), NCRW, and Plutonium Finishing Plant (PFP) waste. The estimated waste inventories for these DST groups (Lambert 1994) are based on tank samples (see Table 4). The DSSF waste, essentially all supernate, has been identified for disposal as LLW after removal of ^{137}Cs by ion exchange. The NCAW contains primary PUREX waste and is clearly HLW material. The CC waste, although cooler than the NCAW material, still contains a significant fraction of the initial fission product activity and is considered HLW material. The NCRW, accumulated in tanks AW-103 and AW-105, has historically been identified as potential TRU waste based on the nominal source history of this material being part of the cladding removal rather than the aqueous raffinate from the first-cycle reprocessing. The PFP waste accumulated in tank SY-102, associated with plutonium product purification, may also be considered a potential TRU waste.

Although the nominal source of tank AW-105 waste was cladding removal waste, a relatively small (30-cm) heel of material was present in the tank as a result of miscellaneous PUREX waste received before 1984. There is no clear basis to indicate that the heel contained HLW material. A Westinghouse Hanford Company internal memo characterized this heel material as a mixture of lab and catch tank wastes, sump and flush solutions, and periodic process chemical flushes. Similarly, tank SY-102, containing nominal PFP waste, also was used for cross-site transfers of other waste primarily liquids from the SST salt well program and decontamination solutions from T Plant. The estimated fission product inventories, which are based on core samples from these tanks including the waste heels, do not indicate significant fission product concentrations (or inventories) relative to the other DST sludges (Lambert 1994) as shown in Table 4. The Table 4 estimates indicate that these potential TRU waste feeds for vitrification represent more than 70 wt% of the solid DST material but less than 2% fission product inventory.

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Table 4. Double-Shell Tank Inventories.

Input chemical	NCAW		DSS/DSSF	NCRW		PPF		CC		Total (kg)*
	Solid (kg)	Liquid (kg)	Liquid (kg)	Solid (kg)	Liquid (kg)	Solid (kg)	Liquid (kg)	Solid (kg)	Liquid (kg)	
Ag+	3.22E+02	2.93E+01	--	--	--	8.98E+01	--	--	--	4.41E+02
Al+3	3.67E+04	3.07E+04	1.54E+06	1.53E+04	5.86E+02	1.69E+04	1.69E+02	2.78E+04	5.28E+05	2.20E+06
As+5	3.48E+02	1.82E+02	--	--	--	3.12E+02	--	--	--	8.41E+02
B+3	2.38E+02	8.13E+01	1.29E+01	1.40E+03	1.25E+00	9.00E+01	--	3.69E+01	7.00E+02	2.56E+03
Ba+2	3.80E+02	9.82E+00	2.98E+02	5.33E+02	4.95E-02	--	--	5.40E+01	4.86E+02	1.76E+03
Be+2	9.23E+00	7.17E-01	--	--	--	--	--	--	--	9.95E+00
Ca+2	1.62E+03	4.21E+01	3.34E+03	1.43E+03	2.90E+01	2.50E+03	--	7.71E+02	6.94E+03	1.67E+04
Cd+2	6.07E+03	1.80E+01	2.79E+02	--	--	3.74E+02	--	--	--	6.74E+03
Co+3	7.81E+02	3.28E+01	1.09E-03	7.93E-04	7.02E-07	7.37E-05	--	--	--	8.14E+02
Cr+3	1.28E+03	4.97E+03	2.30E+04	4.10E+03	9.33E+01	9.31E+03	--	1.28E+03	2.43E+04	6.83E+04
Cu+2	2.33E+02	1.04E+01	2.09E+02	--	--	5.29E+02	--	--	--	9.82E+02
Fe+3	5.94E+04	8.53E+01	1.13E+03	2.89E+03	2.25E+00	9.30E+03	--	1.44E+03	2.74E+04	1.02E+05
Hg+2	--	--	2.80E+02	--	--	--	--	--	--	2.80E+02
K+	2.88E+03	1.92E+04	1.31E+06	5.13E+04	1.93E+04	1.30E+03	3.42E+02	3.13E+02	3.10E+04	1.43E+06
Mg+2	4.63E+02	1.12E+01	5.23E+02	4.11E+02	1.20E+00	7.08E+02	--	3.28E+02	2.95E+03	5.40E+03
Mo+6	7.16E+01	4.59E+02	2.77E+03	3.60E+01	4.32E-02	3.99E+01	--	2.52E+02	4.79E+03	8.42E+03
Na+	5.78E+04	5.31E+05	1.13E+07	4.43E+05	1.18E+04	5.74E+04	2.44E+03	4.51E+04	4.46E+06	1.69E+07
Ni+3	3.43E+03	1.39E+01	5.61E+02	4.16E+02	3.58E-01	2.44E+02	--	2.95E+02	5.60E+03	1.06E+04
Pb+4	4.83E+02	3.42E+01	2.65E+03	--	--	5.18E+02	--	--	--	3.68E+03
Rare earths +3	4.55E+03	6.09E+01	5.16E-01	2.00E+03	5.03E-02	5.82E+02	--	4.43E+02	3.99E+03	1.16E+04
Rh+3	7.53E+01	1.07E+01	1.28E+00	1.41E+02	1.50E-01	2.14E+02	--	--	--	4.43E+02
Ru+3	2.66E+02	2.43E+01	6.17E-01	5.22E+01	3.30E-02	2.10E+02	--	--	--	5.54E+02
Si+4	3.19E+03	2.14E+03	8.12E+03	1.46E+04	1.07E+02	9.36E+02	1.40E+01	3.09E+04	--	5.99E+04
Th+4	5.16E+02	1.98E+01	--	--	--	2.90E+02	--	--	--	8.26E+02
Ti+4	2.21E+02	4.59E+00	1.46E+00	1.60E+02	1.49E-01	5.98E+01	--	--	--	4.47E+02
UO ₂ +2	3.41E+03	5.28E+03	7.88E+03	2.65E+04	3.49E+00	1.12E+03	--	3.20E+00	6.08E+01	4.43E+04
Zn+2	1.63E+02	4.33E+01	8.38E+02	6.38E+01	1.25E-01	1.91E+02	--	1.05E+02	9.42E+02	2.35E+03
Cl-	9.77E+01	7.41E+02	3.29E+05	2.50E+03	2.21E+03	2.21E+03	8.86E+01	1.10E+02	1.10E+05	4.46E+05
CO ₂ -2	7.57E+03	3.44E+04	2.85E+05	2.07E+04	1.05E+03	1.50E+04	3.75E+02	7.57E+02	7.56E+05	1.12E+06
F-	1.42E+03	7.64E+03	9.47E+04	2.29E+05	7.46E+03	2.37E+03	9.49E+01	3.89E+01	3.88E+04	3.81E+05
Fe(CN) ₆ -3	--	--	1.36E+03	--	--	--	--	--	--	1.36E+03
NO ₂ -	1.63E+04	1.27E+05	4.77E+06	3.70E+04	--	1.53E+04	2.87E+02	8.27E+02	8.27E+05	5.80E+06
NO ₃ -	1.81E+04	3.76E+05	9.26E+06	1.02E+05	3.66E+04	7.75E+04	3.10E+03	4.15E+03	4.14E+06	1.40E+07
OH-	1.68E+05	2.34E+05	7.14E+06	1.74E+05	--	4.93E+04	9.45E+02	1.64E+05	2.33E+06	1.03E+07
PO ₄ -3	4.50E+03	4.54E+04	3.55E+04	--	--	2.37E+04	5.93E+01	1.08E+02	1.08E+05	2.18E+05
SO ₄ -2	1.00E+04	1.04E+05	1.27E+05	2.37E+03	6.62E+02	4.00E+03	9.60E+01	1.32E+02	1.32E+05	3.79E+05
Organic carbon	4.39E+03	8.24E+03	1.52E+05	--	--	--	--	9.00E+03	4.41E+05	6.14E+05
H ₂ O	--	6.54E+06	4.41E+07	--	2.00E+06	--	4.84E+05	--	1.26E+07	6.58E+07
MnO ₂	2.77E+03	8.67E+00	7.95E+02	1.61E+03	--	5.43E+03	--	5.83E+02	1.11E+04	2.23E+04
ZrO ₂ ·2H ₂ O	2.76E+04	6.39E+01	--	5.16E+05	--	2.65E+02	--	1.83E+02	1.65E+03	5.46E+05
Total, kg	4.51E+05	8.07E+06	8.06E+07	1.65E+06	2.08E+06	3.01E+05	4.92E+05	2.89E+05	2.66E+07	1.21E+08

Input radionuclides**	Solid (Ci)	Liquid (Ci)	Total (Ci)	Solid (Ci)	Liquid (Ci)	Solid (Ci)	Liquid (Ci)	Total (Ci)	Total (Ci)
C-14	--	3.50E+02	1.00E+03	--	--	--	--	1.00E+03	2.35E+03
Cs, Ba-137	--	2.52E+07	2.58E+07	7.66E+05	4.80E+03	3.72E+05	--	1.42E+07	6.63E+07
I-129	--	5.00E+00	1.50E+01	--	--	--	--	7.00E+00	2.70E+01
Sr, Y-90	2.16E+07	--	6.12E+04	1.40E+05	--	1.76E+05	--	3.78E+06	2.58E+07
Tc-99	2.20E+03	2.20E+03	9.30E+03	--	--	2.85E+02	--	1.00E+04	2.40E+04
Am-241	6.00E+04	--	9.00E+02	6.80E+02	--	2.40E+04	--	1.30E+04	9.86E+04
Pu-239, 240	8.70E+02	--	1.10E+03	2.30E+03	--	1.50E+04	--	3.90E+03	2.32E+04
Total Ci	2.17E+07	2.52E+07	2.59E+07	9.09E+05	4.80E+03	5.87E+05	--	1.80E+07	9.22E+07

	Sludge	Supernate	Supernate	Sludge	Supernate	Sludge	Supernate	Sludge	Supernate	Total
Volume, gal****	1.51E+05	1.78E+06	1.30E+07	6.60E+05	6.60E+04	1.10E+05	3.30E+04	9.12E+04	4.76E+06	2.05E+07
Volume, m ³ ****	5.72E+02	6.74E+03	4.92E+04	2.50E+03	2.50E+02	4.16E+02	1.25E+02	3.45E+02	1.80E+04	7.76E+04

Waste Density, kg/L	NCAW	DSS/DSSF	NCRW	PPF	CC	Overall
	1.17	1.64	1.36	1.46	1.46	1.55

*Totals may be higher because analytical data are not available for some elements.

**Radionuclides decayed to 1991 to be consistent with the integrated database; daughters are included for cesium-137 and strontium-90.

***NCRW and PPF radionuclide data are based on unwashed sludge core sample analysis.

****Sludge volume numbers include drainable and nondrainable interstitial liquid (the solids were calculated on a dry basis).

CC = Complexant concentrate
DSS/DSSF = Double-shell slurry/double-shell slurry feed
NCAW = Neutralized current acid waste
NCRW = Neutralized cladding removal waste
PPF = Plutonium Finishing Plant

4.2 WASTE PROCESSING CONSIDERATIONS

The planned application of sludge washing to these potential TRU wastes to separate inert salts as an LLW fraction may also be expected to remove a significant fraction of the ^{137}Cs activity from the washed solids. This additional fission product removal could provide further credence to the classification of this residual solid material as non-HLW TRU. The estimated compositions of the DST solids, expressed as kilograms of oxide species after sludge washing, are shown in Table 5.

Separate vitrification campaigns for disposal of these potential TRU wastes as individual waste feed types might require extremely low waste loadings in the glass product and correspondingly large amounts of waste glass product (Lambert 1994). The separate NCRW, PFP, and 2C +224 waste glasses would be limited by the allowable amounts for zirconium, chromium, and phosphate, respectively, in the glass product. Blending of these wastes in a single TRU waste vitrification campaign could increase the expected waste loading, but it can be expected to still be well below that possible by the broader blending options available for disposal as HLW.

5.0 CONCLUSION

The identification of the three DSTs containing NCRW and PFP waste and the seven SSTs containing 2C and 224 wastes as potential TRU waste, as opposed to HLW, was based on a conservative interpretation of the definitions for these waste classes, historical records of the tank wastes, and analyses of tank samples. This set of identified potential TRU wastes may be used as an initial basis for a cost/benefit analysis for a proposed TRU segregation from the other HLW and disposal of this material at WIPP. The results of the cost/benefit analysis will be needed before a recommendation of this disposal option can be made. The acceptability of this TRU material by WIPP will be an essential element in the cost/benefit analysis. Concurrence by the DOE, designating this material as a valid, initial, minimum set of potential TRU waste to be used for the cost/benefit analysis, should also be obtained as one of the initial steps for this analysis.

One of the concerns expressed in the NRC rule-making record for the definition of HLW was related to the potential for near-surface disposal for any radioactive waste designated as non-HLW. However, special consideration may be in order for TRU waste designated for geologic disposal in WIPP. A substantially larger fraction of Hanford Site tank waste might have been classified as TRU, with potential disposal at WIPP, if HLW were defined in terms of the concentrations of fission products rather than the current source-based definition. The current source-based definition for HLW results in some Hanford Site tank waste being classified as HLW while possessing much lower fission product concentrations than other tank wastes classified as non-HLW.

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Table 5. Washed Double-Shell Tank Solids.

Waste type	Waste component							
	CC		NCAW		NCRW		PFP	
	(wt%)	(kg)	(wt%)	(kg)	(wt%)	(kg)	(wt%)	(kg)
Al ₂ O ₃	5.67	10,100	6.07	11,500	0.83	5,905	9.59	5,630
CaO	1.47	2,640	1.24	2,350	0.30	2,117	5.51	3,240
CdO	0	0	3.68	6,960	<0.01	<0.1	0.74	433
Cl	0.11	202	0.02	40	0.03	212	0.43	252
Cr ₂ O ₃	0.30	536	0.13	239	0.23	1,605	4.16	2,440
F	0.40	72	0.17	322	2.61	19,070	0.86	507
Fe ₂ O ₃	1.32	2,350	45.1	85,500	0.92	6,500	23.4	13,700
Li ₂ O	0.08	137	0.22	424	0.35	2,490	0.53	312
MgO	0.33	591	0.41	778	0.10	696	2.02	1,190
MoO ₃	0.21	382	0.03	50	0.01	54	0.10	60
Na ₂ O	51.6	92,200	22.4	42,400	31.4	229,000	36.7	21,700
NiO	0.24	395	2.57	4,390	0.08	536	0.60	314
P ₂ O ₅	0.06	111	0.57	1,080	<0.01	<0.1	5.02	2,960
Rh ₂ O ₃	0	0	0.05	92	0.02	176	0.45	268
Ru ₂ O ₃	0	0	0.17	327	0.01	65	0.45	264
SiO ₂	38.4	68,500	3.63	6,890	3.52	25,600	3.51	2,070
SO ₃	0.11	202	0.44	830	0.20	1,420	4.54	2,680
U ₃ O ₈	0.002	3	1.89	3,570	3.84	27,900	1.22	718
ZrO ₂	0.08	14,400	11.3	21,450	55.6	300,000	0.35	207

NOTE: The following are characteristics of the table:

- Uses normalized TRAC data as input into the Aspen computer model.
- Assumes sludge washing/leaching is effective and the split factors used in the Aspen computer model are accurate.
- Converts all forms of the waste components to the elemental state and then to the oxide state. Combines the masses of waste oxides, fluoride, and chloride in the pretreated streams to determine the weight percent. The flowsheet streams 206, 230, and 311 (minus SiO₂ from stream 632) are combined to determine the concentrations and amount of waste oxides, fluoride, and chloride in the HLW glass.
- The selected compounds were considered important in a Don't Say It--Write It! to R. W. Powell from R. A. Watrous, "Feed Spec Information Requested For 2/22/94 Discussions With TAP," Westinghouse Hanford Company, Richland, Washington, February 22, 1994.

CC = Complexant concentrate
 NCAW = Neutralized current acid waste
 NCRW = Neutralized cladding removal waste
 PFP = Plutonium Finishing Plant
 TRAC = Track radionuclide components

An alternative approach for classification of TRU waste in the SSTs, based on selection of those tanks with low fission product specific activities, should be considered as a follow-on task. This approach would permit designation of a much larger fraction of the SST sludge as non-HLW waste, which contained only a small fraction (a few percent) of the fission product activity originally associated with this waste. This approach could meet the intent of the NRC classification for incidental waste. Further discussions with the NRC regarding the SST waste classification will be necessary to resolve this issue.

6.0 REFERENCES

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- 10 CFR 61, "Licensing Requirements for Land Disposal of Radioactive Waste," *Code of Federal Regulations*, as amended.
- 52 FR 5992, "Definition of 'High-Level Radioactive Waste,'" *Federal Register* (February 1987).
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"Safety Measures for Waste Tanks at Hanford Nuclear Reservation," Section 3137 of *National Defense Authorization Act for Fiscal Year 1991*, Public Law 101-510, November 5, 1990.

Nuclear Waste Policy Act of 1982, 42 USC 10101.

Simpson, B. C., 1994, *Tank 241-T-111 Characterization Report*, WHC-EP-0806, Westinghouse Hanford Company, Richland, Washington.

Waste Isolation Pilot Plant Land Withdrawal Act, Public Law 102-579, October 30, 1992.

WIPP, 1991, *Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, WIPP/DOE-069, Rev. 4, Westinghouse Electric Corporation, Waste Isolation Division, Carlsbad, New Mexico.

7.0 GLOSSARY

ABBREVIATIONS AND ACRONYMS

CC	complexant concentrate
CH-TRU	contact-handled transuranic
CW	cladding waste
DOE	U.S. Department of Energy
DSSF	double-shell slurry feed
DST	double-shell tank
HLW	high-level waste
LLW	low-level waste
NCAW	neutralized current acid waste
NCRW	neutralized cladding removal waste
NRC	U.S. Nuclear Regulatory Commission
PFP	Plutonium Finishing Plant
PUREX	Plutonium-Uranium Extraction (Facility at Hanford Site)
REDOX	reduction oxidation
RE-TRU	remotely handled transuranic

SORWT	Sort on Radioactive Waste Type
SST	single-shell tank
TRAC	track radionuclide components
TRU	transuranic
UST	underground storage tank
WIPP	Waste Isolation Pilot Plant

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APPENDIX A

**LETTER FROM R. M. BERNERO (U.S. NUCLEAR REGULATORY COMMISSION)
TO A. J. RIZZO (U.S. DEPARTMENT OF ENERGY)**

SEPTEMBER 25, 1989

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

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Revision 0

SEP 24 1989

9-25-89

copy to L3224

Handwritten initials and scribbles

Mr. A. J. Rizzo
Assistant Manager for Operations
U.S. Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

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Dear Mr. Rizzo:

We have reviewed your letter dated March 6, 1989 concerning the classification and disposal of the Hanford double-shell tank waste. Your letter and supporting information assert that the double-shell tank waste planned for disposal by grouting in near-surface vaults is not high-level waste (HLW), and that U.S. Nuclear Regulatory Commission (NRC) licensing is not required. Your letter requests NRC concurrence in this position.

As you know, our staffs have met on several occasions over the past year in an effort to determine which of the Hanford tank wastes are properly classified as HLW. We consider that the applicable definition of HLW, for purposes of classifying the Hanford tank wastes, is that set forth in 10 CFR Part 50, Appendix F. Specifically, HLW is defined as "those aqueous wastes resulting from the operation of the first cycle solvent extraction system or equivalent, and the concentrated waste from subsequent extraction cycles, or equivalent, in a facility for reprocessing irradiated reactor fuels."

The rulemaking record for Appendix F specifically recognizes a number of "incidental," non-HLW waste streams associated with reprocessing plant operations. These include cladding hulls, ion exchange media, sludges, and miscellaneous trash generated during reprocessing operations. Not mentioned, however, are wastes resulting from further processing of HLW (e.g., volume reduction) or removing non-radioactive materials that were added to the HLW for improved processing and/or storage (e.g., the addition of alkaline material to neutralize acidic HLW). At West Valley and the Savannah River Plant, NRC has agreed that such wastes are not HLW. At Hanford, the question of waste classification (and NRC licensing authority) has been complicated by the mixing of waste from various sources over the past 45 years. This mixing has changed the original characteristics of the wastes and has resulted, in some cases, in the mixing of HLW and low-level waste (LLW). Consequently, it is now difficult to directly differentiate between HLW and LLW, using the source-based definition of Appendix F.

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Mr. A. J. Rizzo

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In earlier meetings of our staffs, criteria were suggested for determining when such wastes should be classified as "incidental" wastes rather than as HLW, and these criteria were documented in our letter of November 29, 1988. Your March 6, 1989 letter records U.S. Department of Energy's (DOE's) application of these criteria. Specifically, your letter proposes that the bulk of the key radionuclides (i.e., strontium, cesium and transuranics) would be separated for disposal in a geologic repository, so that only three to five percent of the original inventories of those radionuclides would be disposed by grouting in near-surface vaults. Your letter also states that the concentration of radionuclides in the grout will be comparable to Class C LLW as defined by 10 CFR Part 61 for cesium and transuranics, and to Class A or B for the remainder. Finally, your letter evaluates the practicability and cost-effectiveness of additional radionuclide removal. An additional separation process, beyond those originally contemplated, was found to be cost-effective for removal of an additional six million curies of cesium. This step would further reduce the total activity disposed in the grout facility to two to three percent of the inventory of HLW that originally entered the tanks. DOE is now proposing to perform this additional radionuclide removal to improve the isolation of HLW. The NRC agrees that the criteria used by DOE for classification of the grout feed as LLW are appropriate. Therefore, the grout facility for the disposal of the double-shell tank waste would not be subject to our licensing authority.

Note
→

Your letter indicates that the radionuclide inventory is an estimate based on existing computer models, rather than actual analyses of tank waste. Given the uncertainty in the actual radionuclide inventory, we endorse your plans to sample and analyze the grout feeds before disposal in an effort to control the final composition of the grout feed. If in the course of conducting this sampling program, you find that the inventories of key radionuclides entering the grout facility are significantly higher than you now estimate, you should notify us so that the classification of the waste can be reconsidered. The NRC requests that DOE periodically submit summaries of the analytical results of all the samples to NRC and other affected parties in a timely manner.

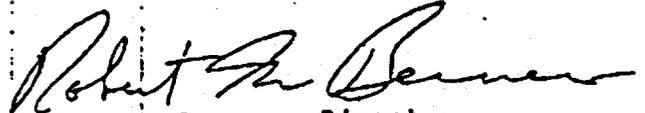
Note
→

Our position on the double-shell tank waste should not be interpreted to reflect a decision on disposal of single-shell tank waste or to establish a precedent in any other context. We intend to defer judgment on the classification of single-shell tank waste until after DOE has completed its program of characterizing this waste. We anticipate that final documentation will be issued for public comment before a decision is made on the disposal of single-shell tank waste.

Mr. A. J. Rizzo

If you should have any questions or comments about this letter, please contact me or Dr. Michael J. Bell, Chief, Regulatory Branch, of my staff at (301) 492-0560.

Sincerely,



Robert M. Bernero, Director
Office of Nuclear Material Safety
and Safeguards

cc: Terry Husseman
WA Department of Ecology
William Don Tahkeal
Yakima Indian Nation
Jeff Breckel
Oregon/Washington Liaison

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APPENDIX B

DEFINITION OF TERM "HIGH-LEVEL RADIOACTIVE WASTE"

NRC DOCKET NO. PRM-60-4

55 FR 51732

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PART 60 PETITION FOR RULE MAKING

or greater must be mitigated: "those engineered structures, systems, and components essential to the prevention or mitigation of an accident . . ." (10 CFR 60.2, emphasis added). The threshold for determining the need for mitigation through the use of engineered safety features is the accident dose criterion, not the "important to safety" threshold. The petitioner suggests modification of the current definition "important to safety" to make it consistent with the proposed accident dose criterion by incorporating the effective dose equivalent concept and the new preclosure control area boundary.

Related NRC Regulatory Initiative

In the NRC Regulatory Agenda (NUREG-0936, Vol. 8, No. 4, published January 1990) and in the Unified Agenda of Federal Regulations (55 FR 17174; April 23, 1990), the NRC has announced a contemplated rulemaking action that would establish additional preclosure regulatory requirements for high-level waste geologic repositories (RIN 3150-AD51). The subject matter of the DOE petition relates closely with the actions under consideration by the NRC as part of this rulemaking effort.

The NRC approach to this related regulatory initiative includes plans to:

1. Perform a functional analysis of a geologic repository using a systematic approach. This functional analysis would include an evaluation of the preclosure operations phase of a repository.
2. Identify in this analysis the functions necessary to protect the health and safety of the workers and the public during normal conditions and abnormal conditions (e.g. design bases accidents/ events).
3. Develop repository operational criteria for each function necessary to protect the health and safety of the workers and public.
4. Compare these repository operational criteria to the current criteria in 10 CFR part 60 to help identify any potential regulatory uncertainties.
5. Use the results of the functional analysis and comparison studies as a basis for consideration of any potential rulemaking.

The NRC is in the process of obtaining studies that would address potential regulatory uncertainties in this area. The results of these studies would be made available as NUREG reports. These studies would provide technical support for any regulatory action that may be needed. The NRC estimates that these reports would be available after November 1991.

Although DOE's petition does address areas of concern similar to those addressed in the NRC regulatory initiative described above, the

petitioner's approach to establishing design criteria for structures, systems, and components important to safety differs markedly from that contemplated by the NRC. In applying the approach of the petitioner, it would be possible to have no structures, systems, and components important to safety if the nearest boundary of the preclosure control area were sufficiently distant. This could encourage extending the boundary of the preclosure control area in order to justify less effective safety design and quality assurance measures and result in inferior structures, systems, and components in the geologic repository operations area. While this approach might be adequate for protection of the general public, it would ignore the safety of the workers.

In contrast, in applying the approach proposed by the NRC staff, the scope of, and the design criteria for, structures, systems, and components important to safety would be derived from a consideration of the functional requirements of the repository system. In addition, criteria for a preclosure controlled area that takes into account postulated accident conditions may be developed as a matter apart from the question of structures, systems, and components important to safety. The corresponding provisions in 10 CFR Part 72 may be considered as possible models for regulatory language in this context.

Comments are solicited with respect to the NRC's regulatory initiative as well as the DOE petition.

Dated in Rockville, Maryland, this 9th day of July, 1990.

For the Nuclear Regulatory Commission,
Samuel J. Chilk,
Secretary of the Commission.

55 FR 32639
Published 8/10/90

10 CFR Part 60

[Docket No. PRM-60-3]

Department of Energy; Correction of Receipt of Petition for Rulemaking

AGENCY: Nuclear Regulatory Commission.

ACTION: Petition for rulemaking; Notice of receipt, Correction.

SUMMARY: This document corrects a notice of receipt of petition for rulemaking filed by the U.S. Department of Energy which was published in the Federal Register on July 13, 1990 (55 FR 28771). This action is necessary to correct two typographical errors.

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.

In the Federal Register of July 13, 1990, in the center column of page 28773, make the following corrections:

1. In the eighth line of the first complete paragraph of the document "the" should be changed to read "that."
2. In the tenth line of the second complete paragraph remove the word "that."

Dated at Bethesda, Maryland, this 3rd day of August 1990.

For the Nuclear Regulatory Commission,
David L. Meyer,
Chief, Regulatory Publications Branch,
Division of Freedom of Information and Publications Services, Office of Administration.

55 FR 51732
Published 12/17/90
Comment period expires 3/18/91

10 CFR Part 60

[Docket No. PRM-60-4]

Definition of the Term "High-Level Radioactive Waste"

AGENCY: Nuclear Regulatory Commission.

ACTION: Petition for rulemaking.

SUMMARY: The States of Washington and Oregon request that the Commission revise the definition of the term "high-level radioactive waste" so as to establish a procedural framework and substantive standards by which the Commission will determine whether reprocessing waste, including in particular certain waste stored at the U.S. Department of Energy's site at Hanford, Washington, is high-level radioactive waste and therefore subject to the Commission's licensing authority. **DATES:** Submit comments by March 18, 1991. Comments received after this date will be considered if it is practical to do so, but consideration cannot be given except as to comments received on or before this date.

ADDRESSES: 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.

PART 60 PETITION FOR RULE MAKING

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.¹

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 Congressional definition of the term "high-level radioactive waste" in 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."²

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 or disposal. 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 1974.³

Reasons for Petition

The petitioners point out that the present definition of HLW in the Commission's regulations is based upon the source of the waste. According to petitioners, while HLW may be differentiated from "incidental waste," the legal basis for doing so must derive from NWPA, specifically 42 U.S.C. 10101 (12) (A), which refers to a "sufficient concentrations" criterion for classification.⁴ The petitioners claim that incidental waste source is impossible to ascertain due to mixing in defense tanks and the unavailability of accurate records. They point out, in particular, 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 believe that the Commission needs to establish both a procedure and a standard for making an evaluation as to whether waste are HLW on a tank-by-tank basis.

The petitioners assert that the proposed amendment is essential to provide protection of the future health and safety of the citizens of the Pacific Northwest.

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 Radioactive 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 cycle 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 1241).⁵

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 density and percent solids, inorganic and organic constituents, 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, saltcrete or vitrified waste);
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;

⁵ 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.

¹ 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.

² For an analysis of this provision, see "Definition of 'High-Level Radioactive Waste'" (advance notice of proposed rulemaking, 52 FR 5982, February 27, 1987) and subsequent rulemaking documents, (proposed amendments to 10 CFR part 61, 53 FR 17709, May 16, 1988; final amendments to 10 CFR part 61, 54 FR 22378, May 25, 1989).

³ It should be noted, however, that the Commission has jurisdiction only if the facilities are of the types described in section 202(4).

⁴ Note, however, the Commission's statement, at 52 FR 5993, February 27, 1987, that classification, under the cited provision "would be irrelevant in determining whether such wastes must be disposed of in licensed disposal facilities."

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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(g) 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 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 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.

Petitioners' Conclusions

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 particular wastes will be assessed. The petitioners contemplate 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.

Request for Comments

Commenters are invited to address, among other things, the desirability and appropriateness of (1) The proposed substantive standard ("remove the largest technically achievable amount of radioactivity on a tank-by-tank basis"), (2) the proposed procedure for applying that standard, and (3) an amendment to 10 CFR part 60 (in view of the scope defined in 10 CFR 60.1) vis-a-vis the adoption of a new Part or amendment to

some other existing Part of NRC regulations.

Dated at Rockville, Maryland, this 11th day of December 1990.

For the Nuclear Regulatory Commission,
Samuel J. Chilk,
Secretary of the Commission.

58 FR 12342
Published 3/4/93

10 CFR Part 60

[Docket No. PRM-60-4]

States of Washington and Oregon:
Denial of Petition for Rulemaking

AGENCY: Nuclear Regulatory Commission.

ACTION: Denial of petition for rulemaking.

SUMMARY: The Nuclear Regulatory Commission (NRC) is denying a petition for rulemaking (PRM-60-4), submitted by the States of Washington and Oregon, which deals with the process and criteria for classifying radioactive waste materials at defense facilities as high-level radioactive waste (HLW) or as non-HLW. (As noted in the petition, certain facilities for the storage of HLW are subject to NRC licensing authority.) The petition is being denied because the NRC concludes that the principles for waste classification are well established and can be applied on a case-by-case basis without revision to the regulations.

ADDRESSES: Copies of the petition for rulemaking, the public comments received, and the NRC's letter to the petitioner are available for public inspection or copying in the NRC Public Document Room, 2120 L Street, NW, (Lower Level), Washington, DC.

FOR FURTHER INFORMATION CONTACT: Naim S. Tanious, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, Washington, DC 20555, telephone (301) 492-3878.

SUPPLEMENTARY INFORMATION:

I. The Petition

The States of Washington and Oregon, and the Yakima Indian Nation, initially submitted a petition for rulemaking on this subject on January 2, 1990. On February 7, 1990, the NRC staff conferred with the petitioners as contemplated by paragraph (b) of 10 CFR 2.802. In response to suggestions by the NRC staff, the petition was clarified and resubmitted (by the States of Washington and Oregon) on July 27, 1990.

On December 17, 1990, the Nuclear

Regulatory Commission published a notice of receipt of the petition for rulemaking (55 FR 51732). The petition requested that the Commission revise the definition of "high-level radioactive waste" (HLW) so as to establish a procedural framework and substantive standards by which the Commission will determine whether reprocessing waste, including in particular certain waste stored at the U.S. Department of Energy's (DOE) site at Hanford, Washington, is HLW and, therefore, subject to the Commission's licensing authority.

The petitioners request that the Commission amend 10 CFR 60.2 to clarify the definition of HLW and the definition of "HLW facility." The petitioners specifically 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.

The petitioners state that the petition for rulemaking is based, in part, on Section 202 of the Energy Reorganization Act of 1974 (ERA), which provides for the Commission to exercise licensing and related regulatory authority over "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."

According to the petitioners, the legislative history of the ERA reveals that Congress intended the Commission to license defense reprocessing tank wastes at the point of long-term storage or disposal. 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 these wastes are HLW, they clearly fall under the Commission's licensing jurisdiction under Section 202(4) of the Energy Reorganization Act of 1974 (42 U.S.C. 5842(4)).

The petitioners acknowledge that the present definition of HLW in the Commission's regulations is based upon

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the source of the waste, and that "incidental waste" generated in the course of reprocessing is not HLW. (The latter point is evident from the proposal to amend 10 CFR 60.2 to provide that a residual fraction would be "considered an incidental waste and, therefore, not HLW.") The petitioners claim, however, that wastes stored in tanks at Hanford cannot practicably be classified as incidental waste (as opposed to HLW) because the tanks contain a mixture of wastes from a number of sources, including reprocessing of reactor fuel. Moreover, the petitioners state that radionuclide inventories are estimates subject to substantial uncertainty, owing to lack of accurate records. Further, the petitioners assert that neither DOE, the Commission, nor the petitioners have adequate information regarding the source and composition of the tank waste. Hence, the petitioners believe that the Commission needs to establish both a procedure and a standard for making an evaluation as to whether wastes are HLW on a tank-by-tank basis.

The petitioners assert that the proposed amendment is essential to provide protection of the future health and safety of the citizens of the Pacific Northwest.

II. Classification of DOE Reprocessing Wastes

At Hanford and other sites, questions have arisen regarding the classification of reprocessing wastes for which DOE must provide disposal. In the long-standing view of the Commission, these questions must be resolved by examining the source of the wastes in question. The reason for this is that when Congress assigned to NRC the licensing authority over certain DOE facilities for "high-level radioactive wastes," the Congress was referring to those materials encompassed within the meaning of the term "high-level radioactive waste" in Appendix F of 10 CFR Part 50. (For a full statement of this position, see the discussion presented in the Commission's advance notice of proposed rulemaking, "Definition of High-Level Radioactive Waste" (52 FR 5993, February 27, 1987).) Accordingly, any facility to be used for the disposal of "those aqueous wastes resulting from the operation of the first cycle solvent extraction system, or equivalent . . ." as HLW is defined in Appendix F to Part 50, must be licensed by the NRC. Most of the waste storage tanks at Savannah River (South Carolina), West Valley (New York), and Hanford contain wastes that meet this definition, and the facilities to be used for disposal of these wastes are, therefore, potentially subject to NRC licensing jurisdiction.

However, when the Appendix F definition was promulgated, the Atomic Energy Commission specifically noted that the term HLW did not include "incidental" waste resulting from reprocessing plant operations, such as ion exchange beds, sludges, and contaminated laboratory items, such as clothing, tools, and equipment. Neither were radioactive hulls and other irradiated and contaminated fuel structural hardware encompassed by the Appendix F definition. Under the same reasoning, as the Commission has previously indicated, incidental wastes generated in further treatment of HLW (e.g., salt residues or miscellaneous trash from waste glass processing) would be outside the Appendix F definition.

In the cases of Savannah River and West Valley wastes, DOE plans to retrieve the wastes from their storage tanks and to separate essentially all of the radioactive materials for eventual disposal in a deep-geologic HLW repository.¹ Accordingly, the projected recovery of HLW from the wastes in tank storage at those sites will be sufficiently complete that the decontaminated salts and other residual wastes are classified as "incidental" (i.e., non-HLW). The NRC will have no regulatory authority, under Section 202 of the Energy Reorganization Act, over DOE's facilities to be used for processing and disposal of the incidental wastes.

At Hanford, DOE plans to process the wastes presently stored in double-shell tanks in a manner similar to that planned for the wastes at Savannah River and West Valley. Such processing would separate most of the radioactive constituents of the wastes for eventual deep-geologic repository disposal and, the residual salts would be disposed of onsite in a shallow, near-surface concrete-like grout facility. (Plans for processing of single-shell tank wastes have been deferred.) However, classification of the Hanford double-shell tank wastes has proven more difficult than classification of Savannah River and West Valley wastes. At Hanford, many of the primary reprocessing wastes were generated using older separation technologies,

¹ See 52 FR 5992, February 27, 1987 (definition of "high-level waste"), n. 1, where the Commission characterizes as "incidental waste," the decontaminated salt with residual activities on the order of 1,500 nCi/g Cs-137, 30 nCi/g Sr-90, 2 nCi/g Pu, as described in the Department of Energy's FES on long-term management of defense HLW at the Savannah River Plant, DOE/EIS-0023, 1979. Although an EIS has not yet been published for the West Valley Demonstration Project, preliminary estimates indicate the likelihood of an equivalent degree of separation.

which resulted in substantial dilution of those wastes with nonradioactive materials. In addition, many of the tanks at Hanford contain mixtures of wastes from both reprocessing sources and other sources. Finally, recordkeeping at Hanford was not always thorough enough to allow precise determinations of the origins of the wastes now present in specific tanks at Hanford. For these reasons, some of the Hanford tank wastes cannot be readily classified as either HLW or incidental wastes using only the definitions and concepts discussed above.

Taking into account these uncertainties and their implications with respect to NRC jurisdiction, the NRC and DOE staff held several meetings to explore the situation in detail. A principal objective of these meetings was to ascertain, to the extent practicable, whether some or all of the wastes should be regarded as HLW and whether, on the other hand, some or all of the wastes should be classified as non-HLW. Several things became clear as a result of these meetings.

First, management records were adequate for DOE to determine that two double-shell waste tanks do not contain wastes from reprocessing of reactor fuels. Therefore, these wastes clearly do not contain HLW within the Appendix F definition. The NRC agreed with DOE that any disposal facility intended exclusively for these wastes would not be subject to NRC licensing authority.

Second, DOE has carried out a "material balance" analysis of waste management activities at Hanford. This analysis estimated the total amount of "first cycle reprocessing wastes" generated at Hanford and, to the extent practical, the current location of those wastes. The DOE proposed onsite grout disposal of the residual waste from the double-shell tank waste processing would be only a small fraction of the reprocessing wastes originally generated at the site.

Finally, DOE studied possible technologies for additional waste processing, and agreed to remove the largest practical amount of radioactive material from double-shell tank wastes prior to disposal in onsite grout facilities. This commitment by DOE, coupled with the material-balance study indicating that most of the originally-generated radioactive material would be recovered, led the NRC staff to conclude that the residual waste material should be classified as incidental waste, since they are wastes incidental to the process of recovering HLW. With this classification, DOE could proceed with onsite disposal of such incidental wastes in a grout facility without

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licensing by the NRC. It should be noted that if the DOE processing operations go as planned, the residual activity of these incidental wastes would be below the concentration limits for Class C wastes under the waste classification criteria of 10 CFR part 61.

Following its review, the NRC staff, by letter dated September 28, 1989, from R.M. Bernero, Director, Office of Nuclear Material Safety and Safeguards, NRC, to A.J. Rizzo, Assistant Manager for Operations, Richland Operations Office, DOE, endorsed DOE's plans to sample and analyze the grout feeds before disposal in an effort to control the final composition of the grout feed. However, the staff indicated that if DOE were to find, in the course of conducting the sampling program, that the inventories of key radionuclides entering the grout facility are significantly higher than previously estimated, DOE should notify the NRC and other affected parties in a timely manner.

It should be noted that the appropriate classification of some Hanford wastes remains to be determined—specifically, any single-shell tank wastes, and any empty but still contaminated waste tanks DOE might dispose of in-place. For both types of wastes, a case-by-case determination of the appropriate waste classification might be necessary.

III. Discussion

The petition for rulemaking presents two basic issues. The question is not whether "high-level waste" should be interpreted by reference to the source-based concepts derived from appendix F to 10 CFR part 50. The petitioners agree that this is proper. Nor is there any fundamental challenge to the concept that "incidental wastes" are excluded from the definition of "high-level waste." The issues are much narrower ones. The first issue is a substantive one—the criteria to be applied in differentiating incidental waste from high-level waste. The second issue is a procedural one—the process that should be employed by the Commission in arriving at a judgment whether or not it has jurisdiction over particular facilities. These will be addressed in turn.

A. The Standard for Classification

We first address the standard that should be employed in distinguishing high-level waste from incidental waste. In doing so, we strive to apply the policies that underlie the adoption of appendix F to 10 CFR part 50 (and, hence, section 202 of the Energy Reorganization Act).

The petitioners suggest that the proper standard, to be applied on a tank-by-tank basis, is to consider all processing streams to be high-level waste unless they have been treated, prior to disposal, "to remove the largest technically achievable amount of radioactivity." Adoption of such a criterion would certainly serve the goal, which had been contemplated by the Commission, of removing the hazardous process streams to a geologic repository for permanent storage. It is not the only standard, however, that would suffice for this purpose, particularly when it is viewed in a broader regulatory context.

The clearest expression of the overall regulatory objectives is the Atomic Energy Commission's (AEC's) explanatory statement when it promulgated appendix F—namely, "that the public interest requires that a high degree of decontamination capability be included in such facilities and that any residual radioactive contamination after decommissioning be sufficiently low as not to represent a hazard to the public health and safety." 35 FR 17530, November 14, 1970. As we read the AEC's intent, the reference to "a high degree of decontamination capability" leaves a substantial degree of discretion. It certainly does not rule out consideration of economic factors as well as technical ones. It was the AEC's contemporaneous practice to consider financial impacts as, for example, in controlling releases of radioactive materials from licensed facilities to the lowest levels "technically and economically practical." AEC Manual Chapter 0511. When the AEC spoke of a "high degree" of decontamination capability, we believe that it was guided by similar considerations. Moreover, from a policy standpoint, this makes good sense, for so long as there is adequate protection of public health and safety, it would not be prudent to expend potentially vast sums without a commensurate expectation of benefit to health and the environment.

Achieving a "high degree of decontamination capability" implies, then, that the facility should separate for disposal as much of the radioactivity as possible, using processes that are technically and economically practical. In addition, however, as the AEC's statement indicates, the residual radioactive contamination should be sufficiently low as not to endanger public health and safety.

These principles—high decontamination capability and protection of health and safety—are the essential benchmarks that have influenced the development of NRC's position vis-a-vis DOE on the question

of the proper classification of the tank wastes and grout at Hanford.

When the question regarding classification of wastes was first raised, the NRC staff identified to DOE some approaches that might be used in distinguishing HLW from incidental waste. One approach was expressed as follows:²

As an alternative approach, we suggest that DOE attempt an overall material balance for HLW at the Hanford site, using the source-based meaning of HLW. It is hoped that this approach might provide a more efficient means of identifying those wastes subject to licensing by NRC under terms of the 1974 Energy Reorganization Act. Under this approach, if DOE could demonstrate that the largest practical amount of the total site activity attributable to "first-cycle solvent extraction" wastes has been segregated for disposal as HLW, then NRC would view the residual as a non-HLW. We would anticipate that at least 90 percent of the activity would have been separated in this way. Thus, if it can be shown that DOE has processed the waste with the intent to dispose of the HLW in a repository or other appropriate licensed facility, leaving behind only a small fraction of only moderately radioactive material, then the goals stated in 10 CFR part 50 appendix F and incorporated in the Energy Reorganization Act would have been satisfied; and the disposal of the residual would accordingly not be subject to NRC licensing.

In response, DOE considered the practicality of various waste processing alternatives and presented the results of its study by letter dated March 8, 1989.³ The results were also presented at a meeting among interested parties, including the petitioners, held on August 4, 1989. (Minutes of the meeting are available for public inspection in the NRC Public Document Room) DOE's "baseline" disposal plans would have recovered all but about 12–13 million curies of cesium-137, together with lesser activities of strontium-90, transuranics, and other radionuclides.⁴ DOE's study indicated the practicality of removing an additional 6 million curies

² Letter from Michael J. Bell, Chief, Regulatory Branch, Division of Low-Level Waste Management and Decommissioning, Office of Nuclear Material Safety and Safeguards, NRC, to Ronald E. Carlton, Director, Waste Management Division, Richland Operations Office, DOE, November 29, 1988. The letter included some "suggested criteria" involving a "good faith" effort to achieve isolation of HLW from nonradioactive salts, such an effort to be judged, as a practical matter, by considering (among other things) alternative separation processes.

³ Letter from A. J. Rizzo, Assistant Manager for Operations, Richland Operations Office, DOE, to Robert M. Bernero, Director, Office of Nuclear Material Safety and Safeguards, NRC, March 8, 1989.

⁴ DOE noted in the March 8, 1989 letter from Rizzo to Bernero that, based on limited available analytical data, the total cesium-137 could be as much as 20 million curies versus the 12–13 million estimate.

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of cesium-137 for repository disposal. DOE proposed to remove this additional 6 million curies of cesium-137. DOE also identified additional treatment alternatives, with their associated costs, which it viewed as not being economically practical. DOE's material balance showed that, after the residue from the double-shell tank wastes is grouted, 2 to 3 percent of the key radionuclides which originally entered all Hanford tanks would be disposed of as LLW in near-surface vaults. The concentrations of radionuclides in the grout would be comparable to Class C for cesium and transuranic wastes, and to Class A or B for the remainder.⁵ DOE also noted certain engineering and institutional factors that might compensate, especially as to potential intrusion hazards, for the possibility that the total amount of waste that would be grouted would be greater than the amount of Class C waste that might be contained in a typical commercial burial ground.

Based on its review of DOE's March 6, 1989 submission, the NRC staff concluded that DOE's proposed processing would remove the largest practical amount of total site activity, attributable to HLW, for disposal in a deep geologic repository. This finding was based on: (1) Past and planned treatment of the tank wastes; (2) radionuclide concentration and material balance; and (3) cost-effectiveness of additional radionuclide removal. These conclusions reflected DOE's undertakings both to achieve a high degree of separation and to provide protection of public health and safety. As a result, the staff concluded that the expected residual waste would not be high-level waste and would thus not be subject to NRC licensing authority. The staff thereupon advised DOE that NRC agreed that the criteria used by DOE for classification of the grout feed are appropriate and that the grout facility for the disposal of the double-shell tank waste would not be subject to NRC licensing authority.⁶

⁵ NRC understood this statement to connote that cesium-137 and transuranic radionuclides in the residual waste would be less than the concentration limits for Class C low-level waste, as defined in NRC's requirements in 10 CFR Part 61, and that the concentration of other radionuclides would be less than the concentration limits for Class A or B low-level waste.

⁶ Letter from Robert M. Bernero, Director, Office of Nuclear Material Safety and Safeguards, NRC, to A. J. Rizzo, Assistant Manager for Operations, Richland Operations Office, DOE, September 25, 1989. The letter also called upon DOE to advise NRC periodically of the analytical results of samples of key radionuclides entering the grout facility, so that the classification of the waste might be reconsidered if the inventories were significantly higher than DOE had estimated.

At a meeting in Richland, Washington on July 16, 1992, DOE staff presented more detailed double-shell tank waste processing options and, based on recent analyses, summarized available information on the characteristics of waste within the tanks. DOE's current estimate of the total amount of radioactivity proposed for disposal in grout in near-surface vaults is within earlier range estimates but is now believed to be nearer the upper end of the range. DOE also clarified its intention to apply criteria comparable to the Performance Objectives set out in 10 CFR part 61. Among other things, these performance objectives include numerical radiation exposure limits for protection of the general population from releases of radioactivity and requires a design to achieve long-term stability of the disposal site.

DOE intends to complete a reassessment of the tank waste processing options by March 1993. This reassessment, the NRC staff understands, will include a reexamination of the practicality of achieving higher degrees of separation, particularly with respect to those tanks that contain substantial quantities of key radionuclides.

Assuming implementation of DOE's plans as described above, the Commission concludes that any radioactive material from the double shell tanks that is deposited in the grout facility would not be high-level radioactive waste subject to NRC's licensing jurisdiction. The responsibility for safely managing those wastes rests with the Department of Energy. The basis for the Commission's conclusion is that the reprocessing wastes disposed of in the grout facility would be "incidental" wastes because of DOE's assurances that they: (1) Have been processed (or will be further processed) to remove key radionuclides to the maximum extent that is technically and economically practical; (2) will be incorporated in a solid physical form at a concentration that does not exceed the applicable concentration limits for Class C low-level waste as set out in 10 CFR part 61; and (3) are to be managed, pursuant to the Atomic Energy Act, so that safety requirements comparable to the performance objectives set out in 10 CFR part 61 are satisfied.

The petitioners also requested that the Commission exercise oversight to assure that the grout meets temperature requirements for low-level waste forms. They acknowledge that DOE's vault design is protective of human health and the environment if heat produced by residual radioactivity, together with

heat generated from reactions during the grout process, is kept within defined limits. They present no technical data to suggest that achievement of these temperature controls presents any unusual engineering challenge. In any event, inasmuch as the Commission does not consider the grout produced in accordance with DOE's plans to be high-level waste, it does not have the authority to carry out this oversight function.

B. Procedural Issues

1. Whether Rulemaking Is Necessary and Desirable

The petitioners urge that the Commission initiate rulemaking procedures that would result in the establishment of substantive criteria for determining whether particular radioactive wastes either are or are not high-level waste. Generally, a decision whether to proceed by rulemaking (as requested) or to make determinations in individual, *ad hoc* litigation lies within the informed discretion of the cognizant administrative agency. Rulemaking is most appropriate where an agency seeks to establish a general principle, having prospective effect, to be applied in a wide variety of factual contexts. Where the issue before an agency involves the application of law to a very specific existing fact situation, especially where that situation is not representative of other matters that may need to be decided by the agency, then it is clearly more efficient and more to the point to decide by a process of adjudication (i.e., on a case-by-case basis).

Applying these principles to the petition at hand, the Commission has little difficulty in concluding that rulemaking is neither necessary nor desirable. Reprocessing wastes are located at only four principal locations in the United States. The Commission has previously determined that the residual contamination anticipated from proposed operations at Savannah River should be characterized as incidental waste and not high-level waste (see 52 FR 5903, Feb. 27, 1987, cited above, at footnote 1.) Wastes generated at the Idaho Chemical Processing Plant are markedly different from those at Hanford and Savannah. Therefore, if questions about classification of the Idaho wastes should arise, precedents established at Savannah River and Hanford might be difficult to apply. Any wastes at the Western New York Nuclear Service Center will require treatment in accordance with the applicable provisions of the West Valley Demonstration Project Act.

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The limited practical effect of the decision—i.e., restricted to the Hanford tanks—is reason enough to proceed by way of adjudication instead of rulemaking. The Commission is persuaded further by the need to avoid making premature decisions with respect to the wastes stored at Hanford in single-shell tanks that are not the subject of pending treatment plans. If the Commission were to establish rules to apply to the wastes remaining in those tanks, our inquiry would have to be greatly broadened; and it might become necessary to consider a wide range of situations that might or might not ever come to pass in the future.

2. Whether the Commission Is Adequately Informed

Petitioners suggest that their proposed procedures, which include detailed tank-by-tank assessments, are necessary to ensure confidence in the treatment process employed by DOE and to build confidence that the treatment standard is being met.

The issue to be decided by the Commission is a much narrower one: It is merely to determine whether the activities being undertaken by the Department of Energy fall within the NRC's statutory jurisdiction. As in the case of other persons whose activities may fall within our regulatory sphere, the Commission may from time to time demand information so as to be able to determine whether or not to initiate an enforcement action. The NRC staff has acted in this manner in its inquiries to DOE. It has obtained and evaluated information that is relevant and material to a determination whether or not the proposed activities of the DOE are subject to NRC licensing jurisdiction. All the information obtained and evaluated has been made available contemporaneously to the public.

Moreover, as a practical matter, NRC recognized the uncertainties associated with the projected radionuclide inventories in the tank wastes and endorsed DOE plans for sampling and analyzing the grout feeds before disposal. The objective of these efforts is to control the final composition of the grout wastes. If DOE finds that it can no longer assure that these wastes will be managed in accordance with the criteria previously discussed, DOE should notify NRC.

If a standard of "largest technically achievable amount" will be isolated" were to be applied, then the facts submitted by DOE might not be sufficient to conclude that NRC lacked jurisdiction. However, the proper standard includes considerations of economical practicality as well. As

indicated in an earlier part of this decision, the Commission has obtained information that is sufficient for this purpose.

3. Future Adjudications

The petitioners contemplate that if a rule were to be adopted in accordance with their proposal, particular determinations of how specific wastes would be characterized would be "left to individual adjudicative proceedings." The NRC infers that the "proceedings" contemplated by petitioners are licensing activities of the kinds specified in Section 189 of the Atomic Energy Act, as amended, 42 U.S.C. 2239. Adjudications in this type of proceeding are in some cases to be conducted in accordance with the hearing provisions of subpart L of 10 CFR part 2.

These procedures are often appropriate with respect to activities that are subject to NRC regulatory and licensing authority. However, the NRC is reluctant to employ them in the context that is proposed—to determine whether NRC has jurisdiction in the first place. To do so would entail the conduct of an adjudicatory proceeding in order to see whether another adjudicatory licensing proceeding must be held. More importantly, the Commission considers that the existing record contains all the factual information needed for a decision and that no unresolved material factual issues remain that would require further proceedings.

4. Other Considerations

While both NRC and DOE have focused their attention upon the meaning of the statutory term "high-level waste" and its application to the materials in storage at Hanford, other considerations might come into play in determining whether or not DOE activities are subject to licensing. In particular, it should be recalled that NRC exercises licensing authority under section 202(4) only as to "facilities authorized for the express purpose of subsequent long-term storage of [DOE-generated] high-level waste." The content of individual waste tanks is by no means dispositive of the question whether the facilities for storage of the treated waste are subject to licensing. A number of other factors may be relevant and material as well: (1) What are the limits, geographically and functionally, of "facilities"; (2) have those facilities been "authorized" (and by whom is such authorization required); and (3) have those facilities been authorized "for the express purpose of subsequent long-term storage of high-level waste" where those who may authorize the

facility make no express mention of high-level waste? It is not necessary for the Commission to address these questions at length in order to dispose of the pending petition.

IV. Public Comments on the Petition

The NRC received letters from 12 commenters. Two letters were from other Federal agencies, two were from public interest groups, one was from a nuclear industry corporation, and seven were from private individuals. Most comments were opposed to the petition.

A. Process and Standards Proposed in Petition

Several comments expressed concern that granting the petition would have an adverse effect on the timely disposal of radioactive waste at Hanford. This was a concern because many of the Hanford waste tanks were seen as nearing or exceeding their design life. The provisions of the rulemaking proposed in the petition were viewed as limiting DOE's flexibility in selecting the most effective processes for waste treatment and disposal. The petitioner's request that "best available technology" be used in removing HLW material from the tank wastes was seen as ignoring costs of disposal, exposures to workers, and environmental impacts.

Some comments disputed the petitioner's claim that the rulemaking proposed in the petition would offer a better process for classification and disposal of the Hanford tank wastes. These commenters did not see any advantage in the proposed process over the process for classification and disposal currently in use. One comment suggested that the Commission's rulemaking requiring disposal of Greater-than-Class C waste in a geologic repository or Commission-approved alternative (53 FR 17710, May 19, 1989) might force 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. The action proposed by the petitioners was viewed as not increasing the safety of disposal of the waste.

The Commission believes that adherence to the standard of technical and economic practicality generally reflects agreement with these comments.

B. Creation of a Risk-Based Classification System

Several comments, while noting that the rulemaking proposed by the petition would not do so, favored creation of a risk-based system of radioactive waste classification.

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The Commission has previously addressed the costs and benefits of creating a new system of radioactive waste classification. Its rationale for not doing so is outlined in the statement of considerations to the proposed part 61 rulemaking on disposal of Greater-than-Class C waste (53 FR 17709, May 18, 1988). Further consideration of these issues is beyond the scope of this proposed rulemaking action.

C. NRC Licensing Authority

Some comments focused on the licensing authority of NRC over the Hanford tank wastes. DOE stated that the rulemaking suggested in the petition would involve NRC in regulation of DOE's predisposal waste treatment and processing activities, which would be inconsistent with NRC authority to license specific DOE facilities under the Energy Reorganization Act of 1974. Another commenter stated that the proposed rulemaking was inconsistent with the statutory responsibilities of DOE and NRC. These arguments have already been discussed, and require no further response. It may be emphasized, however, that even if the Commission were found to have jurisdiction over the disposal facilities, it would not regulate either the tanks themselves or the facilities being used to process the wastes in these tanks; and there is reason for concern that implementation of the petitioner's proposal might draw the Commission improperly into regulation of those facilities.

A commenter concluded that DOE was currently in violation of 10 CFR part 30 requirements for a license because various near-surface waste disposal facilities at Hanford are being used for "long-term storage" of high-level radioactive waste. The issue is not pertinent to the subject matter of the petition. However, in any case, the comment does not take into consideration the judicial interpretation of the term in *Natural Resources Defense Council, Inc. v. U.S. Nuclear Regulatory Commission*, 606 F.2d 1261 (D.C. Cir., 1979). The D.C. Circuit Court of Appeals ruled in this case in support of NRC's position that the tanks have not been authorized for use as long-term storage or disposal and are, therefore, not subject to NRC licensing.

D. Public Input

A number of comments stressed the importance of adequate public input into decision making regarding disposal of the Hanford tank wastes. Some called for public hearings on this subject to be held in the Pacific Northwest. One commenter noted that the EIS which was done for Hanford provided the

opportunity for public comment. Another commenter believed that the Commission's rulemaking procedures did not offer the public a better opportunity for input than does the current licensing procedure.

As indicated in the Discussion above, the NRC's review of the situation with respect to the double-walled tanks has been carried out publicly from the start. Meetings with DOE have been open, and at least one of the petitioners (the State of Washington) has been provided advance notice and an opportunity to attend. Documents have been placed in the Public Document Room and have been made available for public inspection. It appears to the Commission that the essence of the issue concerns the appropriate standard for evaluating whether certain wastes should be regarded as high-level waste or not. Sufficient factual information is available to carry out these evaluations. Also, the petition for rulemaking has afforded an opportunity for views to be expressed with respect to the appropriateness of the standard.

A decision that NRC lacks licensing jurisdiction does not mean that opportunities for public input will be denied. As DOE undertakes its waste management activities, it will afford opportunities for public participation to the extent required by its own enabling statutes, regulations, and orders.

E. Other Comments

One commenter took exception to the petitioner's claim that the radioactive inventory of the Hanford tank wastes was inadequately known. The commenter believed that the contents of the tanks can be bounded well enough to judge the relative safety of various disposal options.

The Commission considers the available information to be sufficiently bounded to enable it to conclude that DOE's proposed operations (with respect to the material stored in the double-shell tanks) can result in the removal from the Hanford double-shell tanks of as much of the radioactive waste as may be technically and economically practical, and that the applicable regulatory objectives have been satisfied. Once these judgments are made, it is not the NRC's role to judge the relative safety of various disposal options, and we decline to do so.

One comment stated that while the petition was aimed solely at the Hanford tank wastes, its provisions could potentially affect all radioactive wastes from reprocessing, including those at Savannah River, West Valley, and the Idaho National Engineering Laboratory. As the waste management programs at

these other sites are in different stages of implementation, the impacts of the provisions would vary from site to site. As indicated above, the Commission is sensitive to this consideration yet believes that the specific case at hand only needs to be addressed at this time.

Some comments urged the Commission not to change the present definition of HLW. The Commission is not changing the present definition.

V. Conclusion

For the reasons presented in this document, the petition for rulemaking is denied.

Dated at Rockville, Maryland this 28th day of February, 1993.

For the Nuclear Regulatory Commission,
Samuel J. Chalk,
Secretary of the Commission.