

**DRAFT**

**WIPP HWFP No. NM4890139088 - TSDF**

**CLASS 3 PERMIT MODIFICATION  
REQUEST**

**ACCEPTANCE OF HANFORD SITE  
CONTACT-HANDLED  
TRANSURANIC MIXED TANK WASTE**

**WASTE ISOLATION PILOT PLANT  
CARLSBAD, NEW MEXICO**

**December 2011**

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**ACRONYMS AND ABBREVIATIONS**

ATWIR	Annual Transuranic Waste Inventory Report
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CH	contact-handled
CH-TRAMPAC	Contact-Handled Transuranic Waste Authorized Methods for Payload Control
CH-TRU	contact-handled transuranic
CH-WAC	Contact-Handled Transuranic Waste Acceptance Criteria
CW	highly caustic, dissolved-coating material wastes
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
DST	Double-Shell Tanks
EPA	U.S. Environmental Protection Agency
HASQARD	<i>Hanford Analytical Services Quality Assurance Requirements Document</i>
HFFACO	Hanford Federal Facility Agreement and Consent Order
HLW	High-Level Waste
LWA	<i>Land Withdrawal Act</i>
LAW	Low-Activity Waste
LLW	Low-Level Waste
mrem/h	millirem per hour
NEPA	National Environmental Policy Act
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
Permit	Hazardous Waste Facility Permit
PMB	Performance Measurement Baseline
PMR	Permit Modification Request
PCB	polychlorinated biphenyls
<sup>239</sup> Pu	plutonium-239
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
RH	remote-handled
RH-TRU	remote-handled transuranic
SST	Single-Shell Tank
TRU	Transuranic
TSDF	Treatment, Storage, and Disposal Facility
TWAPs	Tank Waste Analysis Plans
TWINS	Tank Waste Information Network System
WAC	Waste Acceptance Criteria
WIPP	Waste Isolation Pilot Plant
WRPS	Washington River Protection Solutions, LLC
WTP	Waste Treatment Plant
WTS	Washington TRU Solutions, LLC

## 1.0 INTRODUCTION

1 The U.S. Department of Energy, Carlsbad Field Office (DOE), and Washington TRU Solutions,  
2 LLC (WTS), collectively referred to as the Permittees, submit this Class 3 Permit Modification  
3 Request (PMR) for the Hazardous Waste Facility Permit (Permit) issued to the Waste Isolation  
4 Pilot Plant (WIPP), U.S. Environmental Protection Agency (EPA) Number NM4890139088-  
5 TSDf (Treatment, Storage, and Disposal Facility).

6 Permit, originally issued October 27, 1999, and reissued April 15, 2011 by the New Mexico  
7 Environment Department (NMED), authorizes the management, storage, and disposal of  
8 hazardous waste mixed with contact-handled transuranic (CH-TRU) and remote-handled  
9 transuranic (RH-TRU) waste. This PMR proposes changes to the Permit that would allow the  
10 management, storage, and disposal of CH-TRU mixed waste at the WIPP facility from eleven  
11 (11) Hanford Site single-shell tanks (SST): 241-B-200 series (B-201, B-202, B-203, and B-204);  
12 241-T-200 series (T-201, T-202, T-203, and T-204); and the 241-T-100 series tanks (T-104, T-  
13 110, and T-111). The PMR is submitted pursuant to Permit Condition 1.3.1 and 20.4.1.900 New  
14 Mexico Administrative Code (NMAC) (incorporating 40 Code of Federal Regulations (CFR)  
15 §270.42(c)).

16 The Permit Condition 2.3.3.8 prohibits the Permittees from accepting CH-TRU mixed waste that  
17 has been managed as high-level waste (HLW) and waste from specific tanks identified in Permit  
18 Attachment C, Table C-8, unless specifically approved through a Class 3 PMR and listing such  
19 wastes in Table 2.3.3.8. Waste approved for disposal at the WIPP through this Class 3 PMR will  
20 also have to meet the requirements and criteria of the Permit including the Waste Analysis Plan.  
21 The management, storage, and disposal of Hanford CH-TRU mixed waste from the identified  
22 tanks will require changes to WIPP Permit conditions in Part 2. In accordance with 20.4.1.900  
23 NMAC (incorporating 40 CFR §270.42(c)(1)), this PMR proposes specific changes to be made  
24 to the Permit and provides relevant information on the Permit conditions affected. This Class 3  
25 PMR contains supporting technical information in compliance with the applicable information  
26 required by 40 CFR 270.13 through 270.22, 270.62, 270.63, and 270.66.

27 Waste from the eleven Hanford SSTs discussed within this PMR (b)(5)

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**1.1 HANFORD CONTACT-HANDLED TRANSURANIC MIXED WASTE**

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(b)(5) The Hanford  
CH-TRU tank waste streams are explicitly identified in the Annual Transuranic Waste Inventory

1 Report (ATWIR) (DOE/TRU-11-3425, Waste Stream ID: RP-TFC001, RP-W755, and RP-  
 2 W754). Under the existing WIPP Permit conditions, the Hanford CH-TRU waste streams will be  
 3 subject to the same pre-shipment analysis and testing as all of the wastes listed on the ATWIR.  
 4 The wastes cannot be shipped unless and until they are shown to meet the current Contact-  
 5 Handled Transuranic Waste Acceptance Criteria (CH-WAC) requirements (DOE/WIPP-02-  
 6 3122). (b)(5)

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**1.2 HANFORD CONTACT-HANDLED TRANSURANIC MIXED WASTE INVENTORY**

10 Table 1 provides the estimated waste volumes in the tanks and (b)(5)

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**Table 1. Hanford Tank Waste and Disposal Volumes**

Single-Shell Tank	Estimated In-Tank Waste * (gallons)	(b)(5)	Waste Stream Identification Numbers ***
241-B-201	30,920	(b)(5)	RP-W754
241-B-202	30,290		RP-W754
241-B-203	50,720		RP-W754
241-B-204	50,760		RP-W754
241-T-201	30,820		RP-W754
241-T-202	21,270		RP-W754
241-T-203	36,190		RP-W754
241-T-204	37,590		RP-W754
241-T-104	322,700		RP-TFC001
241-T-110	360,060		RP-W755
241-T-111	442,310		RP-W755
<b>TOTAL</b>	<b>1,413,630</b>		

\* HNF-EP-0182, Rev 280, Waste Tank Summary report for Month Ending July 31, 2011,

(b)(5)

\*\*\* ATWIR - DOE/TRU-11-3425

### **L3 CONTENTS AND ORGANIZATION**

1 This Class 3 PMR includes proposed changes to the existing WIPP Permit, additions that are  
2 specific to Hanford CH-TRU mixed tank waste, and justifications for the changes. The  
3 remaining sections of this Class 3 PMR are organized as follows:

- 4 a) Section 2.0 provides an overview of the PMR and information required for a Class 3  
5 PMR pursuant to 20.4.1.900 NMAC (incorporating 40 CFR §270.42(c)).
- 6 b) Attachment A provides a Table of Changes and a discussion of the modifications  
7 proposed for the WIPP Permit.
- 8 c) Attachment B contains the proposed modifications to the WIPP Permit with the  
9 proposed revisions marked.

10 The technical analyses that supports the designation, as well as the supporting information for  
11 the Hanford CH-TRU mixed tank waste is presented in Appendices A, B, C, D, and E.

## 2.0 OVERVIEW OF THE PERMIT MODIFICATION REQUEST (PMR)

1 This document contains one Class 3 PMR to the WIPP Permit, Permit Number  
2 NM4890139088-TSDF. This PMR is being submitted by the DOE, Carlsbad Field Office  
3 (CBFO) and WTS collectively referred to as the Permittees, in accordance with the WIPP Permit  
4 Condition 1.3.1 and 20.4.1.900 NMAC (incorporating 40 CFR 270.42). This Class 3 PMR is  
5 submitted to address the requirements of the WIPP Permit Condition 2.3.3.8. This PMR  
6 provides origin of waste information and other supporting information for the CH-TRU mixed  
7 waste from the eleven identified Hanford Site SSTs to show that the waste will meet WIPP waste  
8 acceptance requirements (WAC). Approval of this PMR will not reduce the ability of the WIPP  
9 facility to protect human health and the environment.

10 Modifications to the text of the WIPP Permit will be identified using a double underline for  
11 added information and a ~~strikeout~~ font for deleted information and will be provided in  
12 Attachment B. The following is information that is to be included in the Class 3 PMR in  
13 accordance with 20.4.1.900 NMAC (incorporating 40 CFR 270.42(c)).

### 2.1 20.4.1.900 NMAC (INCORPORATING 40 CFR §270.42(C)(1)(I)) REQUIRES THE APPLICANT TO DESCRIBE THE EXACT CHANGE TO BE MADE TO THE PERMIT CONDITIONS AND SUPPORTING DOCUMENTS REFERENCED BY THE PERMIT)

14 This PMR contains proposed Permit changes that are needed to allow Hanford Site CH-TRU  
15 mixed tank waste to be accepted for disposal at the WIPP. Supporting documentation, including  
16 origin of waste data, is provided with this PMR to support the proposed Permit changes so  
17 NMED can approve this Class 3 PMR. Approval of this PMR will allow the permittees to  
18 manage, store, and dispose approximately 1,800 m<sup>3</sup> of Hanford CH-TRU mixed waste from the  
19 following Hanford Site SSTs:

- 20 • 241-B-200 series (B-201, B-202, B-203, and B-204)
- 21 • 241-T-200 series (T-201, T-202, T-203, and T-204)
- 22 • 241-T-100 series SSTs (T-104, T-110, and T-111).

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24 (b)(5)

25 A description of the proposed changes to the  
26 WIPP Permit is provided in the Table of Changes in Attachment A. The exact wording of the  
proposed changes to the WIPP Permit is provided in Attachment B.

**2.2 20.4.1.900 NMAC (INCORPORATING 40 CFR §270.42(C)(1)(II)) REQUIRES THE APPLICANT TO IDENTIFY THAT THE MODIFICATION IS A CLASS 3 MODIFICATION**

1 The proposed modification is a Class 3 PMR for the reasons identified below:

- 2 • Permit Condition 2.3.3.8. “TRU mixed waste that has ever been managed as high-level  
3 waste and waste from tanks specified in Permit Attachment C are not acceptable at WIPP  
4 unless specifically approved through a Class 3 permit modification.”
- 5 • Permit Attachment C Section C-1c. “waste that has ever been managed as high-level  
6 waste and waste from tanks specified in Table C-8, unless specifically approved through  
7 a Class 3 permit modification”.
- 8 • 20.4.1.900 NMAC (incorporating 40 CFR 270.42, Appendix I, Item K.). “*Land*  
9 *Treatment...5. Management of different waste in land treatment units:...a. That require*  
10 *a change in permit operating conditions or unit design specifications...3*”

**2.3 20.4.1.900 NMAC (INCORPORATING 40 CFR §270.42(C)(1)(III)) REQUIRES THE APPLICANT TO EXPLAIN WHY THE MODIFICATION IS NEEDED**

11 The WIPP Permit Condition 2.3.3.8 prohibits acceptance of CH-TRU mixed waste from tanks  
12 that has ever been managed as HLW or from specific tanks identified in Table C-8 of the Permit  
13 unless approved for disposal through a Class 3 PMR. The eleven Hanford Site tanks containing  
14 CH-TRU waste have been managed as HLW and are listed in Table C-8. To assist in the review  
15 and approval process, this Class 3 PMR has been prepared to incorporate supporting information  
16 on the Hanford Site’s CH-TRU tank waste including the following:

- 17 • Historical, operational, and origin of waste information on the CH-TRU waste streams  
18 that were generated and placed in the tanks
- 19 • Information on the tank waste characterization efforts that have been undertaken
- 20 • How the Hanford Site has determined that the waste is CH-TRU and meets the  
21 requirements of the WIPP Permit, TSDF-WAC, and the CH-WAC
- 22 • A process description of how the Hanford Site CH-TRU mixed tank waste will be treated  
23 and packaged to provide a waste form acceptable for disposal at the WIPP.

24 The following descriptive material (Sections 2.3.1 through 2.3.6) is provided in support of this  
25 PMR.

**2.3.1 History of Hanford Site Tank Farms**

26 The U.S. DOE Hanford Site is located in southeast Washington and was established in 1943 as  
27 part of the nuclear weapons complex, formerly known as the Manhattan Project (Gephart 1998).  
28 Hanford was responsible for producing plutonium, which required the establishment of nuclear

1 fuel fabrication operations, the construction and operation of nuclear reactors, and the  
2 construction and operation of chemical separations facilities to extract plutonium from irradiated  
3 nuclear fuel and to subsequently purify the plutonium product to meet weapons fabrication  
4 requirements. During these operations, liquid wastes were generated and stored in the Hanford  
5 waste tanks. There were 149 SSTs constructed between 1943 and 1964, and 28 double-shell  
6 tanks (DSTs) constructed between 1968 and 1986.

7 The SSTs are more than twenty years beyond their design life, have been declared unfit for use  
8 (Letter, S.V. Moore, 2001). Sixty-seven (67) are known or suspected to have leaked wastes to  
9 the environment. Wastes have been transferred to and within these waste tanks based on source,  
10 compatibility, and tank volume management considerations. Liquid waste transfers among the  
11 SSTs were conducted primarily to stage liquid waste for processing through evaporators, remove  
12 pumpable liquid waste from tanks that were suspected to have leaked, or accommodate receipt of  
13 newly generated wastes. No further waste was added to the Hanford Site SSTs after January  
14 1981. The following identifies the last date wastes were added to the specific SSTs identified in  
15 this PMR:

- 16 • B-201, 202, 203, & 204: June 1962
- 17 • T-201, 202, 203, & 204: May 1952
- 18 • T-104: October 1954
- 19 • T-110: December 1954
- 20 • T-111: June 1967

### 2.3.2 Hanford Site Operators

21 DOE's Office of River Protection is responsible for management of the Hanford tank farms,  
22 including the retrieval, treatment, and disposal of Hanford's tank wastes. Washington River  
23 Protection Solutions LLC, (WRPS) is the current tank operations contractor for DOE, with a  
24 mission to safely store and manage the tank wastes, close the waste tanks, treat certain wastes,  
25 dispose of low-activity wastes (LAW), and support the off-site disposition of treated wastes.  
26 DOE has a separate contract with Bechtel National, Inc., to design and construct a tank Waste  
27 Treatment and Immobilization Plant (WTP). WRPS is contracted to supply feed to this facility.

#### 2.3.2.1 Hanford Transuranic Tank Waste Management

28 The Hanford tank farms contain wastes from a variety of past DOE activities including  
29 production of nuclear products; spent nuclear fuel processing for plutonium recovery and  
30 purification; fuel cladding removal; decontamination; research and development; and uranium  
31 and radioisotope recovery operations. The tank wastes are radioactive mixed wastes (i.e.,  
32 radioactive wastes that are mixed with hazardous waste as defined by RCRA). However, as is  
33 evidenced by their diverse origins, some wastes are not HLW by definition, as they were not  
34 directly produced during the reprocessing of spent nuclear fuel, nor were they derived from such  
35 wastes. Consistent with DOE Order 435.1, the radioactive component may be HLW, TRU  
36 waste, or low-level waste (LLW).

1 Current waste management practices involve the segregation of TRU wastes from HLW to the  
2 extent practical. Past waste management practices also involved segregation of wastes based on  
3 waste characteristics to facilitate treatment and disposal activities. In the Hanford tank farms,  
4 this segregation was achieved by establishing separate, dedicated storage tanks for specific waste  
5 types based on the processes that generated the wastes, restricting the transfer of wastes among  
6 tanks, and by subjecting tank wastes to specific administrative controls and decision-making  
7 processes. The administrative controls associated with segregating the tank wastes identified as  
8 CH-TRU in this PMR remain in effect today (HNF-IP-1266).

9 Notwithstanding the physical segregation of waste by type, DOE and its contractors have  
10 managed all tank wastes consistent with current stringent standards for HLW in order to preclude  
11 the need to construct and maintain separate tank systems for interim storage of TRU or other  
12 tank wastes. A single tank farm management protocol avoided the need to establish separate  
13 safety protocols for the management of different tanks, depending on whether the wastes were  
14 high-level, TRU, or low-level, and assured that consistent and stringent protocols were applied to  
15 the waste tanks.

16 Although DOE has managed all tank wastes consistent with standards for HLW, DOE has not  
17 designated all tank wastes as HLW. DOE has provided this information in NEPA documentation  
18 for the Hanford Site:

19 *“Tank wastes result from various processing activities and may be either, high-level,*  
20 *transuranic, low-level, or hazardous chemical wastes.” (DOE/EIS-0113, 1987)*

21 *“Waste must be managed, treated, stored, and disposed of differently according to the*  
22 *waste type, degree of risk posed to humans or the environment, and its source. Waste in*  
23 *the tank farm system includes the following waste types.*

24 *The most dangerous radioactive waste is **high-level waste**, a by-product of*  
25 *reprocessing spent nuclear fuel. This waste requires radiation shielding, special*  
26 *handling techniques, and when disposed of, special measures to isolate it from*  
27 *humans and the environment.*

28 ***Transuranic waste** is material contaminated with radioactive elements with*  
29 *atomic numbers greater than uranium. This waste does not require the same*  
30 *degree of isolation as high-level waste; however, it cannot be disposed of in a*  
31 *near-surface facility.*

32 *The least dangerous radioactive waste is **low-level waste**. It consists of all*  
33 *radioactive waste that is not high-level, transuranic, spent nuclear fuel, or*  
34 *by-product material, and may be disposed of in a near-surface facility.*

35 ***Low-activity waste** consists of waste that remains following the process of*  
36 *separating as much of the radioactivity as is practicable from high-level waste.*  
37 *When solidified, low-activity waste may be disposed of as low-level waste in a*  
38 *near surface facility.*

39 ***Hazardous or dangerous waste** is ignitable, corrosive, reactive, toxic, persistent*  
40 *in the environment, exhibits dangerous waste characteristics, or appears on*  
41 *special EPA lists. The waste may cause or contribute to an increase in health*

1           *hazards when improperly treated, stored, transported, disposed of, or otherwise*  
2           *managed.*

3           **Mixed waste** is waste that is both hazardous or dangerous and radioactive.”  
4           (DOE/EIS-0189, August 1996, page S-3) “

5 In 1988, following the preparation of the *Final Environmental Impact Statement, Disposal of*  
6 *Hanford Defense High-Level, Transuranic and Tank Waste* (DOE/EIS-0113, 1987), DOE issued  
7 a Record of Decision (53 FR 12449, 1988) on the proposed disposition of some tank wastes.  
8 DOE’s Record of Decision announced its decision to retrieve and treat high-level, non-SST TRU  
9 wastes, and DST waste. This Record of Decision also announced that wastes contained in the  
10 SSTs, including those identified in this PMR, as well as buried TRU and other site wastes, would  
11 be further studied and their treatment and disposal would be the subject of future NEPA analyses  
12 and decisions. Consistent with this Record of Decision regarding the DST waste, DOE initiated  
13 plans to construct the Hanford Waste Vitrification Plant, which would have had the capacity to  
14 complete waste treatment of DST wastes.

15 In the early 1990’s, DOE determined that it needed to develop and implement a strategy to  
16 retrieve and treat all the tank wastes in both the SST and DST systems. This strategic change  
17 required a significant increase in the total treatment capacity. The Hanford Waste Vitrification  
18 Plant was determined to be too small to support completion of the mission and was cancelled. A  
19 series of technical studies were undertaken in 1993 to establish a new path forward. A new plan  
20 emerged in 1995 to construct a much larger vitrification facility, with a pretreatment facility to  
21 separate low-activity tank wastes from high-activity tank wastes. The separate waste streams  
22 would then go to large vitrification facilities; one to immobilize the fraction of the wastes  
23 commonly called LAW, and one to immobilize the high-activity waste fraction of the wastes,  
24 commonly called the HLW. This new treatment complex is currently under construction and,  
25 after commissioning, will operate for approximately 30 years.

26 In 1997 DOE prepared the *Tank Waste Remediation System, Hanford Site, Richland,*  
27 *Washington, Final Environmental Impact Statement (DOE/EIS-0189)*. DOE issued a Record of  
28 Decision on the proposed disposition of DST and SST tank wastes (62 FR 8693, 1997). DOE’s  
29 Record of Decision announced its decision to retrieve and treat tank wastes contained in the  
30 DSTs and SSTs. The decision conformed to the revised DOE technical strategy for waste  
31 retrieval, treatment, and disposal.

32 During the planning timeframe of the early 1990’s, DOE and its contractors conducted a series of  
33 additional studies to consider waste treatment strategies other than vitrification. One particular  
34 study conducted in 1995 (WHC-SD-WM-ES-331, 1995 and Letter 9552169, 1995), focused on  
35 identifying SSTs and DSTs containing TRU wastes. As an element of that study, the tank  
36 histories and inventories were reviewed to identify which of the tanks contained TRU wastes.  
37 TRU tank waste treatment strategies were developed in this study using the emerging definitions  
38 from the WIPP LWA, the draft CH-WAC, and an earlier U.S. Nuclear Regulatory Commission  
39 proposed rulemaking associated with HLW definitions.

40 This same study identified an initial population of tanks that contain TRU wastes. The study  
41 also indicated that further characterization and development of tank process history would likely  
42 establish that additional tanks contained TRU wastes.

1 In 1995, the DOE determined that alternative tank waste disposal strategies should be evaluated  
2 based on the projected cost difference between estimated disposal costs for a HLW repository  
3 and WIPP (Letter 95-TWR-129, 1995). Two follow-on technical studies were commissioned  
4 and issued.

5 The first study resulted in a decision document (Letter 9651784, 1996) recommending that the  
6 technical planning baseline be modified to include blending of the TRU tank wastes with HLW  
7 feeds for treatment and disposal of that blended material in a national HLW repository, rather  
8 than separately packaging it for disposal at the WIPP. The decision document was updated in  
9 1996 to include an alternatives evaluation appendix (WHC-SD-WM-ES-368, 1996). The second  
10 study (WHC-SD-WM-ES-386, 1996), established the technical feasibility of separately  
11 processing this TRU material for disposal at the WIPP.

12 The first study provided several key assumptions, upon which the recommendation to blend the  
13 TRU wastes with HLW feeds for treatment were made. These were:

- 14 • The HLW vitrification system had excess capacity to complete vitrification at no  
15 significant incremental capital or operating costs
- 16 • The incremental cost for immobilizing TRU wastes using the HLW vitrification system  
17 would be minor relative to the total cost for the treatment and disposal of the tank wastes
- 18 • The vitrified TRU waste would need to be disposed of as remote-handled.

19 At the time the recommendation (Letter 9651784, 1996) was developed, the process for  
20 addressing remote-handled TRU wastes was highly uncertain as was the DOE-wide capacity  
21 demand for remote-handled waste disposal at WIPP. Accordingly, DOE concurred with the  
22 recommendation in August 1996 (Letter 96-WDD-102, 1996) and authorized changes to the  
23 planning basis. However, DOE specifically precluded any changes to the current waste  
24 management procedures, thus requiring continued segregation of stored TRU wastes from HLW.

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9 DOE has included in the scope of the Draft Tank Closure and Waste Management EIS its most  
10 recent NEPA analysis, and the alternatives for Hanford tank TRU waste removal, treatment, and  
11 disposal based on the re-evaluation of pathways for the disposition of TRU tank wastes. Among  
12 the alternatives are:

- 13 • Continue with the waste treatment and disposal path previously selected 62 FR 8693  
14 (processing the waste for separations at the treatment facility into high-level and low  
15 activity waste streams and/or as single high level waste stream),
- 16 • Select a waste management and disposal approach that would retrieve and package CH-  
17 TRU and RH-TRU for disposal at WIPP.

18 These alternatives are presented in DOE/EIS-0391, Draft, October, 2009. The final EIS and  
19 ROD are scheduled for issuance in 2012.

20 As part of the ongoing EIS review process, DOE has published in the Federal Register (74 FR  
21 67189) that its preference would be not to ship any CH-TRU tank waste to WIPP, but rather it  
22 would be treated at the WTP. However, the EIS still maintains the option of treating specific  
23 tank wastes, such as those identified in this PMR, to meet TRU waste qualification requirements  
24 for WIPP disposal.

25 In summary, eleven Hanford tanks identified in this PMR (b)(5) (b)(5)

26 (b)(5)  
27  
28

**2.3.2.2 Hanford Tank Waste Performance Measurement Baseline**

29 (b)(5)  
30

31 (b)(5) The HFFACO requires tank waste treatment to be completed by 2047. Prior to  
32 2003 the PMB lacked detail as to how to accomplish this milestone. In Fiscal Year 2003,  
33 following the development of the *Hanford Performance Management Plan* (DOE/RL-2002-47,  
34 2002), the PMB was modified to include two additional tank waste treatment and disposal paths.  
35 First, the Transuranic Mixed Waste Packaging Project was added for packaging TRU wastes.  
36 Second, a supplemental treatment approach was added to treat LAW that could not be treated in  
37 the WTP, even with enhancements that were added to increase its overall throughput. These

1 changes to the PMB required active pursuit from the DOE of additional waste treatment and  
2 packaging methods to support retrieval, treatment, and disposal of tank wastes in support of the  
3 HFFACO milestone.

4 DOE has re-affirmed its approach in issuance of the River Protection Project System Plan (ORP-  
5 11242, Rev. 6, 2011). In order to achieve the commitment of treating the tank wastes for  
6 disposal by 2047, the PMB assumes a three-path approach to waste treatment. Implementation  
7 of technologies supplemental to the WTP will reduce the burden on the WTP and improve the  
8 speed with which risks to the environment are reduced. The three paths include the treatment of  
9 high-activity wastes and a percentage of the low-activity wastes through the WTP, processing  
10 TRU tank wastes for disposal at the WIPP, and supplemental treatment of low-activity wastes in  
11 parallel with the WTP.

### 2.3.2.3 Hanford Site Legally Enforceable Milestones

12 The HFFACO was signed on May 15, 1989, by the DOE, the EPA, and Washington State  
13 Department of Ecology (Ecology, EPA, and DOE, 1989). The HFFACO is a legally enforceable  
14 agreement and consent order that establishes a schedule and framework for the cleanup of the  
15 Hanford Site. Specifically, the HFFACO commits the DOE to achieve compliance with the  
16 *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) remedial  
17 action provisions and with the RCRA treatment, storage, and disposal unit regulations and  
18 corrective action provisions, including the Washington State Dangerous Waste implementing  
19 regulations.

20 To achieve compliance, the HFFACO (1) defines and ranks RCRA and CERCLA cleanup  
21 commitments, (2) establishes responsibilities, (3) provides a basis for budgeting, and (4) reflects  
22 a concerted goal of achieving full regulatory compliance and remediation, with enforceable  
23 milestones, in an aggressive manner. Due to the complexities of designing and constructing the  
24 WTP and waste retrieval from the SSTs, the State of Washington and DOE jointly entered into a  
25 Consent Decree agreement that provides milestones that supplement the HFFACO milestones  
26 (Consent Decree No. 08-5085, Filed 10/25/10). Key tank farm milestones include:

- 27 • M-062-40: Submittal of a Hanford Tank Waste Supplemental Treatment Technologies  
28 Report; This report is to identify technologies and cost which in combination with the  
29 WTP are needed to vitrify all of Hanford's tank waste by a date not later than the date  
30 established in Milestone M-062-00 (i.e., 2047) – 10/31/2014
- 31 • M-045-70: Complete retrieval of all remaining SSTs – 12/31/2040
- 32 • M-045-00: Complete closure of all SST farms – 1/31/2043
- 33 • M-062-00: Complete pretreatment processing and vitrification of Hanford high-level and  
34 low-activity tank wastes – 12/31/2047.

35 A cornerstone for the treatment of tank wastes and compliance with HFFACO and Consent  
36 Decree milestones is the WTP, which is planned to begin operating in 2019. With the addition  
37 of handling TRU wastes and supplemental treatment for LAW external to the WTP, sufficient  
38 capacity can be in place to treat the tank wastes by the HFFACO milestone date of 2047 (ORP-

1 11242, Rev. 6, 2011). Implementing supplemental processing tailored to the characteristics of  
2 the wastes to be treated will improve the rate of environmental risk reduction by removing  
3 wastes from these older leak-prone SSTs, such as those tanks that contain TRU wastes  
4 (RPP-13678, 2003 and DOE/RL-2002-47, 2002).

### 2.3.3 Characterization of Hanford Transuranic Mixed Waste

5 (b)(5)  
6  
7 (b)(5) On November 15, 1999, the DNFSB issued a letter stating that sampling  
8 and characterization activities were completed, closing Recommendation 93-5 (Letter, J.T.  
9 Conway, 1999). The HFFACO Milestone M-44-00A (Letter 02-EMD-162, 2002) was  
10 completed October 1, 2002. (b)(5)  
11 (b)(5)  
12 (b)(5) The following sections  
13 (2.2.3.1 and 2.2.3.2) provide summary information on SST waste characterization activities and  
14 summaries of the processes that generated the wastes, which allow delineation of the TRU mixed  
15 waste streams stored in the 11 Hanford SST's identified in this PMR.

#### 2.3.3.1 Characterization of Waste and the Resource Conservation and Recovery Act

16 HFFACO Milestone M-44-00 (89-10, 2003 and M-44-93-01, 1994) required the preparation of  
17 Tank Characterization Reports for the Hanford tank wastes, under RCRA. Those reports were  
18 based on process knowledge, prior characterization data, and validated empirical data acquired  
19 after May, 1989, e.g., laboratory analyses of tank waste samples. Milestone M-44-02 (89-10,  
20 2003 and M-44-93-01, 1994) required that Tank Waste Analysis Plans (TWAPs) and Tank  
21 Characterization Reports be submitted annually to the Washington State Department of Ecology  
22 and EPA for approval. The TWAPs were required to address safety, retrieval, pretreatment, and  
23 other processing needs. The TWAPs were also required to identify sampling and analysis  
24 activities projected for the following fiscal year.

25 TWAPs (WHC-SD-WM-PLN-101, 1996; WHC-SD-WM-PLN-120, 1996; and HNF-SD-WM-  
26 PLN-125, 1997) are subject to specific quality control and quality assurance requirements set  
27 forth in the *Tank Waste Remediation System Characterization Program Quality Assurance*  
28 *Program Plan* (WHC-SD-WM-QAPP-025, 1994). That plan required that the characterization  
29 program use EPA quality assurance guidelines and meet the requirements and standards of  
30 Washington Administrative Code Chapter 173-303, Dangerous Waste Regulations.

31 The *Hanford Analytical Services Quality Assurance Requirements Document* (HASQARD)  
32 (DOE/RL-96-98, 1998) establishes quality requirements in response to DOE Order 5700.6C.  
33 The HASQARD is designed to meet the needs of the DOE for maintaining a consistent level of  
34 quality for sampling, as well as field and laboratory analytical services provided by contractor  
35 and commercial field and laboratory analytical operations. The HASQARD is based on several  
36 EPA drivers including SW-846 (Test Methods for Evaluating Solid Waste, Physical/Chemical  
37 Methods, EPA, 1986).

1 Characterization determinations are made using analytical results from tank waste samples as  
2 well as historical information about the tanks. The characterization of the SST system wastes  
3 and the analytical data were obtained and analyzed consistent with current RCRA requirements  
4 and provide information regarding the RCRA characteristics of the wastes. The HASQARD  
5 qualified characterization data for the eleven SSTs addressed in this document is obtained from  
6 the Hanford Site Tank Waste Information Network System (TWINS) database. Current waste  
7 characterization information is provided from the TWINS-generated Auto Tank Characterization  
8 Reports. These reports contain data regarding the characterization of the wastes in the Hanford  
9 tanks, addressing the physical, chemical, and radiological properties of the wastes. Current  
10 TWINS data provides a regulatory and scientific basis to be used in the identification of RCRA  
11 characteristic waste codes to support eventual disposition of these waste streams at the WIPP, in  
12 accordance with the WIPP Permit. Confirmatory waste sampling and analysis of the packaged  
13 wastes will be conducted to verify acceptable knowledge and certify that the waste meets the  
14 CH-WAC, as set forth in the WIPP Permit.

### 2.3.3.2 Origin of Waste

15 The initial mission at the Hanford Site was to separate plutonium from spent nuclear fuel  
16 elements. The first process used to separate plutonium from spent nuclear fuel elements  
17 consisted of a series of chemical dissolution and precipitation processes known as the Bismuth  
18 Phosphate Process (DOE/ORP-2004-01, 2004) that is fully described in Appendix A. The  
19 Bismuth Phosphate Process was used from 1945 through 1956. Various process operations,  
20 including spent nuclear fuel reprocessing, were carried out in four facilities in separate parts of  
21 the Hanford Site. These facilities were the 221-B Plant and the 224-B Building and the 221-T  
22 Plant and the 224-T Building.

23 The Bismuth Phosphate Process generated five distinct waste types that were transferred to the  
24 SSTs, as shown in Figure 1. These five waste types are commonly called (1) coating removal  
25 wastes, (2) metal wastes, (3) first decontamination cycle wastes, (4) second decontamination  
26 cycle wastes, and (5) 224 wastes. The first four of these waste types (i.e., coating removal waste,  
27 metal waste, first decontamination cycle waste, and second decontamination cycle waste) were  
28 generated in the 221-B and 221-T Plants. The 224 wastes were generated from plutonium  
29 processing activities conducted in the 224-B and 224-T Buildings.

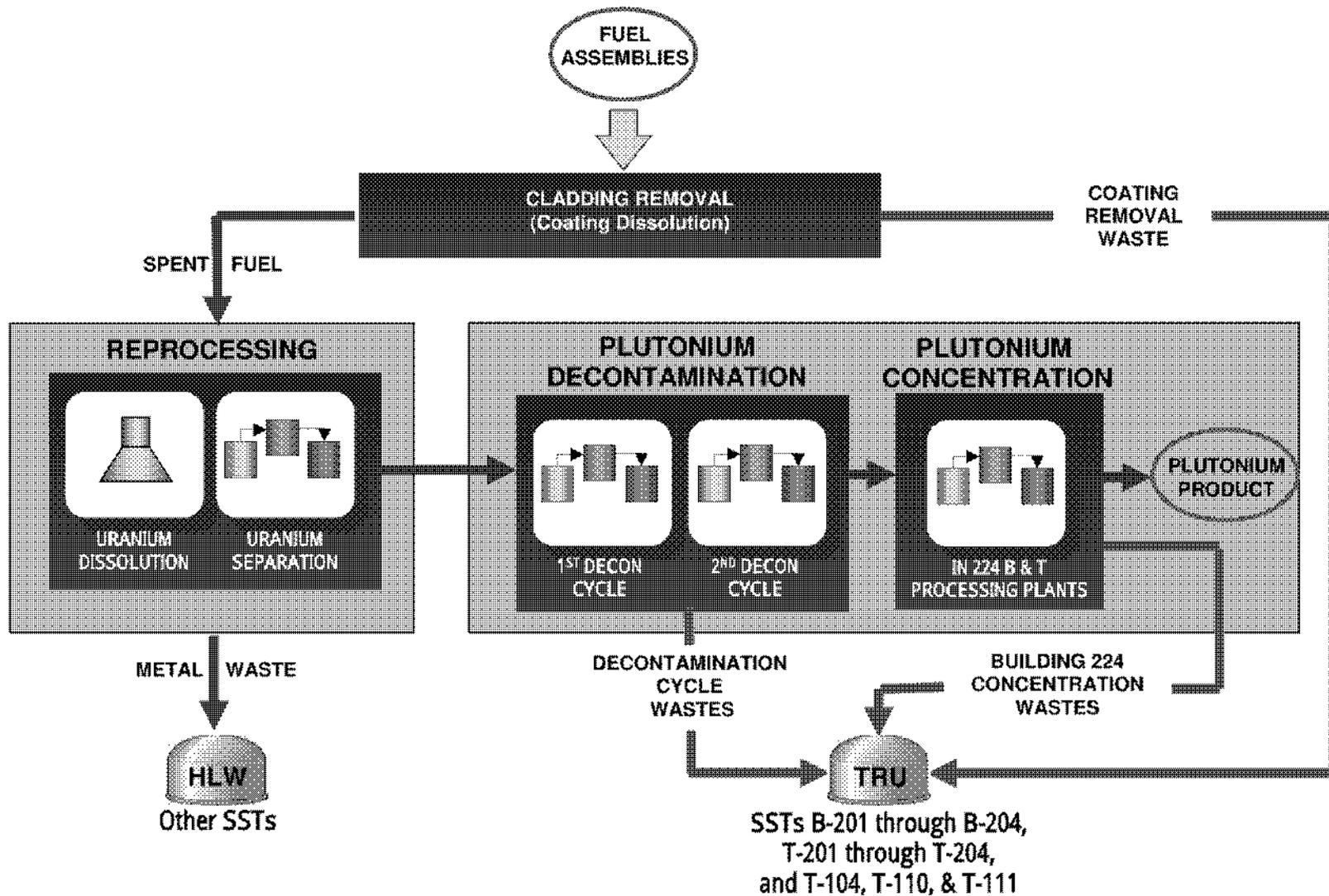
30 The batch nature of the Bismuth Phosphate Process provides very sharp demarcation points  
31 between process steps, which enables clear distinctions to be made regarding whether or not  
32 these steps involved spent nuclear fuel reprocessing. During each batch operation, process  
33 chemicals were added to selectively dissolve and/or precipitate specific chemical compounds.  
34 Then liquids and solids were separated from each other. Following the initial liquids/solids  
35 separations, the solids were rinsed and separated from the rinse liquids in several distinct  
36 operations prior to the solids entering the next batch operation step. This provided a clear basis  
37 for determining, for example, that any liquids produced directly during the reprocessing of spent  
38 nuclear fuel were thoroughly washed from the plutonium product precipitate during the metals  
39 dissolution batch process operation before that plutonium precipitate was transferred to the next  
40 batch operation, first cycle decontamination. The combination of the clear demarcation points  
41 between process operations and the tank farm management protocols that maintained certain

1 waste streams separate from others adds confidence to DOE's determination that the waste  
2 streams discussed in this document are CH-TRU wastes. The Bismuth Phosphate Process steps  
3 are described in more detail below.

4 The nuclear fuel elements that were processed in the 221-B and 221-T Plants consisted of  
5 uranium metal coated with an aluminum-silicon alloy. The aluminum-silicon alloy coating  
6 (sometimes referred to as hull or cladding) was separated from the spent fuel by chemical  
7 dissolution using sodium hydroxide and sodium nitrate. Sodium hydroxide and sodium nitrate  
8 were used to dissolve the aluminum-silicon coating because these chemicals do not dissolve the  
9 uranium metal, (b)(5)

10 (b)(5) The highly caustic dissolved coating material wastes (designated as CW) were  
11 separated from the uranium metal and then transferred to SSTs designated for their storage.

Figure 1. Spent Fuel Reprocessing and TRU Waste Generation



1 Following coating removal, the uranium metal was dissolved in nitric acid to separate the spent  
2 nuclear fuel into its constituent elements of fission products, uranium, plutonium, and other TRU  
3 elements. Water and sulfuric acid were added to the dissolved spent nuclear fuel to ensure the  
4 uranium and long-lived fission products remained in solution. Bismuth nitrate and phosphoric  
5 acid were then added to form bismuth phosphate and plutonium phosphate precipitates (i.e.,  
6 solids). Uranium and approximately 90 percent of the activity from long-lived fission products  
7 such as cesium-137 and strontium-90 remained in solution. The bismuth phosphate and  
8 plutonium phosphate precipitates were separated from the uranium and long-lived fission  
9 products by centrifuging the mixture. The precipitates were washed and re-centrifuged three  
10 times to remove any waste liquids and soluble fission products that may have been entrained in  
11 the precipitate. In addition to a small fraction (less than 10 percent) of strontium-90, short-lived  
12 fission products such as zirconium-95, niobium-95, and cerium-144 were co-precipitated with  
13 the bismuth phosphate and plutonium phosphate. These short-lived fission products, with half-  
14 lives of less than one year, rapidly decayed during storage. The washed plutonium precipitate  
15 solids were segregated for eventual plutonium product generation.

16 The waste solution, from the above processing step was known as metal wastes (designated as  
17 MW). The metal wastes contained the highly radioactive fission products and uranium that were  
18 separated from the spent fuel during reprocessing (b)(5)  
19 (b)(5) (b)(5)  
20 (b)(5) The metal wastes were transferred to a set of SSTs that were  
21 different than the set of SSTs that received other waste types from the Bismuth Phosphate  
22 Process. The tanks that received metal wastes are not under consideration for disposal at the  
23 WIPP.

24 Following the separation of the metal wastes and washing of the bismuth phosphate and  
25 plutonium phosphate precipitates, reprocessing of the spent nuclear fuel has been completed.  
26 The next phase in the Bismuth Phosphate Process was plutonium decontamination where the  
27 bismuth phosphate and plutonium phosphate precipitates underwent further chemical reactions to  
28 purify the plutonium.

29 The bismuth phosphate and plutonium phosphate precipitates were dissolved in nitric acid  
30 solution to form plutonium nitrate and bismuth nitrate in solution. This plutonium solution was  
31 then processed through two successive and similar decontamination cycles to separate the short  
32 half-life fission products such as zirconium-95, niobium-95, and cerium-144. Washings and  
33 waste streams were collected in tank 15-8 (tank number 15-9 for second decontamination cycle  
34 waste) within either 221-B or 221-T Plants.

35 The plutonium solution was then reacted with bismuth sub-nitrate and phosphoric acid to  
36 produce bismuth phosphate and plutonium phosphate precipitates. The liquids collected from  
37 centrifuging and washing the bismuth phosphate and plutonium phosphate precipitates were also  
38 transferred to waste collection tank 15-8 (tank number 15-9 for second decontamination cycle  
39 waste) within the 221-B or 221-T Plants.

40 After washing, the bismuth phosphate and plutonium phosphate precipitates were then dissolved  
41 in nitric acid forming plutonium nitrate and bismuth nitrate in solution. This solution was then

1 transferred to the second decontamination cycle where the first decontamination steps were  
2 repeated to continue purification of the plutonium product. At the end of the second  
3 decontamination cycle, the plutonium nitrate and bismuth nitrate solution was transferred to the  
4 224-B or 224-T Building for additional purification and concentration of the plutonium product.

5 The waste solutions collected in tank 15-8 were known as the first decontamination cycle wastes  
6 (designated as 1C waste). As previously stated, the CW was combined with the 1C wastes to  
7 neutralize the acidic 1C wastes. The neutralized, combined 1C / CW wastes were transferred to  
8 a specific set of SSTs. The waste solutions collected in tank 15-9 were known as the second  
9 decontamination cycle wastes (designated as 2C waste). The 2C wastes were neutralized by  
10 addition of sodium hydroxide solution and transferred to a specific set of SSTs.

11 The plutonium solution from the 221-B / 221-T Plants was transferred to the 224-B / 224-T  
12 Building to remove the bismuth phosphate and residual fission products. The various solutions  
13 from precipitate reactions and acid/base washings were collected as 224 wastes. All of these  
14 waste solutions were neutralized with sodium hydroxide solution and then transferred to a  
15 dedicated set of SSTs.

16 The 1C / CW, 2C and 224 wastes are derived from treating the plutonium product separated from  
17 the spent nuclear fuel. The *Nuclear Waste Policy Act of 1982* defines HLW as:

- 18 a) highly radioactive material resulting from the reprocessing of spent nuclear fuel,  
19 including liquid waste produced directly in reprocessing and any solid material  
20 derived from such liquid waste that contains fission products in sufficient  
21 concentrations  
22 b) highly radioactive material that the NRC, consistent with existing laws, determines by  
23 rule requires permanent isolation.

24 (b)(5)

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30 As previously stated, specific SSTs received the 1C / CW, 2C and 224-waste types. The tanks  
31 that received these waste types are now discussed in further detail.

32 **224-Waste (Tanks 241-B-201 through 241-B-204 and 241-T-201 through 241-T-204)**

33 The 224 wastes originated from plutonium purification and concentration activities that were  
34 conducted in the 224-B and 224-T Buildings at the Hanford Site. (b)(5)

35 (b)(5)

36 The 224-B and 224-T Buildings received plutonium nitrate solution that was separated from spent  
37 nuclear fuel as part of processing activities conducted in the 221-B and 221-T Plants. Wastes  
38 from the 224-B Building were discharged to tanks 241-B-201 through 241-B-204 from October

1 1946 through September 1952. Wastes from the 224-T Building were discharged to tanks 241-T-  
2 201 through 241-T-204 from October 1946 through May 1952 and then to tanks 241-T-110 and  
3 241-T-111 through September 1956.

4 Tanks 241-B-201, 241-B-202, 241-B-203, and 241-B-204 also received wastes from an off-gas  
5 scrubber in the system and decontamination of process equipment following completion of the  
6 Bismuth Phosphate Process activities in the 221-B Plant and 224-B Building. Specifically, from  
7 July 1952 through March 1953, all equipment within the 221-B Plant and the 224-B Building was  
8 flushed with nitric acid and other chemicals to remove plutonium and fission products. The  
9 equipment cleaning solution was processed through the normal process equipment routes to  
10 recover plutonium. High-level waste (metal waste) was not transferred to tanks B-201, B-202, B-  
11 203, or B-204 as a result of this equipment cleaning.

12 In summary, waste storage tanks 241-B-201 through 241-B-204 and 241-T-201 through 241-T-  
13 204 did not receive spent nuclear fuel or HLW. The origin of waste report RPP-13300 provided  
14 in Appendix B demonstrates that these wastes have been segregated from HLW stored at the  
15 Hanford Site since they were generated.

#### 16 **1C/CW and 2C Waste Types (Tanks 241-T-104, 241-T-110, and 241-T-111)**

17 The 1C / CW and 2C waste types originated from plutonium product processing activities that  
18 were conducted between 1945 and 1956 in the 221-T and 221-B Bismuth Phosphate Plants and  
19 the 224-T and 224-B Buildings at the Hanford Site. The 1C / CW wastes were discharged to  
20 various SSTs, including tank 241-T-104. Other tanks at the Hanford Site also received cladding  
21 removal wastes and 1C wastes, but these tanks are not being considered for disposal at the WIPP,  
22 since this material was transferred to other secondary storage tanks and/or mixed with HLW.  
23 The 2C wastes were discharged to various SSTs, including tanks 241-T-110 and 241-T-111.

24 Wastes from the 224-T Building were also discharged to tanks 241-T-110 and 241-T-111 from  
25 May 1952 through September 1956. Tanks 241-T-110 and 241-T-111 received waste from the  
26 cell drainage collection tank in 221-T Plant. Tank 241-T-111 received wastes from equipment  
27 decontamination activities conducted in the 221-T Plant.

28 The 1C / CW and 2C wastes formed solids during storage in these tanks. The solids settled to  
29 the bottom of each tank, leaving a clarified supernatant (liquid). The supernatant was removed  
30 from each tank.

31 In summary, storage tanks 241-T-104, 241-T-110, and 241-T-111 did not receive spent nuclear  
32 fuel or HLW. Origin of Waste reports RPP-16129 and RPP-13873, provided in Appendix C and  
33 D, respectively, demonstrate that wastes generated and stored in these tanks have been  
34 segregated from HLW stored at the Hanford Site since they were generated. (Note: Appendix D  
35 also includes information on tank 241-T-112; however that tank is not included in this PMR).

### 2.3.3.3 Radionuclide Characteristics of Selected Hanford Tanks

1 The wastes in the TRU tanks (Table 1) (b)(5)  
2 (b)(5) Table 2 compares select chemical isotope  
3 concentrations within these tanks to waste within two tanks planned for final treatment as HLW.  
4 These two tanks, B-103 and T-102, do not represent the chemical concentrations of all the HLW  
5 stored within the Hanford tank farm system but do provide a good comparison, as these two  
6 tanks are also within the same tank farms as the TRU tanks. Therefore, they show a comparative  
7 difference between tanks that only received TRU material, compared to those that received a  
8 range of HLW waste streams over similar waste receipt and storage periods. TRU element  
9 isotopic concentrations, i.e.,  $^{239}\text{Pu}$  and  $^{241}\text{Am}$ , are generally one to two orders of magnitude  
10 higher in the TRU tanks than in the HLW sludges. The TRU tanks are also significantly lower by  
11 several orders of magnitude in isotopes generally associated with HLW (high environmental  
12 concern and high dose), and non-TRU uranium isotopes. Table 2 was generated from current  
13 best-basis inventory data, and may not exactly match earlier document tabulations because of  
14 radioactive decay or source calculations; the single number in the TRU column represents the  
15 average value, while the range is noted in parentheses.

**Table 2. Radionuclide Characterization Relative to HLW Tanks<sup>1</sup>**

Analyte	TRU Tank Waste <sup>2</sup> ( $\mu\text{Ci/g}$ )	HLW Tank Sludge Waste ( $\mu\text{Ci/g}$ )	
	B200/T200 Series <sup>3</sup> , T-104, T-110, T-111	B-103	T-102
Typical Transuranic Elements			
<sup>239</sup> Pu	3E-01 (6E-02 to 3E-01)	6E-04	3E-02
<sup>241</sup> Am	3E-02 (5E-03 to 7E-02)	1E-04	2E-01
Typical HLW Elements			
<sup>129</sup> I	3E-08 (0E+00 to 3E-07)	5E-07	1E-04
<sup>137</sup> Cs	5E-02 (6E-03 to 1E-01)	2E+00	1E+01
<sup>90</sup> Sr	9E-01 (2E-03 to 4E+00)	4E+01	1E+02
Typical Non-Transuranic Elements			
<sup>233</sup> U	2E-10 (2E-15 to 1E-09)	7E-08	1E-02
<sup>235</sup> U	7E-06 (9E-11 to 5E-05)	4E-03	4E-04
<sup>236</sup> U	2E-06 (2E-11 to 1E-05)	7E-04	1E-04
<sup>238</sup> U	2E-04 (2E-09 to 1E-03)	9E-02	10E-03

<sup>1</sup> Best Basis Inventory as evaluated in WRPS-2011<sup>2</sup> Average sludge waste concentration value (*range of concentration*)<sup>3</sup> B200/T200 series tanks include: B-201, B-202, B-203, B-204, T-201, T-202, T-203, T-204

**2.3.3.4 TRU Waste Identification Conclusion**

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**2.3.4 Waste Packaging and Characterization Planning**

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(b)(5)

**Table 3. Estimated Concentration for Hanford TRU Tank Wastes After Packaging**

Storage Tank	TRU nanocuries per gram
(b)(5)	

(b)(5)

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(b)(5)

1 (b)(5) The Hanford Site CH-TRU mixed waste treatment and packaging  
2 system process is further described in Appendix E of this PMR.

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### 2.3.5 Acceptability of Waste Pursuant to the WIPP Waste Acceptance Criteria

29 As has been noted, the TRU waste tanks have historically been managed as part of a larger group  
30 of 149 SSTs at Hanford. Although these 149 SSTs contain diverse wastes, the tanks were  
31 identified as a single unit for RCRA permitting purposes. Because of this, waste codes for every  
32 waste type stored, or that may be stored in the SSTs are shown as applicable to all of the tanks as  
33 noted in the SST Part A, Form 3 (DOE/RL-88-21, 2011). The RCRA waste codes applied to the  
34 Hanford radioactive storage tanks containing CH-TRU wastes include those permitted for the  
35 WIPP, except for characteristic waste codes D001, D002, D003, and D041. Hanford Site

36 (b)(5)

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(b)(5) Table 4

- 1 presents the list of hazardous waste codes that are anticipated to be applicable to the treated
- 2 (dried) waste form.

**Table 4. CH-TRU Mixed Waste Treatment and Packaging System Dried Waste Designation**

Characteristic Waste Numbers				Listed Waste Numbers		
D004	D005	D006	D007	F001	F002	F003
D008	D009	D010	D011	F004	F005	
D018	D019	D022	D028			
D029	D030	D033	D034			
D035	D036	D038	D039			
D040	D043					

Note: Washington State specific codes (WT01, WT02, WP01, and WP02) may be applied at the time the waste is profiled and would not render the waste unacceptable in accordance with the CH-WAC.

- 3 Table 5 lists the wastes prohibited for storage and disposal at the WIPP facility. This information
- 4 has been taken from Permit Condition 2.3.3 (Treatment, Storage, and Disposal Facility [TSDF]
- 5 WAC) of the Permit. The table demonstrates (b)(5)
- 6 (b)(5)

**Table 5. How Hanford Site Waste Analysis Will Meet the TSDF-WAC (3 Pages)**

Permit Condition	Prohibited Waste (from Permit Condition 2.3.3, TSDF-WAC)	(b)(5)
2.3.3.1	<p>Liquids – Liquid waste is not acceptable at WIPP. Liquid in the quantities delineated below is acceptable.</p> <p>Observable liquid shall be no more than 1 percent by volume of the outermost container at the time of radiography or visual examination.</p> <p>Internal containers with more than 60 milliliters or 3 percent by volume observable liquid, whichever is greater, are prohibited.</p> <p>Containers with Hazardous Waste Number U134 (hydrofluoric acid) assigned shall have no observable liquid.</p> <p>Over packing the outermost container that was examined during radiography or visual examination or redistributing untreated liquid within the container shall not be used to meet the liquid volume limits.</p>	

**Table 5. How Hanford Site Waste Analysis Will Meet the TSDF-WAC (3 Pages)**

<b>Permit Condition</b>	<b>Prohibited Waste (from Permit Condition 2.3.3, TSDF-WAC)</b>	(b)(5)
2.3.3.2	Pyrophoric materials – Non-radionuclide pyrophoric materials, such as elemental potassium	
2.3.3.3	Non-mixed hazardous wastes -- Hazardous wastes not occurring as co-contaminants with TRU wastes (non-mixed hazardous wastes)	
2.3.3.4	Chemical incompatibility --Wastes incompatible with backfill, seal and panel closures materials, container and packaging materials, shipping container materials, or other wastes	
2.3.3.5	Explosives and compressed gases – Wastes containing explosives or compressed gases	
2.3.3.6	PCB Waste – Wastes with polychlorinated biphenyl (PCB) not authorized under an EPA PCB waste disposal authorization.	
2.3.3.7	Ignitable, corrosive, and reactive wastes – wastes exhibiting the characteristic of ignitability, corrosivity, or reactivity (EPA Hazardous Waste Numbers of D001, D002, or D003)	
2.3.3.8	Excluded Waste – TRU mixed waste that has ever been managed as high-level waste and waste from tanks specified in Permit Attachment C are not acceptable at WIPP unless specifically approved through a Class 3 permit modification.	
2.3.3.9	Unconfirmed Waste – Any waste container that has not been subject to confirmation pursuant to Permit Attachment C7 is not acceptable at WIPP.	

**Table 5. How Hanford Site Waste Analysis Will Meet the TSDF-WAC (3 Pages)**

Permit Condition	Prohibited Waste (from Permit Condition 2.3.3, TSDF-WAC)	(b)(5)
2.3.3.10	Waste stream profiles – Any waste container from a waste stream, which has not been preceded by an appropriate, certified Waste Stream Profile Form.	

CH-TRU                      contact-handled transuranic  
 CH-WAC                     contact-handled Waste Acceptance Criteria  
 EPA                            U.S. Environmental Protection Agency  
 PCB                            polychlorinated biphenyl  
 PMR                            permit modification request  
 VOC                            volatile organic compound  
 WIPP                           Waste Isolation Pilot Plant

**2.3.6 WIPP CH-WAC Requirements**

1  
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(b)(5)

**2.4 20.4.1.900 NMAC (INCORPORATING 40 CFR §270.42(C)(1)(IV)) REQUIRES THE APPLICANT TO PROVIDE THE APPLICABLE INFORMATION REQUIRED BY 40 CFR §§ 270.13 THROUGH 270.22, 270.62, 270.63, AND 270.66**

6 The regulatory crosswalk (see Table 6) describes those applicable portions of the WIPP Permit  
 7 that would be altered by this PMR. However, Sections 270.16 through 270.22, 270.62, 270.63,  
 8 and 270.66 of Title 40 of the CFR are not applicable to the WIPP. Consequently, they are not  
 9 listed in the regulatory crosswalk. Where applicable, regulatory citations in this modification  
 10 reference Title 20, Chapter 4, Part 1, NMAC, revised October 1, 2003, incorporating 40 CFR  
 11 Parts 264 and 270.

**2.5 20.4.1.900 NMAC (INCORPORATING 40 CFR §270.11(D) AND 40 CFR 270.30(K)) REQUIRES ANY PERSON SIGNING UNDER PARAGRAPH A AND B MUST CERTIFY THE DOCUMENT IN ACCORDANCE WITH 20.4.1.900 NMAC**

12 The transmittal letter for this Class 3 PMR contains the signed certification statement in  
 13 accordance with Condition 1.9 of the Permit.

**Table 6. Regulatory Crosswalk (7 pages)**

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the WIPP Permit Application	Yes	No
§270.13		Contents of Part A permit application	Attachment B Part A		✓
§270.14(b)(1)		General facility description	Attachment A		✓
§270.14(b)(2)	§264.13(a)	Chemical and physical analyses	Part 2.3.1 Attachment C		✓
§270.14(b)(3)	§264.13(b)	Development and implementation of waste analysis plan	Part 2.3.1.1 Attachment C	✓	
	§264.13(c)	Off-site waste analysis requirements	Part 2.2.1 Attachment C		✓
§270.14(b)(5)	§264.15(a-d)	General inspection requirements	Part 2.7 Attachment E-1a		✓
	§264.174	Container inspections	Attachment E-1b(1)		✓
§270.23(a)(2)	§264.602	Miscellaneous units inspections	Attachment E-1b Attachment E-1b(1)		✓
§270.14(b)(6)		Request for waiver from preparedness and prevention requirements of Part 264 Subpart C	NA		✓
§270.14(b)(7)	264 Subpart D	Contingency plan requirements	Part 2.12 Attachment D		✓
	§264.51	Contingency plan design and implementation	Part 2.12.1 Attachment D		✓
	§264.52 (a) & (c-f)	Contingency plan content	Attachment D		✓
	§264.53	Contingency plan copies	Part 2.12.2 Attachment D		✓
	§264.54	Contingency plan amendment	Part 2.12.3 Attachment D		✓
	§264.55	Emergency coordinator	Part 2.12.4 Attachment D-4a(1)		✓
	§264.56	Emergency procedures	Attachment D-4		✓
§270.14(b)(8)		Description of procedures, structures or equipment for:	Attachment A Part 2.11		✓
§270.14(b)(8)(i)		Prevention of hazards in unloading operations (e.g., ramps and special forklifts)	Part 2.11		✓
§270.14(b)(8)(ii)		Runoff or flood prevention (e.g., berms, trenches, and dikes)	Attachment A1-1c(1) Part 2.11		✓
§270.14(b)(8)(iii)		Prevention of contamination of water supplies	Part 2.11		✓
§270.14(b)(8)(iv)		Mitigation of effects of equipment failure and power outages	Part 2.11		✓
§270.14(b)(8)(v)		Prevention of undue exposure of personnel (e.g., personal protective equipment)	Part 2.11		✓

**Table 6. Regulatory Crosswalk (7 pages)**

Regulatory Citation(s) <b>20.4.1.900 NMAC (incorporating 40 CFR Part 270)</b>	Regulatory Citation(s) <b>20.4.1.500 NMAC (incorporating 40 CFR Part 264)</b>	Description of Requirement	Added or Clarified Information		
			Section of the WIPP Permit Application	Yes	No
§270.14(b)(8)(vi) §270.23(a)(2)	§264.601	Prevention of releases to the atmosphere	Part 2.11 Part 4.4 Attachment D-4e Attachment G-1a		✓
	264 Subpart C	Preparedness and Prevention	Part 2.10		✓
	§264.31	Design and operation of facility	Part 2.1		✓
	§264.32	Required equipment	Part 2.10.1 Attachment D		✓
	§264.33	Testing and maintenance of equipment	Part 2.10.2 Attachment E-1a		✓
	§264.34	Access to communication/alarm system	Attachment E-1a Part 2.10.3		✓
	§264.35	Required aisle space	Part 2.10.4		✓
	§264.37	Arrangements with local authorities	Attachment D-4a(3)		✓
§270.14(b)(9)	§264.17(a-c)	Prevention of accidental ignition or reaction of ignitable, reactive, or incompatible wastes	Part 2.9		✓
§270.14(b)(10)		Traffic pattern, volume, and controls, for example: Identification of turn lanes Identification of traffic/stacking lanes, if appropriate Description of access road surface Description of access road load-bearing capacity Identification of traffic controls	Attachment A4		✓
§270.14(b)(11)(i) and (ii)	§264.18(a)	Seismic standard applicability and requirements	Attachment G2-2.2 Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓
§270.14(b)(11)(iii-v)	§264.18(b)	100-year floodplain standard	Attachment A1-1c(1) Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓
§270.14(b)(12)	§264.16(a-e)	Personnel training program	Part 2.8 Attachment F		✓
§270.14(b)(13)	264 Subpart G	Closure and post-closure plans	Part 6 & 7 Attachment G & H		✓
§270.14(b)(13)	§264.111	Closure performance standard	Attachment G-1a		✓
§270.14(b)(13)	§264.112(a), (b)	Written content of closure plan	Attachment G-1		✓
§270.14(b)(13)	§264.112(c)	Amendment of closure plan	Part 6.3 Attachment G-1d(4)		✓
§270.14(b)(13)	§264.112(d)	Notification of partial and final closure	Attachment G-2a		✓

**Table 6. Regulatory Crosswalk (7 pages)**

Regulatory Citation(s) <b>20.4.1.900 NMAC (incorporating 40 CFR Part 270)</b>	Regulatory Citation(s) <b>20.4.1.500 NMAC (incorporating 40 CFR Part 264)</b>	Description of Requirement	Added or Clarified Information		
			Section of the WIPP Permit Application	Yes	No
§270.14(b)(13)	§264.112(e)	Removal of wastes and decontamination/dismantling of equipment	Attachment G-1e(2)		✓
§270.14(b)(13)	§264.113	Time allowed for closure	Part 6.5 Attachment G-1d		✓
§270.14(b)(13)	§264.114	Disposal/decontamination	Part 6.6 Attachment G-1e(2)		✓
§270.14(b)(13)	§264.115	Certification of closure	Part 6.7 Attachment G-2a		✓
§270.14(b)(13)	§264.116	Survey plat	Part 6.8 Attachment G-2b		✓
§270.14(b)(13)	§264.117	Post-closure care and use of property	Part 7.3 Attachment H-1a		✓
§270.14(b)(13)	§264.118	Post-closure plan; amendment of plan	Part 7.5 Attachment H-1a (1)		✓
§270.14(b)(13)	§264.118	Closure/containers	Part 6.9 Attachment A1-1h Attachment G-1		✓
§270.14(b)(13)	§264.601	Environmental performance standards- miscellaneous units	Attachment A-4 Attachment D-1 Attachment G-1a		✓
§270.14(b)(13)	§264.603	Post-closure care	Part 7.3 Attachment G-1a(3)		✓
§270.14(b)(14)	§264.119	Post-closure notices	Part 7.4 Attachment H-2		✓
§270.14(b)(15)	§264.142	Closure cost estimate	NA		✓
	§264.143	Financial assurance	NA		✓
§270.14(b)(16)	§264.144	Post-closure cost estimate	NA		✓
	§264.145	Post-closure care financial assurance	NA		✓
§270.14(b)(17)	§264.147	Liability insurance	NA		✓
§270.14(b)(18)	§264.149-150	Proof of financial coverage	NA		✓
§270.14(b)(19)(i), (vi), (vii), and (x)		Topographic map requirements Map scale and date Map orientation Legal boundaries Buildings Treatment, storage, and disposal operations Run-on/run-off control systems Fire control facilities	Attachment B2 Part A Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓

**Table 6. Regulatory Crosswalk (7 pages)**

Regulatory Citation(s) <b>20.4.1.900 NMAC (incorporating 40 CFR Part 270)</b>	Regulatory Citation(s) <b>20.4.1.500 NMAC (incorporating 40 CFR Part 264)</b>	Description of Requirement	Added or Clarified Information		
			Section of the WIPP Permit Application	Yes	No
§270.14(b)(19)(ii)	§264.18(b)	100-year floodplain	Attachment B2 Part A Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓
§270.14(b)(19)(iii)		Surface waters	Attachment B2 Part A Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓
§270.14(b)(19)(iv)		Surrounding land use	Attachment B2 Part A Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓
§270.14(b)(19)(v)		Wind rose	Attachment B2 Part A Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓
§270.14(b)(19)(viii)	§264.14(b)	Access controls	Attachment B2 Part A Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓
§270.14(b)(19)(ix)		Injection and withdrawal wells	Attachment B2 Part A Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓
§270.14(b)(19)(xi)		Drainage on flood control barriers	Attachment B2 Part A Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓
§270.14(b)(19)(xii)		Location of operational units	Attachment B2 Part A Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓

**Table 6. Regulatory Crosswalk (7 pages)**

Regulatory Citation(s) <b>20.4.1.900 NMAC (incorporating 40 CFR Part 270)</b>	Regulatory Citation(s) <b>20.4.1.500 NMAC (incorporating 40 CFR Part 264)</b>	Description of Requirement	Added or Clarified Information		
			Section of the WIPP Permit Application	Yes	No
§270.14(b)(20)		Other federal laws Wild and Scenic Rivers Act National Historic Preservation Act Endangered Species Act Coastal Zone Management Act Fish and Wildlife Coordination Act Executive Orders	Attachment B Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓
§270.15	§264 Subpart I	Containers	Part 3 Part 4.3 Attachment A1		✓
	§264.171	Condition of containers	Part 3.3 Attachment A1		✓
	§264.172	Compatibility of waste with containers	Part 3.4 Attachment A1		✓
	§264.173	Management of containers	Part 3.5 Attachment A1		✓
	§264.174	Inspections	Part 3.7 Attachment E-1 Attachment A1-1e		✓
§270.15(a)	§264.175	Containment systems	Part 3.6 Attachment A1		✓
§270.15(c)	§264.176	Special requirements for ignitable or reactive waste	Attachment A1-1g Permit Part 2.1		✓
§270.15(d)	§264.177	Special requirements for incompatible wastes	Attachment A1-1g Permit Part 2.3.3.4		✓
	§264.178	Closure	Part 6 Attachment G		✓
§270.15(e)	§264.179	Air emission standards	Part 4.4.2 Attachment N		✓
§270.23	264 Subpart X	Miscellaneous units	Part 1.3.1 Attachment A2-1 Attachment G1.3.1		✓
§270.23(a)	§264.601	Detailed unit description	Part 4 Part 5 Attachment A2 Attachment L		✓
§270.23(b)	§264.601	Hydrologic, geologic, and meteorologic assessments	Part 4 Part 5 Attachment A2 Attachment L		✓

**Table 6. Regulatory Crosswalk (7 pages)**

Regulatory Citation(s) <b>20.4.1.900 NMAC (incorporating 40 CFR Part 270)</b>	Regulatory Citation(s) <b>20.4.1.500 NMAC (incorporating 40 CFR Part 264)</b>	Description of Requirement	Added or Clarified Information		
			Section of the WIPP Permit Application	Yes	No
§270.23(e)	§264.601	Potential exposure pathways	Part 4 Part 5 Attachment A2 Attachment N Attachment L		✓
§270.23(d)		Demonstration of treatment effectiveness	Part 4 Attachment A2 Attachment N		✓
	§264.602	Monitoring, analysis, inspection, response, reporting, and corrective action	Part 4 Part 5 Attachment A2 Attachment E-1 Attachment N Attachment L		✓
	§264.603	Post-closure care	Attachment H Attachment H1		✓
	264 Subpart E	Manifest system, record keeping, and reporting	Permit Part 1 Permit Part 2.13 & 2.14 Permit Part 4 Attachment C		✓
§270.30(j)(2)	§264.73(b)	Ground-water records	Part 1		✓
	264 Subpart F	Releases from solid waste management units	Part 5 & 7 Attachment G2 & L		✓
	§264.90	Applicability	Part 5 Attachment L		✓
	§264.91	Required programs	Attachment L		✓
	§264.92	Ground-water protection standard	Attachment L		✓
	§264.93	Hazardous constituents	Attachment L		✓
	§264.94	Concentration limits	Part 5 Attachment L		✓
	§264.95	Point of compliance	Part 5 Attachment L		✓
	§264.96	Compliance period	Attachment L		✓
	§264.97	General ground-water monitoring requirements	Part 5 Attachment L		✓
	§264.98	Detection monitoring program	Part 5 Attachment L		✓
	§264.99	Compliance monitoring program	Part 5 Attachment L		✓
	§264.100	Corrective action program	Part 5 Attachment L		✓

**Table 6. Regulatory Crosswalk (7 pages)**

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the WIPP Permit Application	Yes	No
	§264.101	Corrective action for solid waste management units	Part 8 Attachment L		✓
	264 Appendix IX	Ground-water Monitoring List	Part 5 Attachment L		✓

**Attachment A. Table of Changes**

- 1 This table of changes identifies the proposed modification to the Permit and provides an explanation for
- 2 the proposed change. The changes and additions to the Permit are in compliance with the New Mexico
- 3 Hazardous Waste Act and other applicable regulatory requirements.

**Table of Changes  
 Class 3 Hazardous Waste Facility Permit Modification**

Affected Permit Section	Explanation of Changes
Part 2, Table 2.3.3.8, Additional Approved Waste Streams	Permit Condition 2.3.3.8, <u>Excluded Waste</u> , prohibits TRU mixed waste that has ever been managed as high-level waste and waste from tanks specified in Permit Attachment C (Table C-8) from being accepted and disposed at the WIPP unless approved through a Class 3 PMR. This Class 3 PMR lists the Hanford Site tanks containing CH-TRU mixed waste and provides supporting process and origin of waste information and historical waste management administrative controls to demonstrate that the waste from the eleven Hanford Site tanks to be treated and packaged will meet the WIPP Waste Acceptance Criteria and other WIPP requirements.
Attachment C, Table C-8, Waste Tanks Subject to Exclusion	Permit Table C-8 identifies waste tanks subject to exclusion, as referenced in Condition 2.3.3.8. This Class 3 PMR removes the eleven Hanford Site tanks listed in Table C-8 so that they are no longer excluded from being accepted and disposed at WIPP.

**Attachment B. Proposed Revised Permit Text**

- 4 The Permittees are proposing a modification to Part 2, *General Facility Conditions*, Table 2.3.3.8 and
- 5 Attachment C, Waste Analysis Plan, Table C-8, presented below. This proposed modification allows for
- 6 the receipt, management and disposal of treated CH-TRU mixed waste from eleven Hanford Site SSTs at
- 7 the WIPP Facility.
- 8 Modifications to the text of the WIPP Permit will be identified using a double underline for added
- 9 information and a ~~strikeout~~ font for deleted information as follows:

Table 2.3.3.8 – ADDITIONAL APPROVED WASTE STREAMS	
<u>DATE CLASS 3 PERMIT MODIFICATION REQUEST APPROVED</u>	<u>DESCRIPTION OF WASTE STREAM</u>
	<u>Hanford Site CH-TRU Mixed Waste from the following Single-Shell Tanks:</u> <u>241-B-200 series SSTs (B-201, B-202, B-203, and B-204)</u> <u>241-T-200 series SSTs (T-201, T-202, T-203, and T-204)</u> <u>241-T-100 series SSTs (T-104, T-110, and T-111)</u>

**TABLE C-8  
 WASTE TANKS SUBJECT TO EXCLUSION**

Hanford Site – 177 Tanks	
A-101 through A-106	C-201 through C-204
AN-101 through AN-107	S-101 through S-112
AP-101 through AP-108	SX-101 through SX-115
AW-101 through AW-106	SY-101 through SY-103
AX-101 through AX-104	T-101 through T-112 <u>(except T-104, T-110, and T-111)</u>
AY-101 through AY-102	T-201 through T-204
B-101 through B-112	TX-101 through TX-118
<del>B-201 through B-204</del>	TY-101 through TY-106
BX-101 through BX-112	U-101 through U-112
BY-101 through BY-112	U-201 through U-204
C-101 through C-112	
Savannah River Site – 51 Tanks	
Tank 1 through 51	
Idaho National Engineering and Environmental Laboratory – 15 Tanks	
WM-103 through WM-106	WM-108 through 190

### 3.0 REFERENCES

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2 42 USC 10101, Nuclear Waste Policy Act of 1982, As Amended.  
3 53 FR 12449, 1988, "Record of Decision, Hanford High-Level, Transuranic, and Tank Wastes,"  
4 U.S. Department of Energy, Federal Register, Vol. 53, (April 8).  
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6 Richland, WA," U.S. Department of Energy, Federal Register, Vol. 62, (February 26).  
7 71 FR 5655, "Notice of Intent To Prepare the Tank Closure and Waste Management  
8 Environmental Impact Statement for the Hanford Site, Richland, WA", U.S.  
9 Department of Energy, Federal Register, Vol. 71, February 2, 2006.  
10 74 FR 67189, "Notice of Modifications to the Preferred Alternatives for Tank Waste Treatment  
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30 *Defense High-Level, Transuranic and Tank Wastes*, U.S. Department of Energy,  
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- 1 DOE/RL-88-21, 2011, *Dangerous Waste Part A Permit Application, Form 3, Single Shell Tank*  
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3 Washington.
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5 *Documents, Vol. 1, Administrative Requirements*, Rev. 2, U.S. Department of Energy,  
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- 7 DOE/RL-2002-47, 2002, *Performance Management Plan for Accelerated Cleanup of the*  
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- 10 DOE/RL-2010-25, 2011, *2011 Hanford Lifecycle Scope, Schedule and Cost Report*, Rev. 0, U.S.  
11 Department of Energy, Richland, Washington.
- 12 DOE/TRU-11-3425, 2011, *Annual Transuranic Waste Inventory Report – 2011*, Rev. 0, U.S.  
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- 14 DOE/WIPP-02-3122, 2011, *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot*  
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- 1 Letter 9552169, R. W. Powell, Westinghouse Hanford Company, to G. H. Sanders, U.S.  
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**APPENDIX A. BASIS FOR DESIGNATING CERTAIN HANFORD SINGLE  
SHELL TANK WASTE RESULTING FROM THE BISMUTH-PHOSPHATE PROCESS  
AS TRANSURANIC WASTE \***

**DOE/ORP-2004-01, REV. 0**

**FEBRUARY 2004**

41 Pages (including coversheet)

\* The TRU concentrations in this report, DOE/ORP-2004-01, differ from the values that are reported in RPP-13300, RPP-16129, and RPP-13873 (Appendices B, C and D, respectively). The difference in TRU concentrations reported in DOE/ORP-2004-01 resulted from application of a scaling factor template that has subsequently been revised.)

**APPENDIX B.      ORIGIN OF WASTES IN THE B-200 AND T-200 SERIES SINGLE-SHELL TANKS**

**RPP-13300**

**DECEMBER 2004**

178 Pages (including coversheet)

**APPENDIX C.      ORIGIN OF WASTE IN SINGLE-SHELL TANK 241-T-104**

**RPP-16129, REV. 1**

**DECEMBER 2004**

69 Pages (including coversheet)

**APPENDIX D.           ORIGIN OF WASTES IN SINGLE-SHELL TANKS 241-T-110, 241-T-111 AND 241-T-112**

**RPP-13873, REV. 1**

**DECEMBER 2004**

76 Pages (including coversheet)

**APPENDIX E. HANFORD SITE CONTACT-HANDLED TRANSURANIC MIXED  
WASTE TREATMENT AND PACKAGING SYSTEM PROCESS DESCRIPTION**

13 Pages (including coversheet)

**DRAFT**

WIPP HWFP No. NM4890139088 - TSDF

**CLASS 3 PERMIT MODIFICATION REQUEST**

**ACCEPTANCE OF HANFORD SITE CONTACT-HANDLED  
TRANSURANIC MIXED TANK WASTE FROM  
SINGLE-SHELL TANKS:  
241-B-200 SERIES (B-201, B-202, B-203, AND B-204) AND  
241-T-200 SERIES (T-201, T-202, T-203, AND T-204)**

**WASTE ISOLATION PILOT PLANT  
CARLSBAD, NEW MEXICO**

February 2005

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- APPENDIX B Origin of Wastes in the B-200 and T-200 Series Single-Shell Tanks
- APPENDIX C Hanford Site Contact-Handled Transuranic Mixed Waste Treatment and Packaging System Process Description

## ACRONYMS AND ABBREVIATIONS

1		
2	CCP	Centralized Characterization Program
3	CFR	Code of Federal Regulations
4	CH	contact-handled
5	CH-TRAMPAC	Contact-Handled Transuranic Waste Authorized Methods for Payload Control
6	CH-TRU	contact-handled transuranic
7	CH-WAC	Contact-Handled Transuranic Waste Acceptance Criteria
8	Ci	curie
9	DQO	Data Quality Objectives
10	DOE	U.S. Department of Energy
11	EPA	U.S. Environmental Protection Agency
12	FGE	fissile gram equivalent
13	HASQARD	<i>Hanford Analytical Services Quality Assurance Requirements Document</i>
14	HFFACO	Hanford Federal Facility Agreement and Consent Order
15	HWFP	Hazardous Waste Facility Permit
16	LWA	<i>Land Withdrawal Act</i>
17	mrem/h	millirem per hour
18	NDA	non-destructive assay
19	NMAC	New Mexico Administrative Code
20	NMED	New Mexico Environment Department
21	PMR	Permit Modification Request
22	PCB	polychlorinated biphenyls
23	<sup>239</sup> Pu	plutonium-239
24	PE-Ci	plutonium-239 equivalent curies
25	RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
26	RH	remote-handled
27	SST	single-shell tank
28	TMU	total measurement uncertainty
29	TRUPACT-II	Transuranic Package Transporter – Model II
30	TSDF	Treatment, Storage, and Disposal Facility
31	TWAPs	Tank Waste Analysis Plans
32	TWBIR	Transuranic Waste Baseline Inventory Report
33	WAC	Waste Acceptance Criteria
34	WIPP	Waste Isolation Pilot Plant
35	WTS	Washington TRU Solutions, LLC
36		

1 1.0 Introduction

2 The U.S. Department of Energy (DOE) and Washington TRU Solutions, LLC (WTS), collectively referred  
3 to as the Permittees, submit this Class 3 Permit Modification Request (PMR) for the Hazardous Waste  
4 Facility Permit (HWFP) issued to the Waste Isolation Pilot Plant (WIPP), U.S. Environmental Protection  
5 Agency (EPA) Number NM4890139088-TSDF.

6 The HWFP, issued October 27, 1999, by the New Mexico Environment Department (NMED), authorizes  
7 the management, storage, and disposal of hazardous waste mixed with contact-handled transuranic  
8 (CH-TRU) waste. The purpose of the PMR is to make changes to the HWFP that would allow the  
9 management, storage, and disposal of CH-TRU mixed waste at the WIPP facility from eight (8) Hanford  
10 Site single-shell tanks (SST) (241-B-200 series (B-201, B-202, B-203, and B-204); and the 241-T-200  
11 series (T-201, T-202, T-203, and T-204)). The PMR is submitted pursuant to HWFP Condition I.B.1 and  
12 20.4.1.900 New Mexico Administrative Code (NMAC) (incorporating 40 Code of Federal Regulations  
13 (CFR) §270.42(c)).

14 The DOE submitted a Class 2 PMR, *Procedure for Consideration of Tank Waste*, to NMED on  
15 July 2, 2004. NMED approved the Class 2 PMR with an effective date of November 1, 2004, to the  
16 HWFP. The HWFP now has a procedure for allowing the disposal of CH-TRU mixed waste that has ever  
17 been managed as high-level waste by modifying text in HWFP Condition II.C.3.i and Section B-1c, adding  
18 Table II.C.3.i and Table B-9, and editing Table B6-1, Item 12a of the WIPP HWFP. The conditions  
19 prohibit the Permittees from accepting CH-TRU mixed waste that has been managed as high-level waste  
20 and waste from specific tanks identified in HWFP Attachment B, Table B-9, unless specifically approved  
21 through a Class 3 PMR and incorporating such wastes in Table II.C.3.i. Waste approved for disposal at  
22 the WIPP through this Class 3 PMR will also have to meet the requirements and criteria of the HWFP  
23 including the Waste Analysis Plan. The management, storage, and disposal of Hanford CH-TRU mixed  
24 waste from the identified tanks will require changes to WIPP HWFP permit conditions in Module II. In  
25 accordance with 20.4.1.900 NMAC (incorporating 40 CFR §270.42(c)(1)), the PMR proposes specific  
26 changes to be made to the HWFP and provides relevant information on the HWFP conditions affected.  
27 This Class 3 PMR contains supporting technical information in compliance with the applicable information  
28 required by 40 CFR 270.13 through 270.22, 270.62, 270.63 and 270.66.

29 Waste from the eight Hanford SSTs discussed within this PMR (b)(5)

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3 1.1 Hanford Contact-Handled Transuranic Mixed Waste

4 Waste from the eight Hanford SSTs discussed in this document (b)(5)

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23 (b)(5) Under the  
24 existing WIPP HWFP conditions, the Hanford CH-TRU waste streams will be subject to precisely the  
25 same pre-shipment analysis and testing as all of the wastes listed on the TWBIR. The wastes cannot be  
26 shipped unless and until they are shown to meet the current CH-WAC requirements. (b)(5)

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30 1.2 Hanford Contact-Handled Transuranic Mixed Waste Inventory

31 Table 1 provides the estimated waste volumes in the tanks and (b)(5)

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(b)(5) The Waste Isolation Pilot Plant Disposal Phase Final

Supplemental Environmental Impact Statement, Summary (DOE/EIS-0026-S-2, 1997) indicates that the total CH-TRU disposal capacity at WIPP is 168,500 cubic meters. (b)(5)

(b)(5)

Table 1. Hanford Tank Waste and Treated Waste Volumes

	Estimated In-Tank Waste	(b)(5)
Single-Shell Tank	Total (gallons)	
241-B-201	30,920	
241-B-202	30,290	
241-B-203	50,720	
241-B-204	50,760	
241-T-201	30,820	
241-T-202	21,270	
241-T-203	36,190	
241-T-204	37,590	
<b>TOTAL</b>	<b>288,560</b>	

\* The waste volumes presented are based on information contained in the Hanford Facility Dangerous Waste Permit Application, Contact-Handled Transuranic Mixed Waste Treatment, Packaging, and Storage Facility (DOE/ORP-2003-22, Rev. 0A). (b)(5)

(b)(5)

1.3 Contents and Organization

This Class 3 PMR includes proposed changes to the existing WIPP HWFP, additions that are specific to Hanford CH-TRU mixed tank waste, and justifications for the changes. The remaining sections of the Class 3 PMR are organized as follows:

- a) Section 2.0 provides an overview of the PMR and information required for a Class 3 PMR pursuant to 20.4.1.900 NMAC (incorporating 40 CFR §270.42(c))
- b) Attachment A provides a Table of Changes and a discussion of the changes to be made to the WIPP HWFP
- c) Attachment B contains the proposed modifications to the WIPP HWFP with the proposed revisions marked

The technical analyses for the supporting information is presented in Appendices A, B, and C.

2.0 Overview of the Permit Modification Request (PMR)

This document contains one Class 3 PMR to the WIPP HWFP, Permit Number NM4890139088-TSDF. This PMR is being submitted by the DOE, Carlsbad Field Office (CBFO) and WTS collectively referred to as the Permittees, in accordance with the WIPP HWFP Condition I.B.1 and 20.4.1.900 NMAC (incorporating 40 CFR 270.42). This Class 3 PMR is submitted based on requirements of the WIPP HWFP permit condition II.C.3.i. The PMR provides origin of waste information and other supporting information for the CH-TRU mixed waste from identified Hanford Site tanks to allow acceptance of the waste at the WIPP facility. These changes do not reduce the ability of the WIPP facility to protect human health and the environment.

Modifications to the text of the WIPP HWFP will be identified using a double underline for added information and a ~~strikeout~~ font for deleted information and will be provided in Attachment B. The following is information that is to be included in the Class 3 PMR in accordance with 20.4.1.900 NMAC (incorporating 40 CFR 270.42(c)).

**2.1 20.4.1.900 NMAC (incorporating 40 CFR §270.42(c)(1)(i)) requires the applicant to describe the exact change to be made to the permit conditions and supporting documents referenced by the permit**

This PMR contains proposed changes and supporting documentation that are needed to allow Hanford Site CH-TRU mixed tank waste to be accepted for disposal at the WIPP. Origin of waste data are provided with this PMR by the Permittees so NMED can approve the Class 3 PMR to allow storage and disposal of the Hanford CH-TRU mixed waste from the following Hanford Site SSTs:

- 241-B-200 series (B-201, B-202, B-203, and B-204)
- 241-T-200 series (T-201, T-202, T-203, and T-204).

(b)(5)

(b)(5) A description of the proposed changes to the WIPP HWFP is provided in the Table of Changes in Attachment A to this PMR. The exact wording of the proposed changes to the WIPP HWFP is included in Attachment B of this PMR.

**2.2 20.4.1.900 NMAC (incorporating 40 CFR §270.42(c)(1)(ii)) requires the applicant to identify that the modification is a Class 3 modification**

The proposed modification is a Class 3 PMR in accordance with 20.4.1.900 NMAC (incorporating 40 CFR 270.42(c)). Preparation of the Class 3 PMR is based on requirements of the WIPP HWFP permit condition II.C.3.i. The following descriptive material (Sections 2.2.1 through 2.2.6) is provided in support of the PMR.

### 2.2.1 History of Hanford Site Tank Farms

The U.S. DOE Hanford Site is located in southeast Washington and was established in 1943 as part of the nuclear weapons complex, formerly known as the Manhattan Project (Gephart 1998). Hanford was responsible for producing plutonium, which required the establishment of nuclear fuel fabrication operations, the construction and operation of nuclear reactors, and the construction and operation of chemical separations facilities to extract plutonium from irradiated nuclear fuel and to subsequently purify the plutonium product to meet weapons fabrication requirements. During these operations, liquid wastes were generated and stored in the Hanford waste tanks. There were 149 SSTs constructed between 1943 and 1964, and 28 double-shell tanks constructed between 1968 and 1986. The SSTs are over twenty years beyond their design life, have been declared unfit for use (Letter, S.V. Moore, 2001), and 67 are known or suspected to have leaked wastes to the environment. Wastes were transferred to and within these waste tanks based on source, compatibility, and tank volume management considerations. Liquid waste transfers among the SSTs were conducted primarily to: stage liquid waste for processing evaporators, remove pumpable liquid waste from tanks that were suspected to have leaked, or accommodate receipt of newly generated wastes. No further waste was added to the Hanford Site SSTs after January 1981.

### 2.2.2 Hanford Site Operators

DOE's Office of River Protection is currently responsible for management of the Hanford tank farms and to retrieve, treat, close, and store or dispose of Hanford's tank wastes. CH2M HILL Hanford Group, Inc., is under contract with DOE to safely store the wastes, retrieve the wastes, close the waste tanks, treat certain wastes, dispose of low-activity wastes, and support the off-site disposition of treated wastes. DOE has a separate contract with Bechtel National, Inc., to design and construct a tank waste treatment and immobilization plant.

#### 2.2.2.1 Hanford Transuranic Tank Waste Management

The Hanford tank farms contain wastes from a variety of activities including: production of nuclear products; spent nuclear fuel processing for plutonium recovery and purification; cladding removal; decontamination; research and development; and uranium and radioisotope recovery operations. The tank wastes are radioactive mixed wastes (i.e., radioactive wastes that are mixed with hazardous waste as defined by RCRA), however, as is evident by their diverse origins, some wastes are not high-level waste by definition as they were not directly produced during the reprocessing of spent nuclear fuel nor were they derived from such wastes. The radioactive component is classified as high-level waste, transuranic waste, or low-level waste.

The DOE established waste management rules that required the segregation of transuranic wastes from high-level waste to the extent practical. Its predecessor agencies also segregated wastes based on

1 waste characteristics to facilitate treatment and disposal activities. In the Hanford tank farms, this  
2 segregation was achieved by establishing separate, dedicated storage tanks for each waste type  
3 (e.g., high-level, low level, and transuranic wastes), restricting the transfer of wastes among tanks, and by  
4 subjecting tank wastes to specific administrative controls and decision-making processes. The  
5 administrative controls associated with segregating the transuranic tank wastes remain in effect today.

6 Notwithstanding the physical segregation of waste by type, DOE and its contractors managed all tank  
7 wastes under the stringent standards for high-level waste in order to preclude the need to construct and  
8 maintain separate tank systems for interim storage of transuranic or other tank wastes. A single tank farm  
9 management protocol avoided the need to establish separate safety protocols for the management of  
10 different tanks, depending on whether the wastes were high-level, transuranic, or low-level  
11 (WHC-SD-WM-ES-386, 1996), and assured that the most stringent protocols were applied to the waste  
12 tanks. The administrative controls remain in effect through the current time.

13 Although DOE has managed all tank wastes under the standards for HLW, DOE has not designated all  
14 tank wastes as HLW. DOE has provided this information in environmental impact statements for the  
15 Hanford Site:

16 "Tank wastes result from various processing activities and may be either, high-level, transuranic,  
17 low-level, or hazardous chemical wastes." (DOE/RL-88-13, Background Section)

18 "Waste must be managed, treated, stored, and disposed of differently according to the waste  
19 type, degree of risk posed to humans or the environment, and its source. Waste in the tank farm  
20 system includes the following waste types.

21 The most dangerous radioactive waste is **high-level waste**, a by-product of reprocessing  
22 spent nuclear fuel. This waste requires radiation shielding, special handling techniques,  
23 and when disposed of, special measures to isolate it from humans and the environment.

24 **Transuranic waste** is material contaminated with radioactive elements with atomic  
25 numbers greater than uranium. This waste does not require the same degree of isolation  
26 as high-level waste; however, it cannot be disposed of in a near-surface facility.

27 The least dangerous radioactive waste is **low-level waste**. It consists of all radioactive  
28 waste that is not high-level, transuranic, spent nuclear fuel, or by-product material, and  
29 may be disposed of in a near-surface facility.

30 **Low-activity waste** consists of waste that remains following the process of separating as  
31 much of the radioactivity as is practicable from high-level waste. When solidified, low-  
32 activity waste may be disposed of as low-level waste in a near surface facility.

1           **Hazardous or dangerous waste** is ignitable, corrosive, reactive, toxic, persistent in the  
2 environment, exhibits dangerous waste characteristics, or appears on special EPA lists.  
3 The waste may cause or contribute to an increase in health hazards when improperly  
4 treated, stored, transported, disposed off, or otherwise managed.

5           **Mixed waste** is waste that is both hazardous or dangerous and radioactive.”  
6 (DOE/EIS-0189, August 1996, page S-3)

7 In 1988, following the preparation of the *Final Environmental Impact Statement, Disposal of Hanford*  
8 *Defense High-Level, Transuranic and Tank Waste* (DOE/EIS-0113, 1987), DOE issued a Record of  
9 Decision (53 FR 12449, 1988) on the proposed disposition of the tank wastes. DOE's Record of Decision  
10 announced its decision to retrieve and treat high-level, transuranic, and other tank wastes contained in the  
11 double-shell tanks. The Record of Decision also announced that wastes contained in the SSTs, as well as  
12 buried transuranic and other site wastes, would be further studied and their treatment and disposal would  
13 be the subject of future *National Environmental Policy Act* analyses and decisions. Consistent with this  
14 Record of Decision, DOE initiated plans to construct the Hanford Waste Vitrification Plant, which would  
15 have had the capacity to complete waste treatment of double-shell tank wastes.

16 In the early 1990's, DOE determined that it needed to develop and implement a strategy to retrieve and  
17 treat the tank wastes in both the single-shell and double-shell tank systems. This strategic change  
18 required a significant increase in the total treatment capacity. The Hanford Waste Vitrification Plant was  
19 determined to be too small to support completion of the mission and was cancelled. A series of technical  
20 studies were undertaken in 1993 to establish a new path forward. A new plan emerged in 1995 to  
21 construct a much larger vitrification facility, with a pretreatment facility to separate low-activity tank wastes  
22 from high-activity tank wastes. The separate waste streams would then go to large vitrification facilities;  
23 one to immobilize the fraction of the wastes commonly called low-activity waste, and one to immobilize the  
24 high-activity waste fraction of the wastes, commonly called the high-level waste. This new treatment  
25 complex was to be constructed and begin operations in 1998, with the completion date of 2028 for the  
26 retrieval and treatment mission (approximately 30 years of operations).

27 During the planning timeframe of the early 1990's, DOE and its contractors conducted a series of  
28 additional studies to consider other waste treatment strategies. One particular study, conducted in 1995  
29 (WHC-SD-WM-ES-331, 1995 and Letter 9552169, 1995), focused on identifying SSTs and double-shell  
30 tanks containing transuranic wastes. As an element of that study, the tank histories and inventories were  
31 reviewed to identify which of the tanks contained transuranic wastes. Transuranic tank waste treatment  
32 strategies (WHC-SD-WM-ES-331, 1995) were developed using the emerging definitions from the WIPP  
33 LWA, the draft CH-WAC, and an earlier U.S. Nuclear Regulatory Commission proposed rulemaking  
34 associated with high-level waste definitions.

1 This same study identified an initial population of nine single-shell and double-shell tanks that contain  
2 transuranic wastes: tanks AW-103, AW-105, SY-102, T-110, T-111, T-201, T-202, T-203, and T-204. The  
3 study also indicated that further characterization and development of tank process history would likely  
4 establish that additional tanks contained transuranic wastes. Subsequent to the 1995 analysis, the  
5 Hanford Site has identified an additional four tanks (B-201, B-202, B-203, and B-204) that contain CH-TRU  
6 waste (RPP-13300, 2004).

7 In 1995, the DOE determined that alternative tank waste disposal strategies should be evaluated based on  
8 the projected cost difference between estimated disposal costs for the high-level waste repository  
9 (assumed to be Yucca Mountain) and WIPP (Letter 95-TWR-129, 1995). Two follow-on technical studies  
10 were commissioned and issued.

11 The first was a decision document (Letter 9651784, 1996) recommending that the technical planning  
12 baseline be modified to include blending of the transuranic tank wastes with high-level waste feeds for  
13 treatment and disposal of that blended material in the national high-level waste repository, rather than  
14 separately packaging it for disposal at the WIPP. The decision document was updated in 1996 to include  
15 an alternatives evaluation appendix (WHC-SD-WM-ES-368, 1996). The second document  
16 (WHC-SD-WM-ES-386, 1996), established the technical feasibility of separately processing this  
17 transuranic material for disposal at the WIPP.

18 There were several key assumptions upon which the recommendation to blend the transuranic wastes with  
19 high-level waste feeds for treatment were made. These were:

- 20 • The high-level waste vitrification system had excess capacity to complete vitrification at no  
21 significant incremental capital or operating costs
- 22 • The incremental cost for immobilizing transuranic wastes using the high-level waste vitrification  
23 system would be minor relative to the total cost for the treatment and disposal of the tank wastes
- 24 • The vitrified transuranic waste would need to be disposed of as remote-handled.

25 At the time the recommendation was developed, the process for addressing remote-handled transuranic  
26 wastes was highly uncertain as was the DOE-wide capacity demand for remote-handled waste disposal at  
27 WIPP. Accordingly, DOE concurred with the recommendation in August 1996 (Letter 96-WDD-102, 1996)  
28 and authorized changes to the planning basis. However, DOE specifically precluded any changes to the  
29 current waste management procedures, thus requiring continued segregation of stored transuranic wastes  
30 from high-level waste.

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In summary, the eight Hanford tanks identified in this PMR (b)(5)

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(b)(5) Consistent with this, DOE considers it to be environmentally responsible, appropriate, and cost-effective to package and dispose of the CH-TRU wastes from these eight tanks at the WIPP (DOE/EIS-0189-SA4, 2003).

21 2.2.2.2 Hanford Tank Waste Management Baseline

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(b)(5) The HFFACO includes a milestone (M-62-08) that required DOE to define the path for the remaining wastes (M-62-03-02, 2003). In FY2003, following the development of the *Hanford Performance Management Plan* (DOE/RL-2002-47, 2002), the baseline was modified to include two additional tank waste treatment and disposal paths. First, the Transuranic Mixed Waste Packaging Project was added for packaging both the contact-handled and remote-handled transuranic wastes. Second, a supplemental treatment based approach was added to treat low-activity waste that could not be treated in the Waste Treatment and Immobilization Plant, even with enhancements that were added to increase its overall throughput. (b)(5)

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In order to achieve the commitment of treating the tank wastes for disposal by 2028, the baseline assumes a three-path approach to waste treatment. Implementation of technologies supplemental to the Waste Treatment and Immobilization Plant will reduce the burden on the Waste Treatment and Immobilization Plant and improve the speed with which risks to the environment are reduced. The three paths include the

1 treatment of high-activity wastes and a percentage of the low-activity wastes through the Waste Treatment  
2 and Immobilization Plant, processing transuranic tank wastes for disposal at the WIPP, and supplemental  
3 treatment of low-activity wastes in parallel with the Waste Treatment and Immobilization Plant.

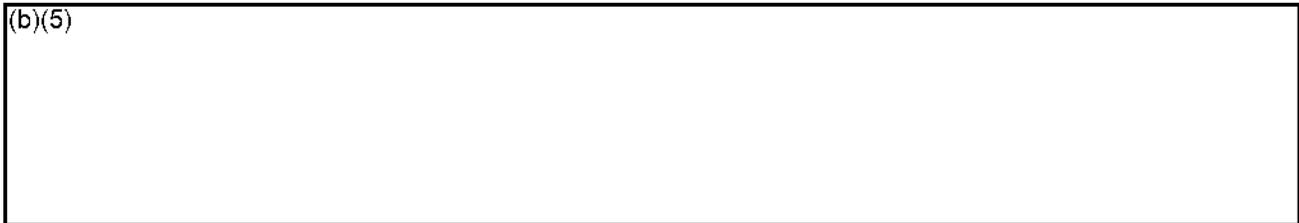
4 2.2.2.3 Hanford Site Legally Enforceable Milestones

5 The HFFACO was signed on May 15, 1989, by the DOE, the EPA, and Washington State Department of  
6 Ecology (89-10, 2003). The HFFACO is a legally enforceable agreement and consent order that  
7 establishes a schedule and framework for the cleanup of the Hanford Site. Specifically, the HFFACO  
8 commits the DOE to achieve compliance with the *Comprehensive Environmental Response,*  
9 *Compensation, and Liability Act* (CERCLA) remedial action provisions and with the RCRA treatment,  
10 storage, and disposal unit regulations and corrective action provisions, including the Washington State  
11 Dangerous Waste implementing regulations. To achieve compliance, the HFFACO (1) defines and ranks  
12 RCRA and CERCLA cleanup commitments, (2) establishes responsibilities, (3) provides a basis for  
13 budgeting, and (4) reflects a concerted goal of achieving full regulatory compliance and remediation, with  
14 enforceable milestones, in an aggressive manner. Key tank farm milestones include:

- 15 • M-062-08: Submittal of Hanford Tank Waste Supplemental Treatment Technologies Report,  
16 Draft Hanford Tank Waste Treatment Baseline, and Draft Negotiations Agreement In Principle  
17 (AIP) – 6/30/06 (proposed)
- 18 • M-045-05: Complete retrieval of all remaining SSTs – 9/30/2018
- 19 • M-045-00: Complete closure of all SST farms – 9/30/2024
- 20 • M-062-00: Complete pretreatment processing and vitrification of Hanford high-level and  
21 low-activity tank wastes – 12/31/2028.

22 A cornerstone for the treatment of tank wastes and compliance with HFFACO milestones is the Waste  
23 Treatment and Immobilization Plant, which is planned to go online in 2011. With the addition of handling  
24 transuranic wastes and supplemental treatment for low-activity waste external to the Waste Treatment and  
25 Immobilization Plant, sufficient capacity can be in place to treat the tank wastes by the HFFACO milestone  
26 date of 2028 (RPP-13678, 2003). Implementing supplemental processing tailored to the characteristics of  
27 the wastes to be treated will improve the rate of environmental risk reduction by removing wastes from  
28 these older leak-prone SSTs, such as those tanks that contain transuranic wastes (RPP-13678, 2003;  
29 DOE/RL-2002-47, 2002; and Letter CH2M-0303490, 2003).

30 (b)(5)



### 2.2.3 Characterization of Hanford Transuranic Mixed Waste

The SST system wastes have been extensively characterized in accordance with the HFFACO and were characterized to implement Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 93-5. On November 15, 1999, the DNFSB issued a letter stating that sampling and characterization activities were completed, closing Recommendation 93-5 (Letter, J.T. Conway, 1999). The HFFACO Milestone M-44-00A (Letter 02-EMD-162, 2002) was completed October 1, 2002. Closure of this milestone and DNFSB Recommendation 93-5 was a culmination of an extensive characterization effort that enabled the resolution of important national safety issues and allowed tank waste remediation planning to go forward.

#### 2.2.3.1 Characterization of Waste and the Resource Conservation and Recovery Act

HFFACO Milestone M-44-00 (89-10, 2003 and M-44-93-01, 1994) required the preparation of Tank Characterization Reports for the Hanford tank wastes, under RCRA. Those reports were based on process knowledge, prior characterization data, and validated empirical data acquired after May, 1989, e.g., laboratory analyses of tank waste samples. Milestone M-44-02 (89-10, 2003 and M-44-93-01, 1994) required that Tank Waste Analysis Plans (TWAPs) and Tank Characterization Reports be submitted annually to the Washington State Department of Ecology and EPA for approval. The TWAPs were required to address safety, retrieval, pretreatment, and other processing needs. The TWAPs were also required to identify sampling and analysis activities projected for the following fiscal year.

TWAPs (WHC-SD-WM-PLN-101, 1996; WHC-SD-WM-PLN-120, 1996; and HNF-SD-WM-PLN-125, 1997) are subject to specific quality control and quality assurance requirements set forth in the *Tank Waste Remediation System Characterization Program Quality Assurance Program Plan* (WHC-SD-WM-QAPP-025, 1994). That plan required that the characterization program utilize EPA quality assurance guidelines and meet the requirements and standards of Washington Administrative Code Chapter 173-303, Dangerous Waste Regulations.

The *Hanford Analytical Services Quality Assurance Requirements Document* (HASQARD) (DOE/RL-96-98, 1998), establishes quality requirements in response to DOE Order 5700.6C. The HASQARD is designed to meet the needs of the DOE for maintaining a consistent level of quality for sampling as well as field and laboratory analytical services provided by contractor and commercial field and laboratory analytical operations. The HASQARD is based on several EPA drivers including SW-846 (EPA, 1986).

Characterization determinations are made using analytical results from tank waste samples as well as historical information about the tanks. The characterization of the SST system wastes and the analytical data were obtained and analyzed consistent with RCRA requirements and provides information regarding the RCRA characteristics of the wastes. The characterization data for the eight SSTs addressed in this document is from the Hanford Site Tank Waste Information Network System (TWINS) database

1 (<http://twins.pnl.gov/twins.htm>). Current waste characterization information is provided from the  
2 TWINS-generated Auto Tank Characterization Reports that contain a description of the characterization of  
3 the wastes in the Hanford tanks addressing the physical, chemical, and radiological properties of the  
4 wastes. The current data provide a regulatory and scientific basis to be used in the identification of  
5 characteristic waste codes for eventual disposition of these waste streams at the WIPP in accordance with  
6 the WIPP HWFP. Confirmatory waste sampling and analysis (RPP-20268, 2004) of the packaged wastes  
7 will be conducted to verify acceptable knowledge as set forth in the WIPP HWFP.

#### 8 2.2.3.2 Origin of Waste

9 The initial mission at the Hanford Site was to separate plutonium from spent nuclear fuel elements. The  
10 first process used to separate plutonium from spent nuclear fuel elements consisted of a series of chemical  
11 dissolution and precipitation processes known as the Bismuth Phosphate process  
12 (DOE/ORP-2004-01, 2004) that is fully described in Appendix A. The Bismuth Phosphate process was  
13 used from 1945 through 1956. Various process operations, including spent nuclear fuel reprocessing,  
14 were carried out in four facilities in separate parts of the Hanford Site. These facilities were the 221-B  
15 Plant and the 224-B Building and the 221-T Plant and the 224-T Building.

16 The Bismuth Phosphate process generated five distinct waste types that were transferred to the SSTs, as  
17 shown in Figure 1. These five waste types are commonly called (1) coating removal wastes, (2) metal  
18 wastes, (3) first decontamination cycle wastes, (4) second decontamination cycle wastes, and (5) 224  
19 wastes. The first four of these waste types (i.e., coating removal waste, metal waste, first decontamination  
20 cycle waste, and second decontamination cycle waste) were generated in the 221-B and 221-T Plants.  
21 The 224 wastes were generated from plutonium processing activities conducted in the 224-B and  
22 224-T Buildings. The chemicals used and the major chemical reactions that occurred in the Bismuth  
23 Phosphate process are described below and in Appendix A (DOE/ORP-2004-01, 2004).

24 The batch nature of the Bismuth Phosphate process provides very sharp demarcation points between  
25 process steps, which enable clear distinctions to be made regarding whether or not these steps involved  
26 spent nuclear fuel reprocessing. During each batch operation, process chemicals were added to  
27 selectively dissolve and/or precipitate specific chemical compounds. Then liquids and solids were  
28 separated from each other. Following the initial liquids/solids separations, the solids were rinsed and  
29 separated from the rinse liquids in several distinct operations prior to the solids entering the next batch  
30 operation step. This provided a clear basis for determining, for example, that any liquids produced directly  
31 during the reprocessing of spent nuclear fuel were thoroughly washed from the plutonium product  
32 precipitate during the metals dissolution batch process operation before that plutonium precipitate was  
33 transferred to the next batch operation, first cycle decontamination, as is discussed below. The  
34 combination of the clear demarcation points between process operations and the tank farm management  
35 protocols that maintained certain waste streams separate from others adds confidence to DOE's

1 determination that the waste streams discussed in this document are CH-TRU wastes. The Bismuth  
2 Phosphate process steps are described in more detail below.

3 The spent nuclear fuel elements that were processed in the 221-B and 221-T Plants consisted of uranium  
4 metal coated with an aluminum-silicon alloy. The aluminum-silicon alloy coating (sometimes referred to as  
5 hull or cladding) was separated from the spent fuel by chemical dissolution using sodium hydroxide and  
6 sodium nitrate. Sodium hydroxide and sodium nitrate were used to dissolve the aluminum-silicon coating  
7 because these chemicals do not dissolve the uranium metal. (b)(5)

8 (b)(5)

9 (b)(5) The highly caustic dissolved coating material (designated as CW) was  
10 separated from the uranium metal and then used to treat the first decontamination cycle wastes where the  
11 CW excess sodium hydroxide neutralized the first decontamination cycle waste's acidity. These combined  
12 waste streams were transferred to SSTs designated for their storage.

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15 (b)(5) The *Nuclear Waste Policy Act of 1982* (42 USC 10101) defines spent nuclear  
16 fuel as "...fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent  
17 elements of which have not been separated by reprocessing." (b)(5)

18 (b)(5)

19 (b)(5) DOE's treatment of coating waste as non-HLW is  
20 consistent with the U.S. Nuclear Regulatory Commission (formerly the Atomic Energy Commission), which  
21 stated that "radioactive hulls (i.e., cladding) and other irradiated and contaminated fuel structural hardware"  
22 were not "encompassed by the Appendix F definition" of high-level waste (58 FR 12342, 1993).

23 Following coating removal, the uranium metal was dissolved in nitric acid to separate the spent nuclear fuel  
24 into its constituent elements of fission products, uranium, plutonium, and other transuranic elements. The

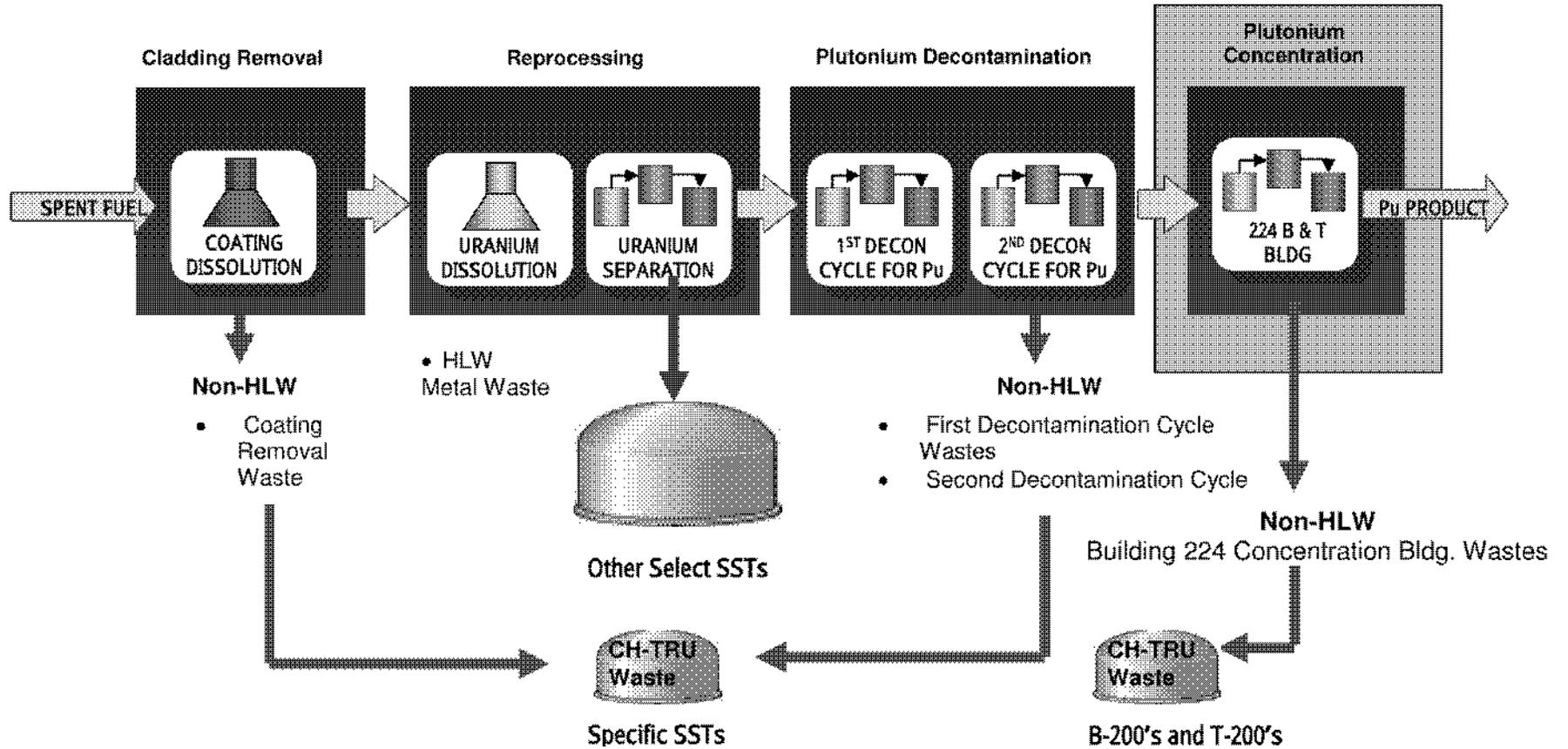
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Water and sulfuric acid were  
27 added to the dissolved spent nuclear fuel to ensure the uranium and long-lived fission products remained  
28 in solution as sulfate compounds during the subsequent plutonium precipitation step  
29 (DOE/ORP-2004-01, 2004) (see Appendix A). Bismuth nitrate and phosphoric acid were then added to  
30 form bismuth phosphate and plutonium phosphate precipitates (i.e., solids). The heavier bismuth  
31 phosphate precipitate caused the plutonium phosphate precipitate to settle. The original process flow  
32 sheet shows the uranium and approximately 90 percent of the long-lived fission products such as cesium-  
33 137 and strontium-90 remained in solution. The bismuth phosphate and plutonium phosphate precipitates  
34 were separated from the uranium and long-lived fission products by centrifuging the mixture.

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Figure 1. Bismuth Phosphate Process



1 The bismuth phosphate and plutonium phosphate precipitates were washed and re-centrifuged three times  
2 to remove any waste liquids and soluble fission products that may have been entrained in the precipitate.  
3 In addition to a small fraction (less than 10 percent) of strontium-90, short-lived fission products such as  
4 zirconium-95, niobium-95, and cerium-144 were co-precipitated with the bismuth phosphate and plutonium  
5 phosphate (DOE/ORP-2004-01, 2004). These short-lived fission products, with half-lives of less than one  
6 year, rapidly decayed during storage. The washed plutonium precipitate solids were segregated for  
7 additional processing.

8 The waste solution, from the above processing step, included uranium sulfate, approximately 90 percent of  
9 the long-lived fission products, and precipitate wash solutions. These were combined and neutralized  
10 using sodium hydroxide and sodium carbonate. The combined, neutralized wastes were known  
11 collectively as metal wastes (designated as MW waste). The metal wastes contained the highly  
12 radioactive fission products and uranium that were separated from the spent fuel during reprocessing  
13 (DOE/ORP-2004-01, 2004). (b)(5)

14 (b)(5) The metal wastes were transferred  
15 to a set of SSTs that were different than the set of SSTs that received other waste types from the Bismuth  
16 Phosphate process. The tanks that received metal wastes are not under consideration for disposal at the  
17 WIPP.

18 Following the separation of the metal wastes and washing of the bismuth phosphate and plutonium  
19 phosphate precipitates, reprocessing of the spent nuclear fuel has been completed. The bismuth  
20 phosphate and plutonium phosphate precipitates are a plutonium product that underwent further  
21 processing steps to purify the plutonium (DOE/ORP-2004-01, 2004) (see Appendix A).

22 The bismuth phosphate and plutonium phosphate precipitates were then dissolved in nitric acid solution  
23 to form plutonium nitrate in solution. The plutonium nitrate solution was then processed through two  
24 successive and similar decontamination cycles to separate the short half-life fission products such as  
25 zirconium-95, niobium-95, and cerium-144. In the first decontamination cycle, the plutonium nitrate  
26 solution was oxidized via the addition of sodium bismuthate and sodium dichromate. Sodium bismuthate,  
27 phosphoric acid, zirconium nitrate, and cerium nitrate were added to precipitate bismuth phosphate and  
28 the phosphate insoluble fission products, primarily strontium-90, cerium-144, zirconium-95, and  
29 niobium-95. The bismuth phosphate and fission product precipitate (solids) were centrifuged to separate  
30 them from the plutonium which remained in solution. The bismuth phosphate and fission products  
31 precipitate were dissolved using nitric acid and hydrogen peroxide and then transferred to waste  
32 collection tank 15-8 (tank number 15-9 for second decontamination cycle waste) within the 221-B or  
33 221-T Plants.

1 The plutonium solution was then reacted with bismuth sub-nitrate and phosphoric acid to produce bismuth  
2 phosphate and plutonium phosphate precipitates. The bismuth phosphate and plutonium phosphate  
3 precipitates were separated from the liquid by centrifugation. The bismuth phosphate and plutonium  
4 phosphate precipitates were washed with water and centrifuged three times to separate entrained liquid.  
5 The liquids collected from centrifuging and washing the bismuth phosphate and plutonium phosphate  
6 precipitates were also transferred to waste collection tank 15-8 (tank number 15-9 for second  
7 decontamination cycle waste) within the 221-B or 221-T Plants.

8 After washing, the bismuth phosphate and plutonium phosphate precipitates were then dissolved in nitric  
9 acid forming plutonium nitrate and bismuth nitrate in solution. This solution was then transferred to the  
10 second decontamination cycle where the first decontamination steps (except for zirconium nitrate and  
11 cerium nitrate additions) were repeated to further purify the plutonium product. At the end of the second  
12 decontamination cycle, the plutonium nitrate and bismuth nitrate solution was transferred to the 224-B or  
13 224-T Building for additional purification and concentration of the plutonium product.

14 The waste solutions collected in tank 15-8 were known as the first decontamination cycle wastes  
15 (designated as 1C waste). As previously stated, the CW was combined with the 1C wastes to neutralize  
16 the acidic 1C wastes. The neutralized, combined 1C / CW wastes were transferred to a specific set of  
17 SSTs. The waste solutions collected in tank 15-9 were known as the second decontamination cycle  
18 wastes (designated as 2C waste). The 2C wastes were neutralized by addition of sodium hydroxide  
19 solution and transferred to a specific set of SSTs. The short-lived fission products (i.e., cesium-144,  
20 zirconium-95 and niobium-95) collected in the 1C and 2C wastes have undergone radionuclide decay and  
21 are no longer detectable in these wastes.

22 The plutonium solution from the 221-B / 221-T Plants was transferred to the 224-B / 224-T Building to  
23 remove the bismuth phosphate and residual fission products (DOE/ORP-2004-01 2004) (see Appendix A).  
24 The plutonium nitrate was oxidized with sodium bismuthate to ensure plutonium would remain in solution.  
25 Phosphoric acid was added to precipitate bismuth phosphate along with residual zirconium-95 and  
26 niobium-95 fission products, which were then separated by centrifugation from the plutonium in solution.  
27 The bismuth phosphate and fission product precipitates were dissolved in nitric acid and collected as part  
28 of the 224 waste.

29 Hydrogen fluoride and lanthanum ammonium nitrate were added to the oxidized plutonium solution to  
30 precipitate lanthanum fluoride along with the remaining fission products (e.g., cerium-144), leaving  
31 plutonium in solution. The lanthanum fluoride and fission products precipitates were separated by  
32 centrifugation from the plutonium in solution. The lanthanum fluoride and fission products precipitates  
33 were dissolved in nitric acid and sodium dichromate and processed in the 224 Building to recover  
34 plutonium.

1 The plutonium solution was then reduced by addition of oxalic acid and nitric acid. Hydrogen fluoride and  
2 lanthanum ammonium nitrate were added to the reduced plutonium solution to precipitate lanthanum  
3 fluoride along with plutonium fluoride, which were centrifuged and washed with nitric acid followed by  
4 centrifugation. The liquid and wash solutions were collected as part of the 224 waste.

5 The lanthanum fluoride and plutonium fluoride precipitates were reacted with potassium hydroxide to  
6 produce lanthanum hydroxide and plutonium hydroxide solids. The lanthanum hydroxide and plutonium  
7 hydroxide solids were washed with potassium hydroxide and centrifuged to remove entrained liquids. The  
8 separated liquids were collected as part of the 224 waste.

9 The lanthanum hydroxide and plutonium hydroxide solids were dissolved in nitric acid to produce a  
10 plutonium nitrate and lanthanum nitrate solution. All of the 224 waste solutions were collected together  
11 and neutralized with sodium hydroxide solution before transfer to a dedicated set of SSTs.

12 The 1C / CW, 2C and 224 wastes are derived from treating the plutonium product separated from the  
13 spent nuclear fuel. The *Nuclear Waste Policy Act of 1982* defines high-level waste as:

14 (A) the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including  
15 liquid waste produced directly in reprocessing and any solid material derived from such liquid  
16 waste that contains fission products in sufficient concentrations

17 (B) other highly radioactive material that the NRC, consistent with existing laws, determines by rule  
18 requires permanent isolation.

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26 As previously stated, specific SSTs received the 1C / CW, 2C and 224-waste types. This Class 3 PMR  
27 addresses the 224-waste type only. The tanks that received the 224-waste type are discussed in further  
28 detail in the section that follows.

29 224-Waste (Tanks 241-B-201 through 241-B-204 and 241-T-201 through 241-T-204)

30 The 224 wastes originated from plutonium purification and concentration activities that were conducted in  
31 the 224-B and 224-T Buildings at the Hanford Site (RPP-13300, 2004) (see Appendix B). (b)(5)

32 (b)(5)

1 The 224-B and 224-T Buildings received plutonium nitrate solution that was separated from spent nuclear  
2 fuel as part of processing activities conducted in the 221-B and 221-T Plants. Wastes from the 224-B  
3 Building were discharged to tanks 241-B-201 through 241-B-204 from October 1946 through September  
4 1952. Wastes from the 224-T Building were discharged to tanks 241-T-201 through 241-T-204 from  
5 October 1946 through May 1952.

6 Tanks 241-B-201, 241-B-202, 241-B-203, and 241-B-204 also received wastes from an off-gas scrubber in  
7 the system and decontamination of process equipment following completion of the Bismuth Phosphate  
8 Process activities in the 221-B Plant and 224-B Building. Specifically, from July 1952 through March 1953,  
9 all equipment within the 221-B Plant and the 224-B Building was flushed with nitric acid and other  
10 chemicals to remove plutonium and fission products. The equipment cleaning solution was processed  
11 through the normal process equipment routes to recover plutonium (RPP-13300, 2004). (b)(5)

12 (b)(5)

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14 (b)(5)

17 (b)(5)

20 In 1997, the Nuclear Regulatory Commission concurred in the classification of some low-activity waste  
21 stored in some of the Hanford Site tanks (Letter, C. J. Paperiello, 1997). (b)(5)

22 (b)(5)

23 As previously noted, process records were reviewed to determine the circumstances and processes that  
24 generated the wastes stored in the subject SSTs (241-B-201 through 241-B-204 and 241-T-201 through  
25 241-T-204). Through that process, it was determined that these wastes are not: high-level waste, wastes  
26 that the Secretary of Energy has determined, with the concurrence of the EPA Administrator, do not need  
27 the degree of isolation required by the disposal regulations; or wastes that the Nuclear Regulatory  
28 Commission has approved for disposal on a case-specific basis in accordance with Part 61 of Title 10,  
29 Code of Federal Regulations (DOE/ORP-2004-01 2004).

30 All of the CH-TRU tank wastes will be de-watered and packaged to meet the CH-WAC. (b)(5)

31 (b)(5)

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2 2.2.4 Waste Packaging and Characterization Planning

3 Extensive evaluation of the waste records and documentation has been performed to validate the  
4 acceptability of the wastes under the CH-WAC. In addition to the internal evaluations performed, external  
5 review of the data was conducted. "Acceptable knowledge" records including the origin of waste reports,  
6 waste characterization data, and analytical records were provided to the WIPP Centralized  
7 Characterization Program (CCP) subject matter expert for the Acceptable Knowledge program at the  
8 WIPP. Upon completing the review of the waste data, CCP concluded that the wastes will meet the  
9 CH-WAC and will be acceptable at the WIPP (E-mail, K. Peters, 2003).

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16 (b)(5) The Hanford Site CH-TRU mixed waste treatment and packaging system process is  
17 described in detail in Appendix C of this PMR.

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As has been noted, the transuranic waste tanks have historically been managed as part of a larger group of 149 SSTs at Hanford. Although these 149 SSTs contain diverse wastes, the tanks were identified as a single unit for RCRA permitting purposes. Because of this, waste codes for every waste type stored, or that may be stored in the SSTs are shown as applicable to all of the tanks as noted in the SST Part A, Form 3 (DOE/RL-88-21, 2003). The RCRA waste codes applied to the Hanford radioactive storage tanks containing CH-TRU wastes include those permitted for the WIPP (RPP-20268, 2004), except for characteristic waste codes D001, D002, D003, and D041. Hanford Site personnel will (b)(5)

(b)(5)

(b)(5) Table 3 presents the list of hazardous waste codes that are anticipated to be applicable to the treated (dried) waste form.

2.2.5 Acceptability of Waste Pursuant to the WIPP Waste Acceptance Criteria

Table 4 lists the wastes prohibited for storage, management and disposal at the WIPP facility. This information has been taken from HWFP Condition II.C.3 (Treatment, Storage, and Disposal Facility [TSDF] WAC) of the HWFP. (b)(5)

(b)(5)

**Table 3. CH-TRU Mixed Waste Treatment and Packaging System Dried Waste Designation**

Characteristic Waste Numbers				Listed Waste Numbers		
D004	D005	D006	D007	F001	F002	F003
D008	D009	D010	D011	F004	F005	
D018	D019	D022	D028			
D029	D030	D033	D034			
D035	D036	D038	D039			
D040	D043					

1 Source: Hanford Facility Dangerous Waste Permit Application, Contact-Handled Transuranic Mixed Waste Treatment,  
 2 Packaging, and Storage Facility (DOE/ORP-2003-22, Rev. 0A)  
 3 ^ Washington State specific codes (WT01, WT02, WP01, and WP02) that are applied at the time the waste is profiled do not  
 4 render the waste unacceptable in accordance with the CH-WAC.

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**Table 4. How Hanford Site Waste Analysis Will Meet the TSDF-WAC (2 Pages)**

HWFP Condition	Prohibited Waste (from HWFP Condition II.C.3, TSDF-WAC)	(b)(5)
II.C.3.a	<u>Liquids</u> - liquid waste is not acceptable at WIPP. Waste shall contain as little residual liquid as is reasonably achievable by pouring, pumping and/or aspirating, and internal containers shall contain less than 1 inch or 2.5 centimeters of liquid in the bottom of the container. Total residual liquid in any payload container (e.g., 55-gallon drum, standard waste box, etc.) may not exceed 1 percent volume of that container.	
II.C.3.b	<u>Pyrophoric materials</u> - Non-radionuclide pyrophoric materials, such as elemental potassium	
II.C.3.c	<u>Non-mixed hazardous wastes</u> - Hazardous wastes not occurring as co-contaminants with TRU wastes (non-mixed hazardous wastes)	
II.C.3.d	<u>Chemical incompatibility</u> - Wastes incompatible with backfill, seal and panel closures materials, container and packaging materials, shipping container materials, or other wastes	
II.C.3.e	<u>Explosives and compressed gases</u> - Wastes containing explosives or compressed gases	
II.C.3.f	<u>PCB Waste</u> - Wastes with polychlorinated biphenyl (PCB) not authorized under an EPA PCB waste disposal authorization.	
II.C.3.g	<u>Ignitable, corrosive, and reactive wastes</u> - wastes exhibiting the characteristic of ignitability, corrosivity, or reactivity (EPA Hazardous Waste Numbers of D001, D002, or D003)	
II.C.3.h	<u>Remote-handled transuranic waste</u> - Remote-handled (RH) TRU mixed waste (waste with a surface dose rate of 200 millirem per hour or greater).	
II.C.3.i	<u>Excluded Waste</u> - TRU mixed waste that has ever been managed as high-level waste and waste from tanks specified in Permit Attachment B are not acceptable at WIPP unless specifically approved through a Class 3 permit modification.	
II.C.3.j	<u>Headspace gas sampling and analysis</u> - Any waste container that does not have VOC concentration values reported for the headspace.	

Table 4. How Hanford Site Waste Analysis Will Meet the TSDF-WAC (2 Pages)

HWFP Condition	Prohibited Waste (from HWFP Condition II.C.3, TSDF-WAC)	(b)(5)
II.C.3.k	<u>Radiographic/visual examination</u> - Any waste container which has not undergone either radiographic or visual examination.	
II.C.3.l	<u>Waste stream profiles</u> - Any waste container from a waste stream which has not been preceded by an appropriate, certified Waste Stream Profile Form.	

- 1 CH-TRU contact-handled transuranic
- 2 CH-WAC contact-handled Waste Acceptance Criteria
- 3 EPA U.S. Environmental Protection Agency
- 4 HWFP Hazardous Waste Facility Permit
- 5 PCB polychlorinated biphenyl
- 6 PMR permit modification request
- 7 VOC volatile organic compound
- 8 WIPP Waste Isolation Pilot Plant

9 **2.2.6 WIPP CH-WAC Requirements**

10 (b)(5)

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14 **2.3 20.4.1.900 NMAC (incorporating 40 CFR §270.42(c)(1)(iii)) requires the applicant to explain**

15 **why the modification is needed**

16 The WIPP HWFP permit condition II.C.3.i prohibits acceptance of CH-TRU mixed waste from tanks that

17 has ever been managed as high-level waste or from specific tanks identified in Table B-9 of the HWFP

18 unless approved for disposal through a Class 3 PMR. The eight Hanford Site tanks (b)(5)

19 (b)(5) and are listed in Table B-9. (b)(5)

20 (b)(5)

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1 (b)(5)  
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3 **2.4 20.4.1.900 NMAC (incorporating 40 CFR §270.42(c)(1)(iv)) requires the applicant to provide**  
4 **the applicable information required by 40 CFR §§ 270.13 through 270.22, 270.62, 270.63,**  
5 **and 270.66**

6 The regulatory crosswalk (see Table 5) describes those applicable portions of the WIPP HWFP that  
7 would be altered by this PMR. However, Sections 270.16 through 270.22, 270.62, 270.63 and 270.66 of  
8 Title 40 of the CFR are not applicable to the WIPP. Consequently, they are not listed in the regulatory  
9 crosswalk. Where applicable, regulatory citations in this modification reference Title 20, Chapter 4,  
10 Part 1, NMAC, revised October 1, 2003, incorporating 40 CFR Parts 264 and 270.

11 **2.5 20.4.1.900 NMAC (incorporating 40 CFR §270.11(d) and 40 CFR 270.30(k)) requires any**  
12 **person signing under paragraph a and b must certify the document in accordance with**  
13 **20.4.1.900 NMAC**

14 The transmittal letter for this Class 3 PMR contains the signed certification statement in accordance with  
15 Condition I.F of the HWFP.

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**Table 5. Regulatory Crosswalk (5 pages)**

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the HWFP or Permit Application	Yes	No
§270.13		Contents of Part A permit application	Attachment O, Part A		✓
§270.14(b)(1)		General facility description	Attachment A		✓
§270.14(b)(2)	§264.13(a)	Chemical and physical analyses	Attachment B		✓
§270.14(b)(3)	§264.13(b)	Development and implementation of waste analysis plan	Module II Attachment B	✓	
	§264.13(c)	Off-site waste analysis requirements	Module II Attachment B		✓
§270.14(b)(4)	§264.14(a-c)	Security procedures and equipment	Attachment C		✓
§270.14(b)(5)	§264.15(a-d)	General inspection requirements	Attachment D		✓
	§264.174	Container inspections	Attachment D		✓
§270.23(a)(2)	§264.602	Miscellaneous units inspections	Attachment D		✓
§270.14(b)(6)		Request for waiver from preparedness and prevention requirements of Part 264 Subpart C	NA		✓
§270.14(b)(7)	264 Subtitle D	Contingency Plan requirements	Attachment F		✓
	§264.51	Contingency plan design and implementation	Attachment F		✓
	§264.52 (a) & (c-f)	Contingency plan content	Attachment F		✓
	§264.53	Contingency plan copies	Attachment F		✓
	§264.54	Contingency plan amendment	Attachment F		✓
	§264.55	Emergency coordinator	Attachment F		✓
	§264.56	Emergency procedures	Attachment F		✓
§270.14(b)(8)		Description of procedures, structures or equipment for:	Attachment E		✓
§270.14(b)(8) (i)		Prevention of hazards in unloading operations (e.g., ramps and special forklifts)	Attachment E		✓
§270.14(b)(8) (ii)		Runoff or flood prevention (e.g., berms, trenches, and dikes)	Attachment E		✓
§270.14(b)(8) (iii)		Prevention of contamination of water supplies	Attachment E		✓
§270.14(b)(8) (iv)		Mitigation of effects of equipment failure and power outages	Attachment E		✓

Table 5. Regulatory Crosswalk (5 pages)

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the HWFP or Permit Application	Yes	No
§270.14(b)(8)(v)		Prevention of undue exposure of personnel (e.g., personal protective equipment)	Attachment E		✓
§270.14(b)(8)(vi) §270.23(a)(2)	§264.601	Prevention of releases to the atmosphere	Module II Module IV Attachment M2 Attachment N		✓
	264 Subpart C	Preparedness and prevention	Attachment E		✓
	§264.31	Design and operation of facility	Attachment E		✓
	§264.32	Required equipment	Attachment E Attachment F		✓
	§264.33	Testing and maintenance of equipment	Attachment D		✓
	§264.34	Access to communication/alarm system	Attachment E		✓
	§264.35	Required aisle space	Attachment E		✓
	§264.37	Arrangements with local authorities	Attachment F		✓
§270.14(b)(9)	§264.17(a-c)	Prevention of accidental ignition or reaction of ignitable, reactive, or incompatible waste	Attachment E		✓
§270.14(b)(10)		Traffic pattern, volume and controls, for example: Identification of turn lanes, identification of traffic/stacking lanes, if appropriate Description of access road surface Description of access road load-bearing capacity Identification of traffic controls	Attachment G		✓
§270.14(b)(11)(i) and (ii)	§264.18(a)	Seismic standard applicability and requirements	Part B, Rev. 6 Chapter B		✓
§270.14(b)(11)(iii-v)	§264.18(b)	100-year floodplain standard	Part B, Rev. 6 Chapter B		✓
	§264.18(c)	Other location standards	Part B, Rev. 6 Chapter B		✓
§270.14(b)(12)	§264.16(a-e)	Personnel training program	Attachment H		✓
§270.14(b)(13)	264 Subpart G	Closure and post-closure plans	Attachment I & J		✓
§270.14(b)(13)	§264.111	Closure performance standard	Attachment I		✓

Table 5. Regulatory Crosswalk (5 pages)

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the HWFP or Permit Application	Yes	No
§270.14(b)(13)	§264.112(a) (b)	Written consent of closure plan	Attachment I		✓
§270.14(b)(13)	§264.112(c)	Amendment of closure plan	Attachment I		✓
§270.14(b)(13)	§264.112(d)	Notification of partial and final closure	Attachment I		✓
§270.14(b)(13)	§264.112(e)	Removal of wastes and decontamination/dismantling of equipment	Attachment I		✓
§270.14(b)(13)	§264.113	Time allowed for closure	Attachment I		✓
§270.14(b)(13)	§264.114	Disposal/decontamination	Attachment I		✓
§270.14(b)(13)	§264.115	Certification of closure	Attachment I		✓
§270.14(b)(13)	§264.116	Survey plat	Attachment I		✓
§270.14(b)(13)	§264.117	Post-closure care and use of property	Attachment I		✓
§270.14(b)(13)	§264.118	Post-closure plan; amendment of plan	Attachment I		✓
§270.14(b)(13)	§264.178	Closure/containers	Attachment I		✓
§270.14(b)(13)	§264.601	Environmental performance standards- Miscellaneous units	Attachment I		✓
§270.14(b)(13)	§264.603	Post-closure care	Attachment I		✓
§270.14(b)(14)	§264.119	Post-closure notices	Attachment J		✓
§270.14(b)(15)	§264.142	Closure cost estimate	NA		✓
	§264.143	Financial assurance	NA		✓
§270.14(b)(16)	§264.144	Post-closure cost estimate	NA		✓
	§264.145	Post-closure care financial assurance	NA		✓
§270.14(b)(17)	§264.147	Liability insurance	NA		✓
§270.14(b)(18)	§264.149-150	Proof of financial coverage	NA		✓
§270.14(b)(19)(i), (vi) (vii), and (x)		Topographic map requirements, Map scale and date. Map orientation, Legal boundaries, Buildings Treatment, storage, and disposal operations, Run-on/run-off control systems, Fire control facilities	Attachment O Part A Part B, Rev. 6 Chapter B, E		✓

Table 5. Regulatory Crosswalk (5 pages)

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information	
			Section of the HWFP or Permit Application	Yes No
§270.14(b)(19)(ii)	§264.18(b)	100-year floodplain	Attachment O Part A Part B, Rev. 6 Chapter B, E	✓
§270.14(b)(19)(iii)		Surface waters	Attachment O Part A Part B, Rev. 6 Chapter B, E	✓
§270.14(b)(19)(iv)		Surrounding land use	Attachment O Part A Part B, Rev. 6 Chapter B, E	✓
§270.14(b)(19)(v)		Wind rose	Attachment O Part A Part B, Rev. 6 Chapter B, E	✓
§270.14(b)(19)(viii)	§264.14(b)	Access controls	Attachment O Part A Part B, Rev. 6 Chapter B, E, F	✓
§270.14(b)(19)(ix)		Injection and withdrawal wells	Attachment O Part A Part B, Rev. 6 Chapter B, E, F	✓
§270.14(b)(19)(xi)		Drainage on flood control barriers	Part B, Rev. 6 Chapter B, E, F	✓
§270.14(b)(19)(xii)		Location of operational units	Part B, Rev. 6 Chapter B	✓
§270.14(b)(20)		Other federal laws: Wild and Scenic Rivers Act National Historic Preservation Act Endangered Species Act Coastal Zone Management Act Fish and Wildlife Coordination Act Executive Orders	Part B, Rev. 6 Chapter K	✓
§270.15	§264 Subpart I	Containers	Attachment M1	✓
	§264.171	Condition of containers	Attachment M1	✓
	§264.172	Compatibility of waste with containers	Attachment M1	✓
	§264.173	Management of containers	Attachment M1	✓
	§264.174	Inspections	Attachment D Attachment M1	✓
§270.15(a)	§264.175	Containment systems	Attachment M1	✓
§270.15(c)	§264.176	Special requirements for ignitable or reactive waste	Attachment E Permit Module II	✓
§270.15(d)	§264.177	Special requirements for incompatible wastes	Attachment E Permit Module II	✓
	§264.178	Closure	Attachment I	✓
§270.15(e)	§264.179	Air emission standards	Attachment E Attachment N	✓
§270.23	§264 Subpart X	Miscellaneous units	Module IV, Attachment M2	✓

Table 5. Regulatory Crosswalk (5 pages)

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the HWFP or Permit Application	Yes	No
§270.23(a)	§264.601	Detailed unit description	Module IV, Attachment M2		✓
§270.23(b)	§264.601	Hydrologic, geologic, and meteorologic assessments	Permit Module IV Attachment M2		✓
§270.23(c)	§264.601	Potential exposure pathways	Permit Module IV Attachment M2 Attachment N		✓
§270.23(d)		Demonstration of treatment effectiveness	Permit Module IV Attachment M2 Attachment N		✓
	§264.602	Monitoring, analysis, inspection, Response, reporting, and corrective action	Permit Module IV Attachment M2 Attachment N		✓
	§264.603	Post-closure care	Attachment J Attachment J1		✓
	§264 Subpart E	Manifest system, record keeping, and reporting	Permit Module I Permit Module II Permit Module IV Attachment B		✓

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**Attachment A. Table of Changes**

This table of changes identifies the proposed modification to the HWFP and provides an explanation for the proposed change. The changes and additions to the HWFP are in compliance with the New Mexico Hazardous Waste Act and other applicable regulatory requirements.

**Table of Changes  
 Class 3 Hazardous Waste Facility Permit Modification**

Affected HWFP Section	Explanation of Changes
Table II.C.3.i	WIPP permit condition II.C.3.i, <u>Excluded waste</u> , prohibits TRU mixed waste that has ever been managed as high-level waste and waste from tanks specified in HWFP Attachment B (Table B-9) from being accepted and disposed at the WIPP unless approved through a Class 3 PMR. This Class 3 PMR lists the Hanford Site tanks containing CH-TRU mixed waste and provides supporting process and origin of waste information to demonstrate that the waste from the eight Hanford Site tanks to be treated and packaged will meet the WIPP Waste Acceptance Criteria and other WIPP requirements.

**Attachment B. Proposed Revised HWFP Text**

The Permittees are proposing a modification to Module II, *General Facility Conditions*, Table II.C.3.i and Attachment B, Waste Analysis Plan, Table B-9, presented below. This proposed modification allows for the receipt, management and disposal of CH-TRU mixed waste from eight Hanford Site SSTs at the WIPP Facility.

Modifications to the text of the WIPP HWFP will be identified using a double underline for added information and a ~~strikeout~~ font for deleted information as follows:

<b>Table II.C.3.i – Additional Approved Waste Streams</b>	
<b>Date Class 3 Permit Modification Request Approved</b>	<b>Description of Waste Stream</b>
	<u>Hanford Site CH-TRU Mixed Waste from the following Single-Shell Tanks:</u> <u>241-B-200 series SSTs (B-201, B-202, B-203, and B-204)</u> <u>241-T-200 series SSTs (T-201, T-202, T-203, and T-204)</u>

**TABLE B-9  
 WASTE TANKS SUBJECT TO EXCLUSION**

Hanford Site – 177 Tanks	
A-101 through A-106	C-201 through C-204
AN-101 through AN-107	S-101 through S-112
AP-101 through AP-108	SX-101 through SX-115
AW-101 through AW-106	SY-101 through SY-103
AX-101 through AX-104	T-101 through T-112
AY-101 through AY-102	T-201 through T-204
B-101 through B-112	TX-101 through TX-118
B-201 through B-204	TY-101 through TY-106
BX-101 through BX-112	U-101 through U-112
BY-101 through BY-112	U-201 through U-204
C-101 through C-112	
Savannah River Site – 51 Tanks	
Tank 1 through 51	
Idaho National Engineering and Environmental Laboratory – 15 Tanks	
WM-103 through WM-106	WM-108 through 190

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18 *Mixed Waste Treatment, Packaging, and Storage*, U.S. Department of Energy, Office of River  
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- 1 EPA, 1986, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, U.S.  
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APPENDIX A\*

**BASIS FOR DESIGNATING CERTAIN HANFORD SINGLE-SHELL TANK WASTE RESULTING FROM  
THE BISMUTH-PHOSPHATE PROCESS AS TRANSURANIC WASTE  
DOE/ORP-2004-01, Rev. 0  
February 2004**

38 Pages (including coversheet)

\*(The TRU concentrations in this report, DOE/ORP-2004-01, differ from the values that are reported in RPP-13300, RPP-16129, and RPP-13873 (Appendices B-1, B-2 and B-3, respectively). The difference in TRU concentrations reported in DOE/ORP-2004-01 resulted from application of a scaling factor template that has subsequently been revised.)

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**APPENDIX B**  
**ORIGIN OF WASTES IN THE B-200 AND T-200 SERIES SINGLE-SHELL TANKS**  
**RPP-13300, Rev. 1**  
**December 2004**

178 Pages (including coversheet)

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**APPENDIX C**  
**HANFORD SITE**  
**CONTACT-HANDLED TRANSURANIC MIXED WASTE TREATMENT AND PACKAGING SYSTEM**  
**PROCESS DESCRIPTION**

12 Pages (including coversheet)

**DRAFT**

**CLASS 3 PERMIT MODIFICATION REQUEST  
ACCEPTANCE OF HANFORD SITE CONTACT-HANDLED  
TRANSURANIC MIXED TANK WASTE**

**WASTE ISOLATION PILOT PLANT  
CARLSBAD, NEW MEXICO**

**WIPP HWFP No. NM4890139088 - TSDF**

**January 2005**

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2.2.6 WIPP CH-WAC Requirements ..... 26

2.3 20.4.1.900 NMAC (incorporating 40 CFR §270.42(c)(1)(iii)) requires the applicant to explain why the modification is needed..... 29

2.4 20.4.1.900 NMAC (incorporating 40 CFR §270.42(c)(1)(iv)) requires the applicant to provide the applicable information required by 40 CFR §§ 270.13 through 270.22, 270.62, 270.63, and 270.66..... 29

2.5 20.4.1.900 NMAC (incorporating 40 CFR §270.11(d) and 40 CFR 270.30(k)) requires any person signing under paragraph a and b must certify the document in accordance with 20.4.1.900 NMAC. .... 30

**ATTACHMENTS**

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- ATTACHMENT A Table of Changes
- ATTACHMENT B Proposed Revised Permit Text

REFERENCES

**APPENDICES**

- APPENDIX A Basis for Designating Certain Hanford Single-Shell Tank Waste Resulting from the Bismuth-Phosphate Process as Transuranic Waste
- APPENDIX B-1 Origin of Wastes in the B-200 and T-200 Series Single-Shell Tanks
- APPENDIX B-2 Origin of Waste in Single-Shell Tank 241-T-104
- APPENDIX B-3 Origin of Wastes in Single-Shell Tanks 241-T-110, 241-T-111 and 241-T-112
- APPENDIX C Hanford Site Contact-Handled Transuranic Mixed Waste Treatment and Packaging System Process Description

## ACRONYMS AND ABBREVIATIONS

1		
2	CCP	Centralized Characterization Program
3	CFR	Code of Federal Regulations
4	CH	contact-handled
5	CH-TRAMPAC	Contact-Handled Transuranic Waste Authorized Methods for Payload Control
6	CH-TRU	contact-handled transuranic
7	Ci	curie
8	DQO	Data Quality Objectives
9	DOE	U.S. Department of Energy
10	EPA	U.S. Environmental Protection Agency
11	FGE	fissile gram equivalent
12	HASQARD	<i>Hanford Analytical Services Quality Assurance Requirements Document</i>
13	HFFACO	Hanford Federal Facility Agreement and Consent Order
14	HWFP	Hazardous Waste Facility Permit
15	LWA	<i>Land Withdrawal Act</i>
16	mrem/h	millirem per hour
17	NDA	non-destructive assay
18	NMAC	New Mexico Administrative Code
19	NMED	New Mexico Environment Department
20	PMR	Permit Modification Request
21	PCB	polychlorinated biphenyls
22	<sup>239</sup> Pu	plutonium-239
23	PE-Ci	plutonium-239 equivalent curies
24	RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
25	RH	remote-handled
26	SST	single-shell tank
27	TMU	total measurement uncertainty
28	TRUPACT-II	Transuranic Package Transporter – Model II
29	TSDf	Treatment, Storage, and Disposal Facility
30	TWAPs	Tank Waste Analysis Plans
31	TWBIR	Transuranic Waste Baseline Inventory Report
32	WAC	Waste Acceptance Criteria
33	WIPP	Waste Isolation Pilot Plant
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1 1.0 Introduction

2 The U.S. Department of Energy (DOE) and Westinghouse TRU Solutions, LLC, collectively referred to as  
3 the Permittees, submit this Class 3 Permit Modification Request (PMR) for the Hazardous Waste Facility  
4 Permit (HWFP) issued to the Waste Isolation Pilot Plant (WIPP), U.S. Environmental Protection Agency  
5 (EPA) Number NM4890139088-TSDF.

6 The HWFP, issued October 27, 1999, by the New Mexico Environment Department (NMED), authorizes  
7 the management, storage, and disposal of contact-handled transuranic (CH-TRU) waste. The purpose of  
8 the PMR is to make changes to the HWFP that would allow the management, storage, and disposal of  
9 CH-TRU mixed waste at the WIPP facility from 11 Hanford Site single-shell tanks (SST) [241-B-200  
10 series (B-201, B-202, B-203, and B-204); 241-T-200 series (T-201, T-202, T-203, and T-204); and the  
11 T-100 series tanks (241-T-104, 241-T-110, and 241-T-111)]. The PMR is submitted pursuant to HWFP  
12 Condition I.B.1 and 20.4.1.900 New Mexico Administrative Code (NMAC) (incorporating 40 Code of  
13 Federal Regulations (CFR) §270.42(c)).

14 The DOE submitted a Class 2 PMR, *Procedure for Consideration of Tank Waste*, to NMED on  
15 July 2, 2004. NMED approved the Class 2 PMR with an effective date of November 1, 2004, to the  
16 HWFP. The HWFP now has a procedure for allowing the disposal of transuranic mixed waste from tanks  
17 that have ever been managed as high-level waste by modifying text in Permit Condition II.C.3.i and  
18 Section B-1c, adding Table II.C.3.i and Table B-9, and editing Table B6-1, Item 12a of the WIPP HWFP.  
19 The conditions prohibit the Permittees of the WIPP facility from accepting transuranic mixed waste from  
20 tanks that has been managed as high-level waste and waste from specific tanks identified in Permit  
21 Attachment B, Table B-9, unless specifically approved through a Class 3 permit modification and  
22 incorporating such wastes in Table II.C.3.i. Waste approved for disposal at the WIPP as a result of the  
23 Class 3 PMR will meet the requirements and criteria of the *Contact-Handled Transuranic Waste*  
24 *Acceptance Criteria (CH-WAC) for the Waste Isolation Pilot Plant* (DOE/WIPP-02-3122, 2004).

25 The management, storage, and disposal of Hanford CH-TRU mixed waste from the identified tanks will  
26 require changes to WIPP HWFP permit conditions in Module II. In accordance with 20.4.1.900 NMAC  
27 (incorporating 40 CFR §270.42(c)(1)), the permit modification will propose specific changes to be made to  
28 the permit and provides relevant information on the permit conditions affected. This Class 3 PMR  
29 contains supporting technical information in compliance with the requirements of 20.4.1.900 NMAC  
30 (incorporating 40 CFR §§ 270.14(a) and 270.42(c)).

31 Source, special nuclear and by-product materials, as defined in the Atomic Energy Act (AEA) of 1954, are  
32 regulated at DOE facilities exclusively by DOE acting pursuant to its AEA authority. These materials are  
33 not subject to regulation by the New Mexico Hazardous Waste Act of 1978, the federal *Resource*  
34 *Conservation and Recovery Act of 1976* (RCRA), or any other relevant provision of law.

1 Where information regarding processing, packaging, management, and disposal of the radioactive  
2 source, byproduct material and/or special nuclear components of mixed waste (as defined by the Atomic  
3 Energy Act of 1954, as amended) has been incorporated into this permit modification, it is not  
4 incorporated for the purpose of regulating the radiation hazards of such components under the authority  
5 of this permit modification, but is only presented for general information in support of the requested permit  
6 modification.

7 1.1 Hanford Contact-Handled Transuranic Mixed Waste

8 Waste from the 11 Hanford SSTs discussed in this document (b)(5)

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29 Under the existing WIPP HWFP conditions, the Hanford transuranic waste streams will be subject to  
30 precisely the same pre-shipment analysis and testing as all of the wastes listed on the TWBIR. The  
31 wastes cannot be shipped unless and until they are shown to meet all of the current CH-WAC  
32 requirements. (b)(5)

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1.2 Hanford Contact-Handled Transuranic Mixed Waste Inventory

Table 1 provides the estimated waste volumes in the tanks and (b)(5)

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(b)(5) The Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement, Summary (DOE/EIS-0026-S-2, 1997) indicates that the total CH-TRU disposal capacity at WIPP is 168,500 cubic meters. (b)(5)

(b)(5)

1.3 Contents and Organization

This Class 3 PMR includes proposed changes to the existing WIPP HWFP, additions that are specific to Hanford CH-TRU mixed tank waste, and justifications for the changes. The remaining sections of the Class 3 PMR are organized as follows:

- a) Section 2.0 provides an overview of the PMR and information required for a Class 3 PMR pursuant to 20.4.1.900 NMAC (incorporating 40 CFR §270.42(c))
- b) Attachment A provides a Table of Changes and a discussion of the changes to be made to the WIPP HWFP
- c) Attachment B contains the proposed modifications to the WIPP HWFP with the proposed revisions marked
- d) The technical analyses for the supporting information is presented in Appendices A, B, and C.

2.0 Overview of the Permit Modification Request (PMR)

This document contains one Class 3 PMR to the WIPP HWFP, Permit Number NM4890139088-TSDF. This PMR is being submitted by the DOE, Carlsbad Field Office (CBFO) and Washington TRU Solutions, LLC, collectively referred to as the Permittees, in accordance with the WIPP HWFP Condition I.B.1 and 20.4.1.900 NMAC (incorporating 40 CFR 270.42). This Class 3 PMR is submitted based on requirements of the WIPP HWFP permit condition II.C.3.i. The PMR provides origin of waste information and other supporting information for the CH-TRU mixed waste from identified Hanford Site tanks to allow acceptance of the waste at the WIPP facility. These changes do not reduce the ability of the WIPP facility to protect human health and the environment.

Table 1. Hanford Tank Waste and Treated Waste Volumes

Single-Shell Tank	Estimated In-Tank Waste	
	Total (gallons)	
241-B-201	30,920	
241-B-202	30,290	
241-B-203	50,720	
241-B-204	50,760	
241-T-201	30,820	
241-T-202	21,270	
241-T-203	36,190	
241-T-204	37,590	
241-T-110	360,060	
241-T-111	442,310	
241-T-104	322,700	
<b>TOTAL</b>	<b>1,413,630</b>	

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\* The waste volumes presented are based on information presented in the Hanford Facility Dangerous Waste (RCRA Part B) Permit Application for the Contact-Handled Transuranic Mixed Waste Treatment, Packaging, and Storage Facility. (b)(5)

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7 Modifications to the text of the WIPP HWFP will be identified using a double underline for added  
 8 information and a ~~strikeout~~ font for deleted information and will be provided in Attachment B. The  
 9 following is information that is to be included in the Class 3 PMR in accordance with 20.4.1.900 NMAC  
 10 (incorporating 40 CFR 270.42(c)).

11 **2.1 20.4.1.900 NMAC (incorporating 40 CFR 270.42(c)(1)(i)) requires the applicant to describe**  
 12 **the exact change to be made to the permit conditions and supporting documents**  
 13 **referenced by the permit.**

14 This PMR contains proposed changes and supporting documentation that are needed to allow Hanford  
 15 Site CH-TRU mixed tank waste to be accepted for disposal at the WIPP. Origin of waste data are  
 16 provided with this PMR by the Permittees so NMED can approve the Class 3 PMR to allow storage,  
 17 characterization, and disposal of the Hanford CH-TRU mixed waste from the following Hanford Site SSTs:

- 18 ♦ 241-B-200 series SSTs (B-201, B-202, B-203, and B-204)
- 19 ♦ 241-T-200 series SSTs (T-201, T-202, T-203, and T-204)
- 20 ♦ 241-T-100 series SSTs (T-104, T-110 and T-111).

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A description of the

2 proposed changes to the WIPP HWFP is provided in the Table of Changes in Attachment A to this PMR.  
3 The exact wording of the proposed changes to the WIPP HWFP is included in Attachment B of this PMR.

4 **2.2 20.4.1.900 NMAC (incorporating 40 CFR §270.42(c)(1)(ii)) requires the applicant to identify**  
5 **that the modification is a Class 3 modification**

6 The proposed modification is a Class 3 PMR in accordance with 20.4.1.900 NMAC (incorporating 40 CFR  
7 270.42(c)). Preparation of the Class 3 PMR is based on requirements of the WIPP HWFP permit  
8 condition II.C.3.i. The following descriptive material (Sections 2.2.1 through 2.2.6) is provided in support  
9 of the PMR.

10 **2.2.1 History of Hanford Site Tank Farms**

11 The U.S. DOE Hanford Site is located in southeast Washington and was established in 1943 as part of  
12 the nuclear weapons complex, formerly known as the Manhattan Project (Gephart, 1998). Hanford was  
13 responsible for producing plutonium, which required the establishment of nuclear fuel fabrication  
14 operations, the construction and operation of nuclear reactors, and the construction and operation of  
15 chemical separations facilities to extract plutonium from irradiated nuclear fuel and to subsequently purify  
16 the plutonium product to meet weapons fabrication requirements. During these operations, wastes were  
17 generated and stored in the Hanford waste tanks. There were 149 SSTs constructed between 1943 and  
18 1964, and 28 double-shell tanks constructed between 1968 and 1986. The SSTs are over twenty years  
19 beyond their design life, have been declared unfit for use (Letter, S.V. Moore, 2001), and 67 are known or  
20 suspected to have leaked wastes to the environment. Wastes were transferred to and within these waste  
21 tanks based on source, compatibility, and tank volume management considerations.

22 **2.2.2 Hanford Site Operators**

23 Since 1943, Hanford tank waste facilities have been operated by four government agencies and nine  
24 prime tank farm contractors. The Hanford Site was originally designed, constructed, and operated under  
25 the Manhattan Engineer District of the U.S. Army through its prime contract with the E. I. DuPont  
26 Company. The Atomic Energy Commission, the Energy Research and Development Administration, and  
27 finally DOE succeeded the Manhattan Engineer District in turn. DuPont, General Electric, Isochem,  
28 Atlantic Richfield, Rockwell, Westinghouse, Fluor Daniel, Lockheed Martin, and CH2M HILL Hanford  
29 Group, Inc., have collectively managed tank farm operations at Hanford from 1943 through 2004.

30 DOE's Office of River Protection is currently responsible for management of the Hanford tank farms and  
31 to retrieve, treat, close, and store or dispose of Hanford's tank wastes. CH2M HILL is under contract with  
32 DOE to safely store the wastes, retrieve the wastes, close the waste tanks, treat certain wastes, dispose  
33 of low-activity wastes, and support the off-site disposition of treated wastes. DOE has a separate

1 contract with Bechtel National, Inc., to design and construct a tank waste treatment and immobilization  
2 plant.

### 3 2.2.2.1 Hanford Transuranic Tank Waste Management

4 The Hanford tank farms contain wastes from a variety of activities including fuel processing; plutonium  
5 recovery and purification; cladding removal; facility decontamination; laboratory research and analysis; and  
6 uranium and radioisotope recovery operations. The tank wastes are radioactive mixed wastes (i.e.,  
7 radioactive wastes that are mixed with RCRA controlled constituents), however, as is evident by their  
8 diverse origins, some wastes are not high-level waste by definition as they were not directly produced  
9 during the reprocessing of spent nuclear fuel nor were they derived from such wastes. The radioactive  
10 component is classified as high-level waste, transuranic waste, or low-level waste.

11 The DOE established waste management rules that required the segregation of transuranic wastes from  
12 high-level waste to the extent practical (e.g., DOE Order 5820.2A, which was later superseded by  
13 DOE Order 435.1). Its predecessor agencies also segregated wastes based on waste characteristics to  
14 facilitate treatment and disposal activities. In the Hanford tank farms, this segregation was achieved by  
15 establishing separate, dedicated storage tanks for each waste type, restricting the transfer of wastes  
16 among tanks, and by subjecting tank wastes to specific administrative controls and decision-making  
17 processes. Regardless of classification, however, DOE and its contractors managed all tank wastes under  
18 the stringent standards for high-level waste in order to preclude the need to construct and maintain  
19 separate tank systems for interim storage of transuranic or other tank wastes. A single tank farm  
20 management protocol avoided the need to establish separate safety protocols for the management of  
21 different tanks, depending on whether the wastes were high-level, transuranic, or low-level  
22 (WHC-SD-WM-ES-386, 1996). The administrative controls associated with segregating the transuranic  
23 tank wastes remain in effect through the current time.

24 In 1988, following the preparation of the *Final Environmental Impact Statement, Disposal of Hanford*  
25 *Defense High-Level, Transuranic and Tank Waste* (DOE/EIS-0113, 1987), DOE issued a Record of  
26 Decision (53 FR 12449, 1988) on the proposed disposition of the tank wastes. DOE's Record of Decision  
27 announced its decision to retrieve and treat high-level, transuranic, and other tank wastes contained in the  
28 double-shell tanks. The Record of Decision also announced that wastes contained in the SSTs, as well as  
29 buried transuranic and other site wastes, would be further studied and their treatment and disposal would  
30 be the subject of future National Environmental Policy Act analyses and decisions. Consistent with this  
31 Record of Decision, DOE initiated plans to construct the Hanford Waste Vitrification Plant, which would  
32 have had the capacity to complete waste treatment of double-shell tank wastes.

33 In the early 1990's, DOE determined that it needed to develop and implement a strategy to retrieve and  
34 treat the tank wastes in both the single-shell and double-shell tank systems. This strategic change

1 required a significant increase in the total treatment capacity. The Hanford Waste Vitrification Plant was  
2 determined to be too small to support completion of the mission and was cancelled. A series of technical  
3 studies were undertaken in 1993 to establish a new path forward. A new plan emerged in 1995 to  
4 construct a much larger vitrification facility, with a pretreatment facility to separate low-activity tank wastes  
5 from high-activity tank wastes. The separate waste streams would then go to large vitrification facilities;  
6 one to immobilize the fraction of the wastes commonly called low-activity waste, and one to immobilize the  
7 high-activity waste fraction of the wastes, commonly called the high-level waste. This new treatment  
8 complex was to be constructed and begin operations in 1998, with the completion date of 2028 for the  
9 retrieval and treatment mission (approximately 30 years of operations).

10 During the planning timeframe of the early 1990's, DOE and its contractors conducted a series of  
11 additional studies to consider other waste treatment strategies. One particular study, conducted in 1995  
12 (WHC-SD-WM-ES-331, 1995 and Letter 9552169, 1995), focused on identifying SSTs and double-shell  
13 tanks containing transuranic wastes. As an element of that study, the tank histories and inventories were  
14 reviewed to identify which of the tanks contained transuranic wastes. Transuranic tank waste treatment  
15 strategies (WHC-SD-WMES-331, 1995) were developed using the emerging definitions from the WIPP  
16 LWA, the draft CH-WAC, and an earlier U.S. Nuclear Regulatory Commission proposed rulemaking  
17 associated with high-level waste definitions.

18 This same study identified an initial population of tanks that contain transuranic wastes. The study also  
19 indicated that further characterization and development of tank process history would likely establish that  
20 additional tanks contained transuranic wastes.

21 In 1995, the DOE determined that alternative tank waste disposal strategies should be evaluated based on  
22 the projected cost difference between estimated disposal costs for the high-level waste repository  
23 (assumed to be Yucca Mountain) and WIPP (Letter 95-TWR-129, 1995). Two follow-on technical studies  
24 were commissioned and issued.

25 The first was a decision document (Letter 9651784, 1996) recommending that the technical planning  
26 baseline be modified to include blending of the transuranic tank wastes with high-level waste feeds for  
27 treatment and disposal of that blended material in the national high-level waste repository, rather than  
28 separately packaging it for disposal at the WIPP. The decision document was updated in 1996 to include  
29 an alternatives evaluation appendix (WHC-SD-WM-ES-368, 1996). The second document  
30 (WHC-SD-WM-ES-386, 1996) established the technical feasibility of separately processing this transuranic  
31 material for disposal at the WIPP.

32 There were several key assumptions upon which the recommendation to blend the transuranic wastes with  
33 high-level waste feeds for treatment were made. These were:

- 1 • The high-level waste vitrification system had excess capacity to complete vitrification at no  
2 significant incremental capital or operating costs.
- 3 • The incremental cost for immobilizing transuranic wastes using the high-level waste vitrification  
4 system would be minor relative to the total cost for the treatment and disposal of the tank wastes.
- 5 • The vitrified transuranic waste would need to be disposed of as remote-handled.

6 At the time the recommendation was developed, the process for addressing remote-handled transuranic  
7 wastes was highly uncertain as was the DOE-wide capacity demand for remote-handled waste disposal at  
8 WIPP. Accordingly, DOE concurred with the recommendation in August 1996 (Letter 96-WDD-102, 1996)  
9 and authorized changes to the planning basis. However, DOE specifically precluded any changes to the  
10 current waste management procedures, thus requiring continued segregation of stored transuranic wastes  
11 from high-level waste. As a consequence of the assumptions discussed above, the Hanford tank waste  
12 transuranic tank waste streams were not included in the TWBIR.

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38 Consistent with this, DOE considers it to be environmentally responsible, appropriate, and  
39 cost-effective to package and dispose of the transuranic wastes from these 11 tanks at the  
40 WIPP (DOE/EIS-0189-SA4, 2003).

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### 2.2.2.2 Hanford Tank Waste Management Baseline

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(b)(5) The HFFACO includes a milestone (M-62-08) that required DOE to define the path for the remaining wastes (M-62-03-02, 2003). In FY2003, following the development of the *Hanford Performance Management Plan* (DOE/RL-2002-47, 2002), the baseline was modified to include two additional tank waste treatment and disposal paths. First, the Transuranic Mixed Waste Packaging Project was added for packaging both the contact-handled and remote-handled transuranic wastes. Second, a supplemental treatment based approach was added to treat low-activity waste that could not be treated in the Waste Treatment and Immobilization Plant, even with enhancements that were added to increase its overall throughput. (b)(5)

(b)(5)

In order to achieve the commitment of treating the tank wastes for disposal by 2028, the baseline assumes a three-path approach to waste treatment. Implementation of technologies supplemental to the Waste Treatment and Immobilization Plant will reduce the burden on the Waste Treatment and Immobilization Plant and improve the speed with which risks to the environment are reduced. The three paths include the treatment of high-activity wastes and a percentage of the low-activity wastes through the Waste Treatment and Immobilization Plant, processing transuranic tank wastes for disposal at the WIPP, and supplemental treatment of low-activity wastes in parallel with the Waste Treatment and Immobilization Plant.

### 2.2.2.3 U.S. DOE Hanford Site Legally Enforceable Milestones

The HFFACO was signed on May 15, 1989, by the DOE, the EPA, and Washington State Department of Ecology (89-10, 2003). The HFFACO is a legally enforceable agreement and consent order that establishes a schedule and framework for the cleanup of the Hanford Site. Specifically, the HFFACO commits the DOE to achieve compliance with the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) remedial action provisions and with the RCRA treatment, storage, and disposal unit regulations and corrective action provisions, including the Washington State Dangerous Waste implementing regulations. To achieve compliance, the HFFACO (1) defines and ranks RCRA and CERCLA cleanup commitments, (2) establishes responsibilities, (3) provides a basis for budgeting, and (4) reflects a concerted goal of achieving full regulatory compliance and remediation, with enforceable milestones, in an aggressive manner. Key tank farm milestones include:

- M-062-08: Submittal of Hanford Tank Waste Supplemental Treatment Technologies Report, Draft Hanford Tank Waste Treatment Baseline, and Draft Negotiations Agreement In Principle (AIP) – 6/30/06 (proposed)
- M-045-05: Complete retrieval of all remaining SSTs – 9/30/2018

- 1 • M-045-00: Complete closure of all SST farms – 9/30/2024
- 2 • M-062-00: Complete pretreatment processing and vitrification of Hanford high-level and
- 3 low-activity tank wastes – 12/31/2028

4 A cornerstone for the treatment of tank wastes and compliance with HFFACO milestones is the Waste  
5 Treatment and Immobilization Plant, which is planned to go online in 2011. With the addition of handling  
6 transuranic wastes and supplemental treatment for low-activity waste external to the Waste Treatment and  
7 Immobilization Plant, sufficient capacity can be in place to treat the tank wastes by the HFFACO milestone  
8 date of 2028 (RPP-13678, 2003). Implementing supplemental processing tailored to the characteristics of  
9 the wastes to be treated will improve the rate of environmental risk reduction by removing wastes from  
10 these older leak-prone SSTs, such as those tanks that contain transuranic wastes (RPP-13678, 2003;  
11 DOE/RL-2002-47, 2002; and Letter CH2M-0303490, 2003).

12 (b)(5)

### 16 2.2.3 Characterization of Hanford Transuranic Mixed Waste

17 The SST system wastes have been extensively characterized in accordance with the HFFACO and were  
18 characterized to implement Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 93-5. On  
19 November 15, 1999, the DNFSB issued a letter stating that sampling and characterization activities were  
20 completed, closing Recommendation 93-5 (Letter, J.T. Conway, 1999). The HFFACO Milestone M-44-00A  
21 (Letter 02-EMD-162, 2002) was completed October 1, 2002. Closure of this milestone and DNFSB  
22 Recommendation 93-5 was a culmination of an extensive characterization effort that enabled the resolution  
23 of important national safety issues and allowed tank waste remediation planning to go forward.

#### 24 2.2.3.1 Characterization of Waste and the Resource Conservation and Recovery Act

25 HFFACO Milestone M-44-00 (89-10, 2003 and M-44-93-01, 1994) required the preparation of Tank  
26 Characterization Reports for the Hanford tank wastes, under RCRA. Those reports were based on  
27 process knowledge, prior characterization data, and validated empirical data acquired after May 1989,  
28 e.g., laboratory analyses of tank waste samples. Milestone M-44-02 (89-10, 2003 and M-44-93-01, 1994)  
29 required that Tank Waste Analysis Plans (TWAPs) and Tank Characterization Reports be submitted  
30 annually to the Washington State Department of Ecology and EPA for approval. The TWAPs were  
31 required to address safety, retrieval, pretreatment, and other processing needs. The TWAPs were also  
32 required to identify sampling and analysis activities projected for the following fiscal year.

33 TWAPs (WHC-SD-WM-PLN-101, 1996; WHC-SD-WM-PLN-120, 1996; and HNF-SD-WM-PLN-125, 1997)  
34 are subject to specific quality control and quality assurance requirements set forth in the *Tank Waste*

1 *Remediation System Characterization Program Quality Assurance Program Plan*

2 (WHC-SD-WM-QAPP-025, 1994). That plan required that the characterization program utilize EPA quality  
3 assurance guidelines and meet the requirements and standards of Washington Administrative Code  
4 Chapter 173-303, Dangerous Waste Regulations.

5 The *Hanford Analytical Services Quality Assurance Requirements Document* (HASQARD)

6 (DOE/RL-96-98, 1998), establishes quality requirements in response to DOE Order 5700.6C. The  
7 HASQARD is designed to meet the needs of the DOE for maintaining a consistent level of quality for  
8 sampling as well as field and laboratory analytical services provided by contractor and commercial field  
9 and laboratory analytical operations. The HASQARD is based on several EPA drivers including SW-846.

10 Characterization determinations are made using analytical results from tank waste samples as well as  
11 historical information about the tanks. The characterization of the SST system wastes and the analytical  
12 data were obtained and analyzed consistent with RCRA requirements and provides information regarding  
13 the RCRA characteristics of the wastes. The characterization data for the 11 SSTs addressed in this  
14 document is from the Hanford Site Tank Waste Information Network System (TWINS) database  
15 (<http://twins.pnl.gov/twms.htm>). Current waste characterization information is provided from the  
16 TWINS-generated Auto Tank Characterization Reports that contain a description of the characterization of  
17 the wastes in the Hanford tanks addressing the physical, chemical, and radiological properties of the  
18 wastes. The current data provide a regulatory and scientific basis to be used in the identification of  
19 characteristic waste codes for eventual disposition of these waste streams at the WIPP. Confirmatory  
20 waste sampling and analysis (RPP-20268, 2004) of the packaged wastes will be conducted to verify  
21 acceptable knowledge and certify that the waste meets the CH-WAC, as set forth in the WIPP HWFP.

#### 22 2.2.3.2 Origin of Waste

23 The initial mission at the Hanford Site was to separate plutonium from spent nuclear fuel elements. The  
24 first process used to separate plutonium from spent nuclear fuel elements consisted of a series of chemical  
25 dissolution and precipitation processes known as the Bismuth Phosphate process  
26 (DOE/ORP-2004-01, 2004) that is fully described in Appendix A. The Bismuth Phosphate process was  
27 used from 1945 through 1956. Various process operations, including spent nuclear fuel reprocessing,  
28 were carried out in four facilities in separate parts of the Hanford Site. These facilities were the  
29 221-B Plant and the 224-B Building and the 221-T Plant and the 224-T Building.

30 The Bismuth Phosphate process generated five distinct waste types that were transferred to the SSTs, as  
31 shown in Figure 1. These five waste types are commonly called (1) coating removal wastes, (2) metal  
32 wastes, (3) first decontamination cycle wastes, (4) second decontamination cycle wastes, and (5) 224  
33 wastes. The first four of these waste types (i.e., coating removal waste, metal waste, first decontamination  
34 cycle waste, and second decontamination cycle waste) were generated in the 221-B and 221-T Plants.

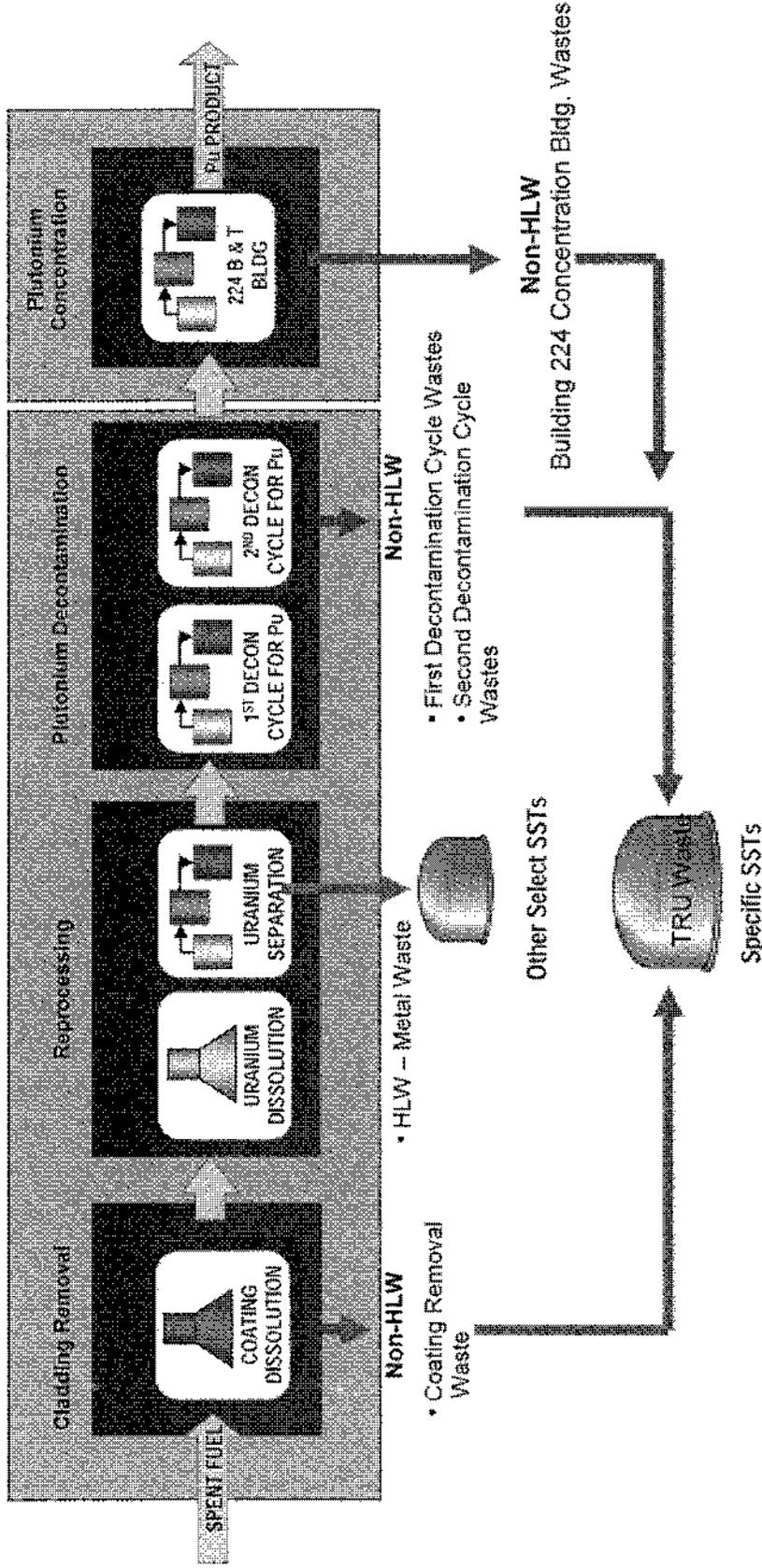
1 The 224 wastes were generated from plutonium processing activities conducted in the 224-B and  
2 224-T Buildings. The chemicals used and the major chemical reactions that occurred in the Bismuth  
3 Phosphate process are described below and in Appendix A (DOE/ORP-2004-01, 2004).

4 The batch nature of the Bismuth Phosphate process provides very sharp demarcation points between  
5 process steps, which enables clear distinctions to be made regarding those steps were and were not spent  
6 nuclear fuel reprocessing. During each batch operation, process chemicals were added to selectively  
7 dissolve and/or precipitate specific chemical compounds. Then liquids and solids were separated from  
8 each other. Following the initial liquids/solids separations, the solids were rinsed and separated from the  
9 rinse liquids in several distinct operations prior to the solids entering the next batch operation step. This  
10 provided a clear basis for determining, for example, that any liquids produced directly during the  
11 reprocessing of spent nuclear fuel were thoroughly washed from the plutonium product precipitate during  
12 the metals dissolution batch process operation before that plutonium precipitate was transferred to the next  
13 batch operation, first cycle decontamination, as is discussed below. The combination of the clear  
14 demarcation points between process operations and the tank farm management protocols that maintained  
15 certain waste streams separate from others adds confidence to DOE's determination that the waste  
16 streams discussed in this document are transuranic wastes. The Bismuth Phosphate process steps are  
17 described in more detail below.

18 The spent nuclear fuel elements that were processed in the 221-B and 221-T Plants consisted of uranium  
19 metal that were coated with an aluminum-silicon alloy. The aluminum-silicon alloy coating (sometimes  
20 referred to as hull or cladding) was separated from the spent fuel by chemical dissolution using sodium  
21 hydroxide and sodium nitrate. Sodium hydroxide and sodium nitrate were used to dissolve the aluminum-  
22 silicon coating because these chemicals do not dissolve the uranium metal, i.e., the coating removal  
23 process did not separate the spent nuclear fuel constituents (b)(5)  
24 (b)(5) The highly caustic dissolved coating material  
25 (designated as CVV) was separated from the uranium metal and then combined with the first  
26 decontamination cycle wastes where the CW excess sodium hydroxide neutralized the first  
27 decontamination cycle waste's acidity. These combined waste streams were transferred to SSTs  
28 designated for their storage.

29

Figure 1. Bismuth Phosphate Process



1 Following coating removal, the uranium metal was dissolved in nitric acid to separate the spent nuclear fuel  
2 into its constituent elements of fission products, uranium, plutonium, and other transuranic elements. The

3 (b)(5)

4 (b)(5)

Water and sulfuric acid were added to

5 the dissolved spent nuclear fuel to ensure the uranium and long-lived fission products remained in solution  
6 as sulfate compounds during the subsequent plutonium precipitation step (DOE/ORP-2004-01, 2004)  
7 (see Appendix A). Bismuth nitrate and phosphoric acid were then added to form bismuth phosphate and  
8 plutonium phosphate precipitates (i.e., solids). The heavier bismuth phosphate precipitate caused the  
9 plutonium phosphate precipitate to settle. The original process flow sheet shows the uranium and  
10 approximately 90 percent of the long-lived fission products such as cesium-137 and strontium-90 remained  
11 in solution. The bismuth phosphate and plutonium phosphate precipitates were separated from the  
12 uranium and long-lived fission products by centrifuging the mixture. The bismuth phosphate and plutonium  
13 phosphate precipitates were washed and re-centrifuged three times to remove any waste liquids and  
14 soluble fission products that may have been entrained in the precipitate. In addition to a small fraction  
15 (less than 10 percent) of strontium-90, short-lived fission products such as zirconium-95, niobium-95, and  
16 cerium-144 were co-precipitated with the bismuth phosphate and plutonium phosphate  
17 (DOE/ORP-2004-01, 2004). These short-lived fission products, with half-lives of less than one year,  
18 rapidly decayed during storage. The washed plutonium precipitate solids were segregated for additional  
19 processing.

20 The waste solution, from the above processing step, included uranium sulfate, approximately 90 percent of  
21 the long-lived fission products, and precipitate wash solutions. These were combined and neutralized  
22 using sodium hydroxide and sodium carbonate. The combined, neutralized wastes were known  
23 collectively as metal wastes (designated as MW waste). The metal wastes contained the highly  
24 radioactive fission products and uranium that were separated from the spent fuel during reprocessing  
25 (DOE/ORP-2004-01, 2004). (b)(5)

26 (b)(5)

The metal wastes were transferred

27 to a set of SSTs that were different than the set of SSTs that received other waste types from the Bismuth  
28 Phosphate process. The tanks that received metal wastes are not under consideration for disposal at the  
29 WIPP.

30 Following the separation of the metal wastes and washing of the bismuth phosphate and plutonium  
31 phosphate precipitates, reprocessing of the spent nuclear fuel has been completed. The bismuth  
32 phosphate and plutonium phosphate precipitates are a plutonium product that underwent further  
33 processing steps to purify the plutonium (DOE/ORP-2004-01, 2004) (see Appendix A).

34 The bismuth phosphate and plutonium phosphate precipitates were then dissolved in nitric acid solution  
35 to form plutonium nitrate in solution. The plutonium nitrate solution was then processed through two

1 successive and similar decontamination cycles to separate the short half-life fission products such as  
2 zirconium-95, niobium-95, and cerium-144. In the first decontamination cycle, the plutonium nitrate  
3 solution was oxidized via the addition of sodium bismuthate and sodium dichromate. Sodium bismuthate,  
4 phosphoric acid, zirconium nitrate, and cerium nitrate were added to precipitate bismuth phosphate and  
5 the phosphate insoluble fission products, primarily strontium-90, cerium-144, zirconium-95, and  
6 niobium-95. The bismuth phosphate and fission product precipitate (solids) were centrifuged to separate  
7 them from the plutonium which remained in solution. The bismuth phosphate and fission products  
8 precipitate were dissolved using nitric acid and hydrogen peroxide and then transferred to waste  
9 collection tank 15-8 (tank number 15-9 for second decontamination cycle waste) within the 221-B or  
10 221-T Plants.

11 The plutonium solution was then reacted with bismuth sub-nitrate and phosphoric acid to produce bismuth  
12 phosphate and plutonium phosphate precipitates. The bismuth phosphate and plutonium phosphate  
13 precipitates were separated from the liquid by centrifugation. The bismuth phosphate and plutonium  
14 phosphate precipitates were washed with water and centrifuged three times to separate entrained liquid.  
15 The liquids collected from centrifuging and washing the bismuth phosphate and plutonium phosphate  
16 precipitates were also transferred to waste collection tank 15-8 (tank number 15-9 for second  
17 decontamination cycle waste) within the 221-B or 221-T Plants.

18 After washing, the bismuth phosphate and plutonium phosphate precipitates were then dissolved in nitric  
19 acid forming plutonium nitrate and bismuth nitrate in solution. This solution was then transferred to the  
20 second decontamination cycle where the first decontamination steps (except for zirconium nitrate and  
21 cerium nitrate additions) were repeated to further purify the plutonium product. At the end of the second  
22 decontamination cycle, the plutonium nitrate and bismuth nitrate solution was transferred to the 224-B or  
23 224-T Building for additional purification and concentration of the plutonium product.

24 The waste solutions collected in tank 15-8 were known as the first decontamination cycle wastes  
25 (designated as 1C waste). As previously stated, the CW was combined with the 1C wastes to neutralize  
26 the acidic 1C wastes. The neutralized, combined 1C / CW wastes were transferred to a specific set of  
27 SSTs. The waste solutions collected in tank 15-9 were known as the second decontamination cycle  
28 wastes (designated as 2C waste). The 2C wastes was neutralized by addition of sodium hydroxide  
29 solution and transferred to a specific set of SSTs. The short-lived fission products (i.e., cesium-144,  
30 zirconium-95 and niobium-95) collected in the 1C and 2C wastes have undergone radionuclide decay and  
31 are no longer detectable in these wastes.

32 The plutonium solution from the 221-B / 221-T Plants was transferred to the 224-B / 224-T Building to  
33 remove the bismuth phosphate and residual fission products (DOE/ORP-2004-01 2004) (see Appendix A).  
34 The plutonium nitrate was oxidized with sodium bismuthate to ensure plutonium would remain in solution.  
35 Phosphoric acid was added to precipitate bismuth phosphate along with residual zirconium-95 and

1 niobium-95 fission products, which were then separated by centrifugation from the plutonium in solution.  
2 The bismuth phosphate and fission product precipitates were dissolved in nitric acid and collected as part  
3 of the 224 waste.

4 Hydrogen fluoride and lanthanum ammonium nitrate were added to the oxidized plutonium solution to  
5 precipitate lanthanum fluoride along with the remaining fission products (e.g., cerium-144), leaving  
6 plutonium in solution. The lanthanum fluoride and fission products precipitates were separated by  
7 centrifugation from the plutonium in solution. The lanthanum fluoride and fission products precipitates  
8 were dissolved in nitric acid and sodium dichromate and processed in the 224 Building to recover  
9 plutonium.

10 The plutonium solution was then reduced by addition of oxalic acid and nitric acid. Hydrogen fluoride and  
11 lanthanum ammonium nitrate were added to the reduced plutonium solution to precipitate lanthanum  
12 fluoride along with plutonium fluoride, which were centrifuged and washed with nitric acid followed by  
13 centrifugation. The liquid and wash solutions were collected as part of the 224 waste.

14 The lanthanum fluoride and plutonium fluoride precipitates were reacted with potassium hydroxide to  
15 produce lanthanum hydroxide and plutonium hydroxide solids. The lanthanum hydroxide and plutonium  
16 hydroxide solids were washed with potassium hydroxide and centrifuged to remove entrained liquids. The  
17 separated liquids were collected as part of the 224 waste.

18 The lanthanum hydroxide and plutonium hydroxide solids were dissolved in nitric acid to produce a  
19 plutonium nitrate and lanthanum nitrate solution. All of the 224 waste solutions were collected together  
20 and neutralized with sodium hydroxide solution before transfer to a dedicated set of SSTs.

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As previously stated, specific SSTs received the 1C / CW, 2C and 224-waste types. The tanks that received these waste types are now discussed in further detail. The specific wastes that were sent to each of the SSTs are provided in Table 2.

224-Waste (Tanks 241-B-201 through 241-B-204 and 241-T-201 through 241-T-204)

The 224 wastes originated from plutonium purification and concentration activities that were conducted in the 224-B and 224-T Buildings at the Hanford Site (RPP-13300, 2004) (see Appendix B-1). (b)(5)

(b)(5)

The 224-B and 224-T Buildings received plutonium nitrate solution that was separated from spent nuclear fuel as part of processing activities conducted in the 221-B and 221-T Plants. Wastes from the 224-B Building were discharged to tanks 241-B-201 through 241-B-204 from October 1946 through September 1952. Wastes from the 224-T Building were discharged to tanks 241-T-201 through 241-T-204 from October 1946 through May 1952 and then to tanks 241-T-110 and 241-T-111 through September 1956.

**Table 2. Waste Streams Sent to Specific Hanford Tanks**

Tank	Date of Last Waste Receipt	Waste Sources
241-B-201	1953	224, BFSH
241-B-202	1953	224, BFSH
241-B-203	1953	224, BFSH
241-B-204	1953	224, BFSH
241-T-201	1952	224
241-T-202	1952	224
241-T-203	1952	224
241-T-204	1952	224
241-T-110	1954	2C, 224
241-T-111	1967	2C, 224, 241-T-110*, equipment decontamination waste
241-T-104	1954	1C/CW

BFSH = B-Plant flush solutions  
 2C = Second cycle waste from the Bismuth Phosphate process  
 224 = Lanthanum Fluoride waste from the 224 buildings  
 1C/CW = First decontamination cycle waste/coating removal waste from Bismuth Phosphate process  
 \* Waste cascaded through interconnecting pipeline from 241-T-110 into Tank 241-T-111  
 Source: Origin of Waste Reports RPP-13300, RPP-13873 and RPP-18129

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1 Tanks 241-B-201, 241-B-202, 241-B-203, and 241-B-204 also received wastes from decontamination of  
2 process equipment following completion of the Bismuth Phosphate process activities in the 221-B Plant  
3 and 224-B Building. Specifically, from July 1952 through March 1953, all equipment within the 221-B Plant  
4 and the 224-B building was flushed with nitric acid and other chemicals to remove plutonium and fission  
5 products. The equipment cleaning solution was processed through the normal process equipment routes  
6 to recover plutonium (RPP-13300, 2004), (b)(5)

7 (b)(5)

8 (b)(5)

11 1C/ CW and 2C (Tanks 241-T-104, 241-T-110, and 241-T-111)

12 The 1C / CW and 2C waste types were collectively identified as Bismuth Phosphate process wastes in  
13 draft Revision 4 of the TWBIR. As previously stated, the 1C / CW and 2C waste types originated from  
14 plutonium product processing activities that were conducted between 1945 and 1956 in the 221-T and  
15 221-B Bismuth Phosphate Plants and the 224-T and 224-B Buildings at the Hanford Site  
16 (DOE/ORP-2004-01, 2004, and Internal Memo 7G330-MEJ-03-001, 2003). The 1C / CW wastes were  
17 discharged to various SSTs, including tank 241-T-104 (RPP-16129, 2004). Other tanks at the Hanford Site  
18 also received cladding wastes and 1C wastes, but these tanks are not being considered for disposal at the  
19 WIPP, since the cladding wastes and 1C wastes in these tanks were either removed from the tanks or  
20 mixed with high-level waste. The 2C wastes were discharged to various SSTs, including tanks 241-T-110,  
21 241-T-111 and 241-T-112 (RPP-13873, 2004),.

22 As previously stated, wastes from the 224-T Building were also discharged to tanks 241-T-110 and  
23 241-T-111 from May 1952 through September 1956. Tanks 241-T-110, 241-T-111, and 241-T-112 also  
24 received low-activity wastes from the cell drainage collection tank in 221-T Plant. Tanks 241-T-111 and  
25 241-T-112 also received wastes from equipment decontamination activities conducted in the 221-T Plant.

26 The 1C / CW and 2C wastes formed solids during storage in these tanks. The solids settled to the bottom  
27 of each tank, leaving a clarified supernatant (liquid). The supernatant was removed from each tank.  
28 Various tanks including 241-T-112 were then reused to receive wastes from a radioisotope recovery  
29 (i.e., cerium-144, promethium-147, cesium-137, and strontium-90) separation processes conducted at the  
30 221-B Plant from 1963 through 1985. The fission by-product processing wastes were deposited atop of  
31 the 1C / CW or 2C solids present in each of these tanks. The wastes in tank 241-T-112 are not currently  
32 being considered for disposal at WIPP. The DOE is evaluating whether the radioisotope recovery wastes  
33 can be separated from these wastes and is evaluating the proper disposal path for the wastes in these six  
34 tanks.

1 In short, waste storage tanks 241-T-104, 241-T-110, and 241-T-111 did not receive spent nuclear fuel or  
2 high-level waste. Origin of Waste reports RPP-16129 and RPP-13873, provided in Appendix B-2 and B-3,  
3 respectively, demonstrates that wastes generated and stored in these tanks have been segregated from  
4 high-level waste stored at the Hanford Site.

5 (b)(5)

8 In 1997, the NRC concurred in the classification of some low-activity waste stored in some of the Hanford  
9 Site tanks (Letter, C. J. Paperiello, 1997), (b)(5)

10 (b)(5)

11 As previously noted, process records were reviewed to determine the circumstances and processes that  
12 generated the wastes stored in the subject SSTs (241-B-201 through 241-B-204, 241-T-201 through  
13 241-T-204, 241-T-104, 241-T-110, and 241-T-111).

14 These wastes meet the definition of transuranic waste provided in DOE M 435.1 and the WIPP LWA.  
15 Through that process, it was determined that these wastes are not: high-level waste, wastes that the  
16 Secretary of Energy has determined, with the concurrence of the EPA Administrator, do not need the  
17 degree of isolation required by the disposal regulations; or wastes that the NRC has approved for disposal  
18 on a case-specific basis in accordance with Part 61 of Title 10, Code of Federal Regulations  
19 (DOE/ORP-2004-01 2004).

20 All of the transuranic tank wastes will be de-watered and packaged to meet the CH-WAC. (b)(5)

21 (b)(5)

#### 23 2.2.4 Waste Packaging and Characterization Planning

24 Extensive evaluation of the waste records and documentation has been performed to validate the  
25 acceptability of the wastes under the CH-WAC. In addition to the internal evaluations performed, external  
26 review of the data was conducted. "Acceptable knowledge" records including the origin of waste reports,  
27 waste characterization data, and analytical records were provided to the WIPP Centralized  
28 Characterization Program (CCP) subject matter expert for the Acceptable Knowledge program at the  
29 WIPP working as a subcontractor to Washington TRU Solutions. Upon completing the review of the  
30 waste data, CCP concluded that the wastes will meet the CH-WAC and will be acceptable at the WIPP  
31 (E-mail, K. Peters, 2003).

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**Table 3. Estimated Concentration for Hanford TRU  
Tank Wastes After Packaging**

Storage Tank	TRU nanocuries per gram
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(b)(5) The Hanford Site CH-TRU mixed waste treatment and packaging system process is described in detail in Appendix C of this PMR.

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18 As has been noted, the transuranic waste tanks have historically been managed as part of a larger group  
19 of SSTs at Hanford. Although they contain diverse wastes, the tanks were identified as a single unit for  
20 RCRA permitting purposes. Because of this, waste codes for every waste type stored, or that may be  
21 stored in the SSTs are shown as applicable to all of the tanks as noted in the SST Part A, Form 3  
22 (DOE/RL-88-21, 2003). The RCRA waste codes permitted for the Hanford radioactive storage tanks  
23 containing transuranic wastes include those permitted for the WIPP (RPP-20268, 2004), except for  
24 characteristic waste codes D001, D002, D003, and D041 (b)(5)

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28 (b)(5) Table 4 presents the list of hazardous  
29 waste codes that are anticipated to be applicable to the treated (dried) waste form.

30 2.2.5 Acceptability of Waste Pursuant to the WIPP Waste Acceptance Criteria

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33 (b)(5) The waste will be compliant with WIPP  
34 HWFP conditions and the CH-WAC for retrieval, treatment, packaging, and characterization.

**Table 4. CH-TRU Mixed Waste Treatment and Packaging System Dried Waste Designation**

Characteristic Waste Numbers				Listed Waste Numbers		
D004	D005	D006	D007	F001	F002	F003
D008	D009	D010	D011	F004	F005	
D018	D019	D022	D028			
D029	D030	D033	D034			
D035	D036	D038	D039			
D040	D043	WT01*	WT02*			
WP01*	WP02*					

1 Source: CH-TRU Mixed Waste Part A Permit Application  
 2 \* Washington State generic dangerous waste numbers per Washington Administrative Code 173-303-100 Dangerous Waste  
 3 Criteria (WT01/WT02 are toxic dangerous waste codes and WP01/WP02 are persistent dangerous waste, i.e., halogenated  
 4 organic compounds) codes not applicable under the WIPP HWFP.

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12 Table 5 lists the wastes prohibited for storage, management and disposal at the WIPP facility. This  
 13 information has been taken from Permit Condition II.C.3 (Treatment, Storage, and Disposal Facility  
 14 [TSDF] WAC) of the HWFP. The table demonstrates how the treated (dried) waste form from the Hanford  
 15 Site CH-TRU mixed waste tanks will address or meet the requirements of the TSDF-WAC.

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Table 5. How Hanford Site Waste Analysis Will Meet the TSDF-WAC (2 Pages)

Permit Condition	Prohibited Waste (from Permit Condition II.C.3, TSDF-WAC)	(b)(5)
II.C.3.a	<u>Liquids</u> - Liquid waste is not acceptable at WIPP. Waste shall contain as little residual liquid as is reasonably achievable by pouring, pumping and/or aspirating, and internal containers shall contain less than 1 inch or 2.5 centimeters of liquid in the bottom of the container. Total residual liquid in any payload container (e.g., 55-gallon drum, standard waste box, etc.) may not exceed 1 percent volume of that container.	
II.C.3.b	<u>Pyrophoric materials</u> - Non-radionuclide pyrophoric materials, such as elemental potassium	
II.C.3.c	<u>Non-mixed hazardous wastes</u> - Hazardous wastes not occurring as co-contaminants with TRU wastes (non-mixed hazardous wastes)	
II.C.3.d	<u>Chemical incompatibility</u> - Wastes incompatible with backfill, seal and panel closures materials, container and packaging materials, shipping container materials, or other wastes	
II.C.3.e	<u>Explosives and compressed gases</u> - Wastes containing explosives or compressed gases	
II.C.3.f	<u>PCB Waste</u> - Wastes with polychlorinated biphenyl (PCB) not authorized under an EPA PCB waste disposal authorization.	
II.C.3.g	<u>Ignitable, corrosive, and reactive wastes</u> - wastes exhibiting the characteristic of ignitability, corrosivity, or reactivity (EPA Hazardous Waste Numbers of D001, D002, or D003)	
II.C.3.h	<u>Remote-handled transuranic waste</u> - Remote-handled (RH) TRU mixed waste (waste with a surface dose rate of 200 millirem per hour or greater).	
II.C.3.i	<u>Excluded Waste</u> - TRU mixed waste that has ever been managed as high-level waste and waste from tanks specified in Permit Attachment B are not acceptable at WIPP unless specifically approved through a Class 3 permit modification.	

Table 5. How Hanford Site Waste Analysis Will Meet the TSDF-WAC (2 Pages)

Permit Condition	Prohibited Waste (from Permit Condition II.C.3, TSDF-WAC)	(b)(5)
II.C.3.j	<u>Headspace gas sampling and analysis</u> - Any waste container that does not have VOC concentration values reported for the headspace.	
II.C.3.k	<u>Radiographic/visual examination</u> - Any waste container which has not undergone either radiographic or visual examination.	
II.C.3.l	<u>Waste stream profiles</u> - Any waste container from a waste stream which has not been preceded by an appropriate, certified Waste Stream Profile Form.	

- 1 CH-TRU contact-handled transuranic
- 2 EPA U.S. Environmental Protection Agency
- 3 PCB polychlorinated biphenyl
- 4 WIPP Waste Isolation Pilot Plant

5 Data Quality Objectives (DQO) have been established within the WIPP HWFP (Section B-4a (1) of  
 6 Attachment B, Waste Analysis Plan). To ensure that the Permittees meet regulatory requirements and  
 7 that the Hanford Site treated CH-TRU mixed tank waste is managed in an acceptable manner during  
 8 disposal, Table 6 describes how Hanford will meet the DQOs of the WIPP Waste Analysis Plan.

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**Table 6. Hanford Site CH-TRU Mixed Waste Analysis Approach to Meet the DQO of the WIPP Waste Analysis Plan**

DQO Requirements	(b)(5)
<p><b>Headspace-Gas Sampling and Analysis.</b> To identify VOCs and quantify the concentrations of VOC constituents in the total waste inventory to ensure compliance with the environmental performance standards of 20.4.1.500 NMAC (incorporating 40 CFR, §264.601(c)), and to confirm hazardous waste identification by acceptable knowledge.</p>	
<p><b>Homogeneous Waste Sampling and Analysis.</b> To compare UCL90 values for the mean measured contaminant concentrations in a waste stream with specified toxicity characteristic levels in 20.4.1.200 NMAC (incorporating 40 CFR §261), to determine if the waste is hazardous, and to confirm hazardous waste identification by acceptable knowledge.</p> <p>To report the average concentration of hazardous constituents in a waste stream, as specified in 20.4.1.200 NMAC (incorporating 40 CFR §261) Appendix VIII, with a 90 percent confidence interval, with all averages greater than PRQL considered a detection and subsequent assignment of the waste (if an adequate explanation for the constituent cannot be determined) as a hazardous waste, and to confirm hazardous waste identification by acceptable knowledge.</p>	
<p><b>Radiography.</b> To verify the TRU mixed waste streams by Waste Matrix Code for purposes of physical waste form identification and determination of sampling and analytical requirements, to identify prohibited items, and to confirm the waste stream delineation by acceptable knowledge.</p>	
<p><b>Visual Examination.</b> To verify the TRU mixed waste streams by Waste Matrix Code for purposes of physical waste form identification, determination of sampling and analytical requirements, and to identify prohibited items.</p> <p>To provide a process check on a sample basis by verifying the information determined by radiography, and to confirm the waste stream delineation by acceptable knowledge.</p>	

- 2 CFR Code of Federal Regulations
- 3 CH-TRU contact-handled transuranic
- 4 DQO Data Quality Objectives
- 5 NMAC New Mexico Administrative Code
- 6 RCRA Resource Conservation and Recovery Act
- 7 RTR real-time radiography
- 8 PRQL practical reportable quantification limit
- 9 TULP Toxicity Characteristic Leaching Procedure
- 10 VOC volatile organic compound

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1 2.2.6 WIPP CH-WAC Requirements

2 (b)(5)

7 2.2.6.1 Container Properties (Section 3.2 of CH-WAC)

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39 2.2.6.2 Radiological Properties (Section 3.3 of the CH-WAC)

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2.2.6.3 Physical Properties (Section 3.4 of the CH-WAC)

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2.2.6.4 Chemical Properties (Section 3.5 of the CH-WAC)

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2.2.6.5 Data Package Contents (Section 3.6 of the CH-WAC)

(b)(5)

**Table 7. <sup>239</sup>Pu Fissile Gram Equivalent (FGE) Limits Applicable for Payload Containers and Packages Containing Hanford Site Treated CH-TRU Mixed Tank Waste**

Payload Containers	Beryllium Mass Limit <sup>1</sup>	<sup>239</sup> Pu FGE Limit <sup>2</sup>	
55-gallon drum (Non-machine Compacted Waste)	≤ 1 percent by weight of the waste	≤ 200	
	> 1 percent by weight of the waste but ≤ 100 kg	≤ 100	
Standard Waste Box (Non-machine Compacted Waste)	≤ 1 percent by weight of the waste and ≤ 5 kg and is particulate <sup>3</sup>	≤ 325	
	> 1 percent by weight of the waste but ≤ 5 kg and is particulate	≤ 100	
Payload Packages	<sup>239</sup> Pu FGE Limit (No Credit for <sup>240</sup> Pu Poisoning)	<sup>239</sup> Pu FGE Limit (Credit for <sup>240</sup> Pu Poisoning <sup>4</sup> )	
<del>Applicable to Beryllium Mass ≤ 1 percent by Weight of the Waste and Non-Machine-Compacted Waste</del>			
TRUPACT-II (containing either 14 55-gallon drums, or 2 standard waste boxes) HalfPACT (containing either 7 55-gallon drums, or 1 standard waste box)	≤ 325	5	≤ 340
		15	≤ 360
		25	≤ 380
<del>Applicable to Beryllium Mass &gt; 1 percent by Weight of the Waste and Non-Machine-Compacted Waste</del>			
TRUPACT-II (containing either 14 55-gallon drums, or 2 standard waste boxes) HalfPACT (containing either 7 55-gallon drums, or 1 standard waste box)	≤ 100	Unauthorized	

2 1 Beryllium includes both the metal (Be) and its oxide (BeO).  
 3 2 The FGE limit given applies to the payload container regardless of <sup>240</sup>Pu content in the package.  
 4 3 Particulate beryllium includes fines or shavings.  
 5 4 The numbers 0, 5, 15, and 25 represent the minimum <sup>240</sup>Pu content of the payload expressed in grams that must be  
 6 exceeded to take credit for the higher FGE loading limit. The minimum <sup>240</sup>Pu content for the payload shall be determined  
 7 after subtraction of two times the error.  
 8

**Table 8. <sup>239</sup>Pu Equivalent Curie (PE-Ci) Limits Applicable for Hanford Site Payload Containers Containing Treated CH-TRU Mixed Tank Waste**

Waste Container	Packaging Configuration	PE-Ci Limit
55-gallon drum in good condition	Direct load – all approved waste forms	≤ 80
	Direct load – solidified/vitrified waste only	≤ 1,800
	Overpacked into Standard Waste Box – all approved waste forms	≤ 1,100
	Overpacked into Standard Waste Box – solidified/vitrified waste only	≤ 1,800
55-gallon drum in damaged condition	Overpacked into Standard Waste Box – all approved waste forms	≤ 130
	Overpacked into Standard Waste Box – solidified/vitrified waste only	≤ 1,800

**2.3 20.4.1.900 NMAC (incorporating 40 CFR §270.42(c)(1)(iii)) requires the applicant to explain why the modification is needed.**

The WIPP HWFP permit condition II.C.3.I prohibits acceptance of CH-TRU mixed waste from tanks that has ever been managed as high-level waste or from specific tanks identified in Table B-9 of the HWFP unless approved for disposal through a Class 3 PMR. The 11 Hanford Site tanks containing CH-TRU waste have been managed as high-level waste and are listed in Table B-9. To assist in the review and approval process, this Class 3 PMR has been prepared to incorporate supporting information on the Hanford Site's CH-TRU tank waste including the following:

- Historical, operational, and origin of waste information on the CH-TRU waste streams that were generated and placed in the tanks
- Information on the tank waste characterization efforts that have been undertaken
- How the Hanford Site has determined that the waste is CH-TRU and meets the requirements of the TSDF-WAC, the DQOs of the WIPP Waste Analysis Plan, and the CH-WAC
- A process description of how the Hanford Site CH-TRU mixed tank waste will be treated and packaged to provide a waste form acceptable for disposal at the WIPP.

**2.4 20.4.1.900 NMAC (incorporating 40 CFR §270.42(c)(1)(iv)) requires the applicant to provide the applicable information required by 40 CFR §§ 270.13 through 270.22, 270.62, 270.63, and 270.66.**

The regulatory crosswalk (see Table 9) describes those applicable portions of the WIPP HWFP that would be altered by this PMR. However, Sections 270.16 through 270.22, 270.62, 270.63 and 270.66 of Title 40 of the CFR are not applicable to the WIPP. Consequently, they are not listed in the regulatory crosswalk. Where applicable, regulatory citations in this modification reference Title 20, Chapter 4, Part 1, NMAC, revised October 1, 2003, incorporating 40 CFR Parts 264 and 270.

1 **2.5** 20.4.1.900 NMAC (incorporating 40 CFR §270.11(d) and 40 CFR 270.30(k)) requires any  
 2 person signing under paragraph a and b must certify the document in accordance with  
 3 20.4.1.900 NMAC.

4 The transmittal letter for this Class 3 PMR contains the signed certification statement in accordance with  
 5 Condition I.F of the permit.  
 6

**Table 9. Regulatory Crosswalk (5 pages)**

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the HWFP or Permit Application	Yes	No
§270.13		Contents of Part A permit application	Attachment C, Part A		✓
§270.14(b)(1)		General facility description	Attachment A		✓
§270.14(b)(2)	§264.13(a)	Chemical and physical analyses	Attachment B		✓
§270.14(b)(3)	§264.13(b)	Development and implementation of waste analysis plan	Module II Attachment B	✓	
	§264.13(c)	Off-site waste analysis requirements	Module II Attachment B		✓
§270.14(b)(4)	§264.14(a-c)	Security procedures and equipment	Attachment C		✓
§270.14(b)(5)	§264.15(a-d)	General inspection requirements	Attachment D		✓
	§264.174	Container inspections	Attachment D		✓
§270.23(a)(2)	§264.602	Miscellaneous units inspections	Attachment D		✓
§270.14(b)(6)		Request for waiver from preparedness and prevention requirements of Part 264 Subpart C	NA		✓
§270.14(b)(7)	264 Subtitle D	Contingency Plan requirements	Attachment F		✓
	§264.51	Contingency plan design and implementation	Attachment F		✓
	§264.52 (a) & (c-f)	Contingency plan content	Attachment F		✓
	§264.53	Contingency plan copies	Attachment F		✓
	§264.54	Contingency plan amendment	Attachment F		✓
	§264.55	Emergency coordinator	Attachment F		✓
	§264.55	Emergency procedures	Attachment F		✓
§270.14(b)(8)		Description of procedures, structures or equipment for:	Attachment E		✓
§270.14(b)(8) (i)		Prevention of hazards in unloading operations (e.g., ramps and special forklifts)	Attachment E		✓

Table 9. Regulatory Crosswalk (5 pages)

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the HWFP or Permit Application	Yes	No
§270.14(b)(8) (ii)		Runoff or flood prevention (e.g., berms, trenches, and dikes)	Attachment E		✓
§270.14(b)(8) (iii)		Prevention of contamination of water supplies	Attachment E		✓
§270.14(b)(8) (iv)		Mitigation of effects of equipment failure and power outages	Attachment E		✓
§270.14(b)(8) (v)		Prevention of undue exposure of personnel (e.g., personal protective equipment)	Attachment E		✓
§270.14(b)(8) (vi) §270.23(a)(2)	§264.601	Prevention of releases to the atmosphere	Module II Module IV Attachment M2 Attachment N		✓
	264 Subpart C	Preparedness and prevention	Attachment E		✓
	§264.31	Design and operation of facility	Attachment E		✓
	§264.32	Required equipment	Attachment E Attachment F		✓
	§264.33	Testing and maintenance of equipment	Attachment D		✓
	§264.34	Access to communication/alarm system	Attachment E		✓
	§264.35	Required aisle space	Attachment E		✓
	§264.37	Arrangements with local authorities	Attachment F		✓
§270.14(b)(9)	§264.17(a-c)	Prevention of accidental ignition or reaction of ignitable, reactive, or incompatible waste	Attachment E		✓
§270.14(b)(10)		Traffic pattern, volume and controls, for example: Identification of turn lanes, identification of traffic/stacking lanes, if appropriate Description of access road surface Description of access road load-bearing capacity Identification of traffic controls	Attachment G		✓
§270.14(b)(11)(i) and (ii)	§264.18(a)	Seismic standard applicability and requirements	Part B, Rev. 6 Chapter B		✓
§270.14(b)(11) (iii-v)	§264.18(b)	100-year floodplain standard	Part B, Rev. 6 Chapter B		✓
	§264.18(c)	Other location standards	Part B, Rev. 6 Chapter B		✓

Table 9. Regulatory Crosswalk (5 pages)

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the HWFP or Permit Application	Yes	No
§270.14(b)(12)	§264.16(a-e)	Personnel training program	Attachment H		✓
§270.14(b)(13)	264 Subpart G	Closure and post-closure plans	Attachment I & J		✓
§270.14(b)(13)	§264.111	Closure performance standard	Attachment I		✓
§270.14(b)(13)	§264.112(a) (b)	Written consent of closure plan	Attachment I		✓
§270.14(b)(13)	§264.112(c)	Amendment of closure plan	Attachment I		✓
§270.14(b)(13)	§264.112(d)	Notification of partial and final closure	Attachment I		✓
§270.14(b)(13)	§264.112(e)	Removal of wastes and decontamination/dismantling of equipment	Attachment I		✓
§270.14(b)(13)	§264.113	Time allowed for closure	Attachment I		✓
§270.14(b)(13)	§264.114	Disposal/decontamination	Attachment I		✓
§270.14(b)(13)	§264.115	Certification of closure	Attachment I		✓
§270.14(b)(13)	§264.116	Survey plat	Attachment I		✓
§270.14(b)(13)	§264.117	Post-closure care and use of property	Attachment I		✓
§270.14(b)(13)	§264.118	Post-closure plan; amendment of plan	Attachment I		✓
§270.14(b)(13)	§264.178	Closure/containers	Attachment I		✓
§270.14(b)(13)	§264.601	Environmental performance standards- Miscellaneous units	Attachment I		✓
§270.14(b)(13)	§264.603	Post-closure care	Attachment I		✓
§270.14(b)(14)	§264.119	Post-closure notices	Attachment J		✓
§270.14(b)(15)	§264.142	Closure cost estimate	NA		✓
	§264.143	Financial assurance	NA		✓
§270.14(b)(16)	§264.144	Post-closure cost estimate	NA		✓
	§264.145	Post-closure care financial assurance	NA		✓
§270.14(b)(17)	§264.147	Liability insurance	NA		✓

Table 9. Regulatory Crosswalk (5 pages)

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the HWFP or Permit Application	Yes	No
§270.14(b)(18)	§264.149-150	Proof of financial coverage	NA		✓
§270.14(b)(19)(i), (vi) (vii), and (x)		Topographic map requirements, Map scale and date, Map orientation, Legal boundaries, Buildings Treatment, storage, and disposal operations, Run-on/run-off control systems, Fire control facilities	Attachment O Part A Part B, Rev. 6 Chapter B, E		✓
§270.14(b)(19)(ii)	§264.18(b)	100-year floodplain	Attachment O Part A Part B, Rev. 6 Chapter B, E		✓
§270.14(b)(19)(iii)		Surface waters	Attachment O Part A Part B, Rev. 6 Chapter B, E		✓
§270.14(b)(19)(iv)		Surrounding land use	Attachment O Part A Part B, Rev. 6 Chapter B, E		✓
§270.14(b)(19)(v)		Wind rose	Attachment O Part A Part B, Rev. 6 Chapter B, E		✓
§270.14(b)(19)(viii)	§264.14(b)	Access controls	Attachment O Part A Part B, Rev. 6 Chapter B, E, F		✓
§270.14(b)(19)(ix)		Injection and withdrawal wells	Attachment O Part A Part B, Rev. 6 Chapter B, E, F		✓
§270.14(b)(19)(xi)		Drainage on flood control barriers	Part B, Rev. 6 Chapter B, E, F		✓
§270.14(b)(19)(xii)		Location of operational units	Part B, Rev. 6 Chapter B		✓
§270.14(b)(20)		Other federal laws: Wild and Scenic Rivers Act National Historic Preservation Act Endangered Species Act Coastal Zone Management Act Fish and Wildlife Coordination Act Executive Orders	Part B, Rev. 6 Chapter K		✓
§270.15	§264 Subpart I	Containers	Attachment M1		✓
	§264.171	Condition of containers	Attachment M1		✓
	§264.172	Compatibility of waste with containers	Attachment M1		✓
	§264.173	Management of containers	Attachment M1		✓
	§264.174	Inspections	Attachment D Attachment M1		✓
§270.15(a)	§264.175	Containment systems	Attachment M1		✓

Table 9. Regulatory Crosswalk (5 pages)

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the HWFP or Permit Application	Yes	No
§270.15(c)	§264.176	Special requirements for ignitable or reactive waste	Attachment E Permit Module II		✓
§270.15(d)	§264.177	Special requirements for incompatible wastes	Attachment E Permit Module II		✓
	§264.178	Closure	Attachment I		✓
§270.15(e)	§264.179	Air emission standards	Attachment E Attachment N		✓
§270.23	§264 Subpart X	Miscellaneous units	Module IV, Attachment M2		✓
§270.23(a)	§264.601	Detailed unit description	Module IV, Attachment M2		✓
§270.23(b)	§264.601	Hydrologic, geologic, and meteorologic assessments	Permit Module IV Attachment M2		✓
§270.23(c)	§264.601	Potential exposure pathways	Permit Module IV Attachment M2 Attachment N		✓
§270.23(d)		Demonstration of treatment effectiveness	Permit Module IV Attachment M2 Attachment N		✓
	§264.602	Monitoring, analysis, inspection, Response, reporting, and corrective action	Permit Module IV Attachment M2 Attachment N		✓
	§264.603	Post-closure care	Attachment J Attachment J1		✓
	§264 Subpart E	Manifest system, record keeping, and reporting	Permit Module I Permit Module II Permit Module IV Attachment B		✓

**Attachment A. Table of Changes**

This table of changes identifies the proposed modification to the HWFP and provides an explanation for the proposed change. The changes and additions to the HWFP are in compliance with the New Mexico Hazardous Waste Act and other applicable regulatory requirements.

**Table of Changes  
 Class 3 Hazardous Waste Facility Permit Modification**

Affected Permit Section	Explanation of Changes
Table II.C.3.i	WIPP permit condition II.C.3.i, <u>Excluded waste</u> , prohibits TRU mixed waste that has ever been managed as high-level waste and waste from tanks specified in Permit Attachment B (Table B-9) from being accepted and disposed at the WIPP unless approved through a Class 3 permit modification. This Class 3 PMR lists the Hanford Site tanks containing CH-TRU mixed waste and provides supporting process and origin of waste information to demonstrate that the waste from the 11 Hanford Site tanks to be treated and packaged will meet the WIPP Waste Acceptance Criteria and other WIPP requirements.

**Attachment B. Proposed Revised Permit Text**

The Permittees are proposing a modification to Module II, *General Facility Conditions*, Table II.C.3.i, presented below. This proposed modification allows for the receipt, management and disposal of CH-TRU mixed waste from 11 Hanford Site SSTs at the WIPP Facility.

Modifications to the text of the WIPP HWFP will be identified using a double underline for added information and a ~~strikeout~~ font for deleted information as follows:

<b>Table II.C.3.i – Additional Approved Waste Streams</b>	
Date Class 3 Permit Modification Request Approved	Description of Waste Stream
	<u>Hanford Site CH-TRU Mixed Waste from the following Single-Shell Tanks:</u> <u>241-B-200 series SSTs (B-201, B-202, B-203, and B-204)</u> <u>241-T-200 series SSTs (T-201, T-202, T-203, and T-204)</u> <u>241-T-100 series SSTs (T-104, T-110, and T-111)</u>

## REFERENCES

- 42 USC 10101, *Nuclear Waste Policy Act of 1982*, As Amended.
- 53 FR 12449, 1988, "*Record of Decision, Hanford High-Level, Transuranic, and Tank Wastes*," U.S. Department of Energy, *Federal Register*, Vol. 53, (April 6).
- 58 FR 12342 thru p. 12344, 1993, "*States of Washington and Oregon: Denial of Petition for Rulemaking*," Nuclear Regulatory Commission, Petition for rule making, pp. 12342-12344., *Federal Register*, Vol. 58 (March 4).
- 89-10, 2003, *Hanford Federal Facility Agreement and Consent Order*, Rev. 6, As amended through April 18, 2003, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.
- DOE/EIS-0113, 1987, *Final Environmental Impact Statement, Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes*, U.S. Department of Energy, Washington, D.C.
- DOE/EIS-0026-S-2, 1997, *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement*, U.S. Department of Energy, Carlsbad, New Mexico.
- DOE/EIS-0189-SA4, 2003, *Supplement Analysis for Hanford Tank Farm Contact-Handled Transuranic Mixed Waste Treatment, Packaging, and Storage*, U.S. Department of Energy, Office of River Protection, Richland, Washington.
- DOE/ORP-2004-01, 2004, *Basis for Designating Certain Hanford Single-Shell Tank Waste Resulting from the Bismuth-Phosphate Process as Transuranic Waste*, Rev. 0, U.S. Department of Energy, Office of River Protection, Richland, Washington.
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- DOE/RL-96-98, 1998, *Hanford Analytical Services Quality Assurance Requirements Documents*, Vol. 1, Administrative Requirements, Rev. 2, U.S. Department of Energy, Richland, Washington.
- DOE/RL-2002-47, 2002, *Performance Management Plan for Accelerated Cleanup of the Hanford Site*, Rev. D, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
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- E-mail, K. Peters, TechSpec, to M. Jennings, CH2M HILL Hanford Group, Inc., Re: Resolution of CH-TRU Tank Waste RCRA Codes, Carlsbad, New Mexico.
- EPA, 1986, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.
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- 1 Internal Memo 7G330-MEJ-03-001, M.E. Johnson to J. G. Kristofzski, CH2M HILL Hanford Group, Inc.,  
2 Richland, Washington, Summary of Bismuth Phosphate Process and Plutonium-Uranium Process  
3 Chemical Flowsheets, dated December 11, 2003.
- 4 Letter 02-EMD-162, J. E. Rasmussen, U.S. Department of Energy, Office of River Protection, to M. A.  
5 Wilson, Department of Ecology, Completion and Closure of Hanford Federal Facility Agreement  
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- 7 Letter 9552169, R. W. Powell, Westinghouse Hanford Company, to G. H. Sanders, U.S. Department of  
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10 1995.
- 11 Letter 95-TWR-129, J. Kinzer, U.S. Department of Energy, Richland Operations Office, to A. L. Trego,  
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13 Requirement Review Action Plan, dated September 28, 1995.
- 14 Letter 9651784, J. O. Honeyman, Westinghouse Hanford Company, to W. J. Taylor, U.S. Department of  
15 Energy, Richland Operations Office, Transmittal of Decision Document for Transuranic Tank  
16 Waste Disposal, dated April 22, 1996.
- 17 Letter 96-WDD-102, W.J. Taylor, U.S. Department of Energy, Richland Operations Office, to President,  
18 Westinghouse Hanford Company, Concurrence with Westinghouse Hanford Company (WHC)  
19 Recommendation on Transuranic (TRU) Tank Waste Disposal, dated August 1, 1996.
- 20 Letter CH2M-0303490, E. S. Aromi, CH2M HILL Hanford Group, Inc., to R. J. Schepens, U.S. Department  
21 of Energy, Office of River Protection, Contract Number DE-AC27-99RL14047; Supplement  
22 Analysis of the Environmental Effects of New Information Relating to the Tank Waste  
23 Remediation System Environmental Impact Statement, DOE/EIS-0189-SA4, dated September  
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26 Commission, to J. Kinzer, U.S. Department of Energy, Richland Operations Office, Richland,  
27 Washington, Classification of Hanford Low-Activity Tank Waste Fraction, dated June 9, 1997.
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- 35 M-62-03-02, 2003, Federal Facility Agreement and Consent Order Change Control Form, *Modification of*  
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38 *schedule the establishment of requirements regarding the completion of Phase II tank waste*  
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- 7 RPP-16129, 2004, *Origin of Waste In Single-Shell Tank 241-T-104*, Rev. 1, CH2M HILL Hanford Group,  
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- 22 WHC-SD-WM-PLN-101, 1996, *FY1996 Tank Waste Analysis Plan*, Rev. 2, Westinghouse Hanford  
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- 24 WHC-SD-WM-PLN-120, 1996, *FY1997 Tank Waste Analysis Plan*, Rev. 0, Westinghouse Hanford  
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APPENDIX A\*

**BASIS FOR DESIGNATING CERTAIN HANFORD SINGLE-SHELL TANK WASTE RESULTING FROM  
THE BISMUTH-PHOSPHATE PROCESS AS TRANSURANIC WASTE  
DOE/ORP-2004-01, Rev. 0  
February 2004**

38 Pages (including coversheet)

\*(The TRU concentrations in this report, DOE/ORP-2004-01, differ from the values that are reported in RPP-13300, RPP-16129, and RPP-13873 (Appendices B-1, B-2 and B-3, respectively). The difference in TRU concentrations reported in DOE/ORP-2004-01 resulted from application of a scaling factor template that has subsequently been revised.)

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**APPENDIX B-1**  
**ORIGIN OF WASTES IN THE B-200 AND T-200 SERIES SINGLE-SHELL TANKS**  
**RPP-13300, Rev. 1**  
**December 2004**

178 Pages (including coversheet)

APPENDIX B-2

ORIGIN OF WASTE IN SINGLE-SHELL TANK 241-T-104  
RPP-16129, Rev. 1  
December 2004

68 Pages (including coversheet)

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**APPENDIX B-3**

**ORIGIN OF WASTES IN SINGLE-SHELL TANKS 241-T-110, 241-T-111 AND 241-T-112  
RPP-13873, Rev. 1  
December 2004**

75 Pages (including coversheet)

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**APPENDIX C**  
**HANFORD SITE**  
**CONTACT-HANDLED TRANSURANIC MIXED WASTE TREATMENT AND PACKAGING SYSTEM**  
**PROCESS DESCRIPTION**

12 Pages (including coversheet)