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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	*Hanford Analytical Services Quality Assurance Requirements Document*
HFFACO	Hanford Federal Facility Agreement and Consent Order
HLW	High-Level Waste
LWA	*Land Withdrawal Act*
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
^{239}Pu	plutonium-239
RCRA	*Resource Conservation and Recovery Act of 1976*
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

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

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

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

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

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

(b)(5)

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
TOTAL	**1,413,630**		---

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

(b)(5)

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

1.3 CONTENTS AND ORGANIZATION

This Class 3 PMR includes proposed changes to the existing WIPP Permit, additions that are specific to Hanford CH-TRU mixed tank waste, and justifications for the changes. The remaining sections of this 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 modifications proposed for the WIPP Permit.
c) Attachment B contains the proposed modifications to the WIPP Permit with the proposed revisions marked.

The technical analyses that supports the designation, as well as the supporting information for 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)

This document contains one Class 3 PMR to the WIPP Permit, 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 Permit Condition 1.3.1 and 20.4.1.900 NMAC (incorporating 40 CFR 270.42). This Class 3 PMR is submitted to address the requirements of the WIPP Permit Condition 2.3.3.8. This PMR provides origin of waste information and other supporting information for the CH-TRU mixed waste from the eleven identified Hanford Site SSTs to show that the waste will meet WIPP waste acceptance requirements (WAC). Approval of this PMR will not reduce the ability of the WIPP facility to protect human health and the environment.

Modifications to the text of the WIPP Permit 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 Permit changes that are needed to allow Hanford Site CH-TRU mixed tank waste to be accepted for disposal at the WIPP. Supporting documentation, including origin of waste data, is provided with this PMR to support the proposed Permit changes so NMED can approve this Class 3 PMR. Approval of this PMR will allow the permittees to manage, store, and dispose approximately 1,800 m^3 of 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)
- 241-T-100 series SSTs (T-104, T-110, and T-111).

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(b)(5) A description of the proposed changes to the 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

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

- Permit Condition 2.3.3.8. "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."
- Permit Attachment C Section C-1c. "waste that has ever been managed as high-level waste and waste from tanks specified in Table C-8, unless specifically approved through a Class 3 permit modification".
- 20.4.1.900 NMAC (incorporating 40 CFR 270.42, Appendix I, Item K.). *"Land Treatment…5. Management of different waste in land treatment units:…a. That require 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

The WIPP Permit Condition 2.3.3.8 prohibits acceptance of CH-TRU mixed waste from tanks that has ever been managed as HLW or from specific tanks identified in Table C-8 of the Permit unless approved for disposal through a Class 3 PMR. The eleven Hanford Site tanks containing CH-TRU waste have been managed as HLW and are listed in Table C-8. 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 WIPP Permit, TSDF-WAC, 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.

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

2.3.1 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 (DSTs) constructed between 1968 and 1986.

The SSTs are more than twenty years beyond their design life, have been declared unfit for use (Letter, S.V. Moore, 2001). Sixty-seven (67) are known or suspected to have leaked wastes to the environment. Wastes have been 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 through 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. The following identifies the last date wastes were added to the specific SSTs identified in this PMR:

- B-201, 202, 203, & 204: June 1962
- T-201, 202, 203, & 204: May 1952
- T-104: October 1954
- T-110: December 1954
- T-111: June 1967

2.3.2 Hanford Site Operators

DOE's Office of River Protection is responsible for management of the Hanford tank farms, including the retrieval, treatment, and disposal of Hanford's tank wastes. Washington River Protection Solutions LLC, (WRPS) is the current tank operations contractor for DOE, with a mission to safely store and manage the tank wastes, close the waste tanks, treat certain wastes, dispose of low-activity wastes (LAW), 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 (WTP). WRPS is contracted to supply feed to this facility.

2.3.2.1 Hanford Transuranic Tank Waste Management

The Hanford tank farms contain wastes from a variety of past DOE activities including production of nuclear products; spent nuclear fuel processing for plutonium recovery and purification; fuel 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 evidenced by their diverse origins, some wastes are not HLW by definition, as they were not directly produced during the reprocessing of spent nuclear fuel, nor were they derived from such wastes. Consistent with DOE Order 435.1, the radioactive component may be HLW, TRU waste, or low-level waste (LLW).

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

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

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

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

> *"Waste must be managed, treated, stored, and disposed of differently according to the waste type, degree of risk posed to humans or the environment, and its source. Waste in the tank farm system includes the following waste types.*
>
> *The most dangerous radioactive waste is **high-level waste**, a by-product of reprocessing spent nuclear fuel. This waste requires radiation shielding, special handling techniques, and when disposed of, special measures to isolate it from humans and the environment.*
>
> ***Transuranic waste** is material contaminated with radioactive elements with atomic numbers greater than uranium. This waste does not require the same degree of isolation as high-level waste; however, it cannot be disposed of in a near-surface facility.*
>
> *The least dangerous radioactive waste is **low-level waste**. It consists of all radioactive waste that is not high-level, transuranic, spent nuclear fuel, or by-product material, and may be disposed of in a near-surface facility.*
>
> ***Low-activity waste** consists of waste that remains following the process of separating as much of the radioactivity as is practicable from high-level waste. When solidified, low-activity waste may be disposed of as low-level waste in a near surface facility.*
>
> ***Hazardous or dangerous waste** is ignitable, corrosive, reactive, toxic, persistent in the environment, exhibits dangerous waste characteristics, or appears on special EPA lists. The waste may cause or contribute to an increase in health*

hazards when improperly treated, stored, transported, disposed of, or otherwise managed.
***Mixed waste** is waste that is both hazardous or dangerous and radioactive."*
(DOE/EIS-0189, August 1996, page S-3) "

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

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

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

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

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

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

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

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

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

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

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

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

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

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

In summary, eleven Hanford tanks identified in this PMR (b)(5) (b)(5)
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2.3.2.2 Hanford Tank Waste Performance Measurement Baseline

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

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

DOE has re-affirmed its approach in issuance of the River Protection Project System Plan (ORP-11242, Rev. 6, 2011). In order to achieve the commitment of treating the tank wastes for disposal by 2047, the PMB assumes a three-path approach to waste treatment. Implementation of technologies supplemental to the WTP will reduce the burden on the WTP 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 WTP, processing TRU tank wastes for disposal at the WIPP, and supplemental treatment of low-activity wastes in parallel with the WTP.

2.3.2.3 Hanford Site Legally Enforceable Milestones

The HFFACO was signed on May 15, 1989, by the DOE, the EPA, and Washington State Department of Ecology (Ecology, EPA, and DOE, 1989). 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. Due to the complexities of designing and constructing the WTP and waste retrieval from the SSTs, the State of Washington and DOE jointly entered into a Consent Decree agreement that provides milestones that supplement the HFFACO milestones (Consent Decree No. 08-5085. Filed 10/25/10). Key tank farm milestones include:

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

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

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

2.3.3 Characterization of Hanford Transuranic Mixed Waste

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(b)(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. (b)(5)

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(b)(5) The following sections (2.2.3.1 and 2.2.3.2) provide summary information on SST waste characterization activities and summaries of the processes that generated the wastes, which allow delineation of the TRU mixed 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

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 use 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 (Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, 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 current RCRA requirements and provide information regarding the RCRA characteristics of the wastes. The HASQARD qualified characterization data for the eleven SSTs addressed in this document is obtained from the Hanford Site Tank Waste Information Network System (TWINS) database. Current waste characterization information is provided from the TWINS-generated Auto Tank Characterization Reports. These reports contain data regarding the characterization of the wastes in the Hanford tanks, addressing the physical, chemical, and radiological properties of the wastes. Current TWINS data provides a regulatory and scientific basis to be used in the identification of RCRA characteristic waste codes to support eventual disposition of these waste streams at the WIPP, in accordance with the WIPP Permit. Confirmatory waste sampling and analysis of the packaged wastes will be conducted to verify acceptable knowledge and certify that the waste meets the CH-WAC, as set forth in the WIPP Permit.

2.3.3.2 Origin of Waste

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

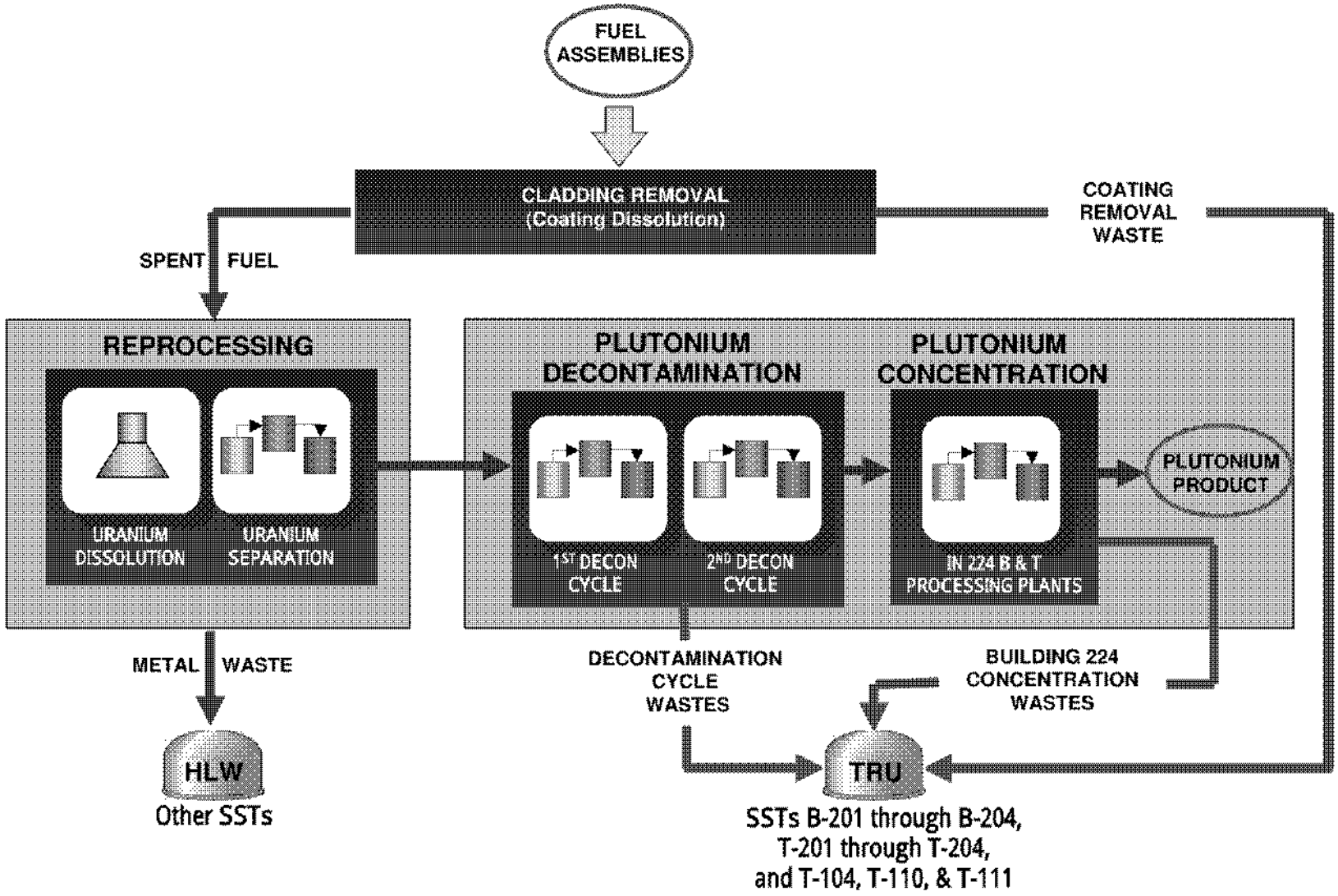
The Bismuth Phosphate Process generated five distinct waste types that were transferred to the SSTs, as shown in Figure 1. These five waste types are commonly called (1) coating removal wastes, (2) metal wastes, (3) first decontamination cycle wastes, (4) second decontamination cycle wastes, and (5)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

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

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

The nuclear fuel elements that were processed in the 221-B and 221-T Plants consisted of uranium metal coated with an aluminum-silicon alloy. The aluminum-silicon alloy coating (sometimes referred to as hull or cladding) was separated from the spent fuel by chemical dissolution using sodium hydroxide and sodium nitrate. Sodium hydroxide and sodium nitrate were used to dissolve the aluminum-silicon coating because these chemicals do not dissolve the uranium metal, (b)(5) (b)(5) The highly caustic dissolved coating material wastes (designated as CW) were separated from the uranium metal and then transferred to SSTs designated for their storage.

Figure 1.Spent Fuel Reprocessing and TRU Waste Generation



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

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

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

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

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

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

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

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

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

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

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

(b)(5)

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.

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. (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.

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

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

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

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

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

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

In summary, storage tanks 241-T-104, 241-T-110, and 241-T-111 did not receive spent nuclear fuel or HLW. Origin of Waste reports RPP-16129 and RPP-13873, provided in Appendix C and D, respectively, demonstrate that wastes generated and stored in these tanks have been segregated from HLW stored at the Hanford Site since they were generated. (Note: Appendix D 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

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

Table 2. Radionuclide Characterization Relative to HLW Tanks[1]

	TRU Tank Waste[2] (µCi/g)	HLW Tank Sludge Waste (µCi/g)	
Analyte	**B200/T200 Series[3], T-104, T-110, T-111**	**B-103**	**T-102**
Typical Transuranic Elements			
^{239}Pu	3E-01 *(6E-02 to 8E-01)*	6E-04	3E-02
^{241}Am	3E-02 *(5E-03 to 7E-02)*	1E-04	2E-01
Typical HLW Elements			
^{129}I	3E-08 *(0E+00 to 3E-07)*	5E-07	1E-04
^{137}Cs	5E-02 *(6E-03 to 1E-01)*	2E+00	1E+01
^{90}Sr	9E-01 *(2E-03 to 4E+00)*	4E+01	1E+02
Typical Non-Transuranic Elements			
^{233}U	2E-10 *(2E-15 to 1E-09)*	7E-08	1E-02
^{235}U	7E-06 *(9E-11 to 5E-05)*	4E-03	4E-04
^{236}U	2E-06 *(2E-11 to 1E-05)*	7E-04	1E-04
^{238}U	2E-04 *(2E-09 to 1E-03)*	9E-02	10E-03

[1] Best Basis Inventory as evaluated in WRPS-2011

[2] Average sludge waste concentration value (*range of concentration*)

[3] 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

(b)(5)

2.3.4 Waste Packaging and Characterization Planning

(b)(5)

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

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

(b)(5)

(b)(5)

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

(b)(5)

(b)(5)

(b)(5)

2.3.5 Acceptability of Waste Pursuant to the WIPP Waste Acceptance Criteria

As has been noted, the TRU 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, 2011). The RCRA waste codes applied to the Hanford radioactive storage tanks containing CH-TRU wastes include those permitted for the WIPP, except for characteristic waste codes D001, D002, D003, and D041. Hanford Site

(b)(5)

(b)(5) Table 4

presents the list of hazardous waste codes that are anticipated to be applicable to the treated (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.

Table 5 lists the wastes prohibited for storage and disposal at the WIPP facility. This information has been taken from Permit Condition 2.3.3 (Treatment, Storage, and Disposal Facility [TSDF] WAC) of the Permit. The table demonstrates (b)(5)
(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	Liquids – Liquid waste is not acceptable at WIPP. Liquid in the quantities delineated below is acceptable. Observable liquid shall be no more than 1 percent by volume of the outermost container at the time of radiography or visual examination. Internal containers with more than 60 milliliters or 3 percent by volume observable liquid, whichever is greater, are prohibited. Containers with Hazardous Waste Number U134 (hydrofluoric acid) assigned shall have no observable liquid. 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.	

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)
2.3.3.2	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

(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

The regulatory crosswalk (see Table 6) describes those applicable portions of the WIPP Permit 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.

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

The transmittal letter for this Class 3 PMR contains the signed certification statement in 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©	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) 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
§270.14(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©	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) 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
§270.14(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)	§264.178	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) 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
§270.14(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) 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
§270.14(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) 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
§270.23(c)	§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

This table of changes identifies the proposed modification to the Permit and provides an explanation for the proposed change. The changes and additions to the Permit 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
Part 2, Table 2.3.3.8, Additional Approved Waste Streams	Permit Condition 2.3.3.8, Excluded Waste, 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

The Permittees are proposing a modification to Part 2, *General Facility Conditions*, Table 2.3.3.8 and Attachment C, Waste Analysis Plan, Table C-8, presented below. This proposed modification allows for the receipt, management and disposal of treated CH-TRU mixed waste from eleven Hanford Site SSTs at the WIPP Facility.

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

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

TABLE C-8
WASTE TANKS SUBJECT TO EXCLUSION

Hanford Site – 177 Tanks	
A-101 through A-106	C-201 though 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 (except T-104, T-110, and T-111)
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

3.0 REFERENCES

10 CFR 61, Licensing Requirements for Land Disposal of Radioactive Waste, As Amended.

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53 FR 12449, 1988, "Record of Decision, Hanford High-Level, Transuranic, and Tank Wastes," U.S. Department of Energy, Federal Register, Vol. 53, (April 8).

62 FR 8693, 1997, "Record of Decision for the Tank Waste Remediation System, Hanford Site, Richland, WA," U.S. Department of Energy, Federal Register, Vol. 62, (February 26).

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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 subseqnently 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

TABLE OF CONTENTS

ATTACHMENTS

APPENDICES

ACRONYMS AND ABBREVIATIONS

CCP	Centralized Characterization Program
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
Ci	curie
DQO	Data Quality Objectives
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FGE	fissile gram equivalent
HASQARD	*Hanford Analytical Services Quality Assurance Requirements Document*
HFFACO	Hanford Federal Facility Agreement and Consent Order
HWFP	Hazardous Waste Facility Permit
LWA	*Land Withdrawal Act*
mrem/h	millirem per hour
NDA	non-destructive assay
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
PMR	Permit Modification Request
PCB	polychlorinated biphenyls
^{239}Pu	plutonium-239
PE-Ci	plutonium-239 equivalent curies
RCRA	*Resource Conservation and Recovery Act of 1976*
RH	remote-handled
SST	single-shell tank
TMU	total measurement uncertainty
TRUPACT-II	Transuranic Package Transporter – Model II
TSDF	Treatment, Storage, and Disposal Facility
TWAPs	Tank Waste Analysis Plans
TWBIR	Transuranic Waste Baseline Inventory Report
WAC	Waste Acceptance Criteria
WIPP	Waste Isolation Pilot Plant
WTS	Washington TRU Solutions, LLC

1.0 Introduction

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

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

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

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

(b)(5)

(b)(5)

1.1 Hanford Contact-Handled Transuranic Mixed Waste

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

(b)(5)

(b)(5)

(b)(5)

(b)(5)

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

(b)(5)

1.2 Hanford Contact-Handled Transuranic Mixed Waste Inventory

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

(b)(5)

(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	
TOTAL	**288,560**	

* 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

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

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

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

> "Tank wastes result from various processing activities and may be either, high-level, transuranic, low-level, or hazardous chemical wastes." (DOE/RL-88-13, Background Section)
>
> "Waste must be managed, treated, stored, and disposed of differently according to the waste type, degree of risk posed to humans or the environment, and its source. Waste in the tank farm system includes the following waste types.
>
> > The most dangerous radioactive waste is **high-level waste**, a by-product of reprocessing spent nuclear fuel. This waste requires radiation shielding, special handling techniques, and when disposed of, special measures to isolate it from humans and the environment.
> >
> > **Transuranic waste** is material contaminated with radioactive elements with atomic numbers greater than uranium. This waste does not require the same degree of isolation as high-level waste; however, it cannot be disposed of in a near-surface facility.
> >
> > The least dangerous radioactive waste is **low-level waste**. It consists of all radioactive waste that is not high-level, transuranic, spent nuclear fuel, or by-product material, and may be disposed of in a near-surface facility.
> >
> > **Low-activity waste** consists of waste that remains following the process of separating as much of the radioactivity as is practicable from high-level waste. When solidified, low-activity waste may be disposed of as low-level waste in a near surface facility.

> **Hazardous or dangerous waste** is ignitable, corrosive, reactive, toxic, persistent in the environment, exhibits dangerous waste characteristics, or appears on special EPA lists. The waste may cause or contribute to an increase in health hazards when improperly treated, stored, transported, disposed off, or otherwise managed.
>
> **Mixed waste** is waste that is both hazardous or dangerous and radioactive."
> (DOE/EIS-0189, August 1996, page S-3)

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

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

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

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

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

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

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

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

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

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

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

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

(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 (DNSFB) 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 HAZQARD 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

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

2.2.3.2 Origin of Waste

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

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

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

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

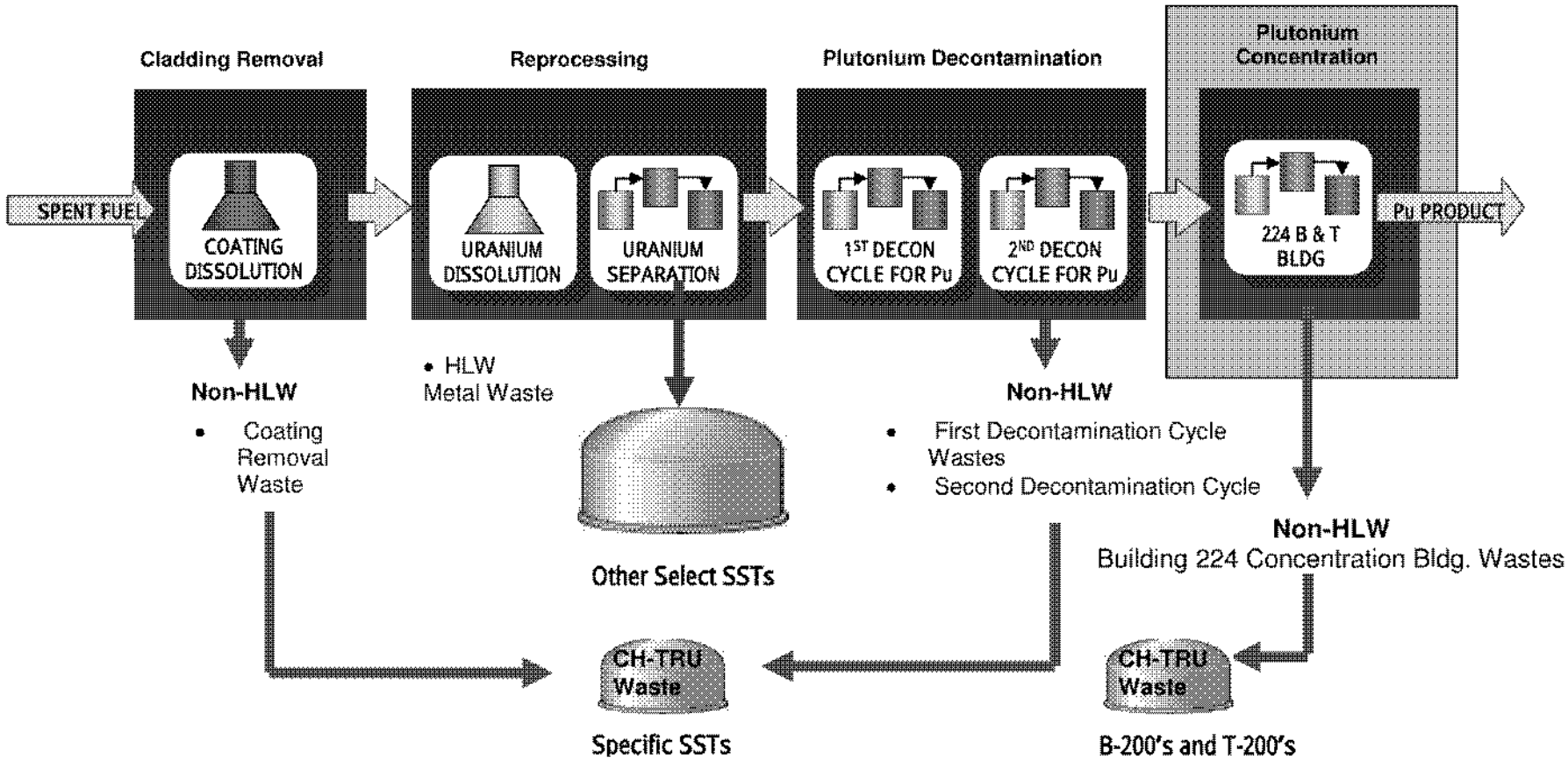
The spent nuclear fuel elements that were processed in the 221-B and 221-T Plants consisted of uranium metal coated with an aluminum-silicon alloy. The aluminum-silicon alloy coating (sometimes referred to as hull or cladding) was separated from the spent fuel by chemical dissolution using sodium hydroxide and sodium nitrate. Sodium hydroxide and sodium nitrate were used to dissolve the aluminum-silicon coating because these chemicals do not dissolve the uranium metal. (b)(5) (b)(5) (b)(5) The highly caustic dissolved coating material (designated as CW) was separated from the uranium metal and then used to treat the first decontamination cycle wastes where the CW excess sodium hydroxide neutralized the first decontamination cycle waste's acidity. These combined waste streams were transferred to SSTs designated for their storage.

(b)(5)

(b)(5) The *Nuclear Waste Policy Act of 1982* (42 USC 10101) defines spent nuclear fuel as "...fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing." (b)(5) (b)(5) (b)(5) DOE's treatment of coating waste as non-HLW is consistent with the U.S. Nuclear Regulatory Commission (formerly the Atomic Energy Commission), which stated that "radioactive hulls (i.e., cladding) and other irradiated and contaminated fuel structural hardware" were not "encompassed by the Appendix F definition" of high-level waste (58 FR 12342, 1993).

Following coating removal, the uranium metal was dissolved in nitric acid to separate the spent nuclear fuel into its constituent elements of fission products, uranium, plutonium, and other transuranic elements. The (b)(5) (b)(5) Water and sulfuric acid were added to the dissolved spent nuclear fuel to ensure the uranium and long-lived fission products remained in solution as sulfate compounds during the subsequent plutonium precipitation step (DOE/ORP-2004-01, 2004) (see Appendix A). Bismuth nitrate and phosphoric acid were then added to form bismuth phosphate and plutonium phosphate precipitates (i.e., solids). The heavier bismuth phosphate precipitate caused the plutonium phosphate precipitate to settle. The original process flow sheet shows the uranium and approximately 90 percent of the long-lived fission products such as cesium-137 and strontium-90 remained in solution. The bismuth phosphate and plutonium phosphate precipitates were separated from the uranium and long-lived fission products by centrifuging the mixture.

Figure 1. Bismuth Phosphate Process



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

The waste solution, from the above processing step, included uranium sulfate, approximately 90 percent of the long-lived fission products, and precipitate wash solutions. These were combined and neutralized using sodium hydroxide and sodium carbonate. The combined, neutralized wastes were known collectively as metal wastes (designated as MW waste). The metal wastes contained the highly radioactive fission products and uranium that were separated from the spent fuel during reprocessing (DOE/ORP-2004-01, 2004). (b)(5) (b)(5) The metal wastes were transferred to a set of SSTs that were different than the set of SSTs that received other waste types from the Bismuth Phosphate process. The tanks that received metal wastes are not under consideration for disposal at the WIPP.

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

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

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

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

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

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

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

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

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

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

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

> (A) the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations
>
> (B) other highly radioactive material that the NRC, consistent with existing laws, determines by rule requires permanent isolation.

(b)(5)

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

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). (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.

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

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

(b)(5)

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

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

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2.2.4 Waste Packaging and Characterization Planning

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

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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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(b)(5)

(b)(5)

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					

Source: Hanford Facility Dangerous Waste Permit Application, Contact-Handled Transuranic Mixed Waste Treatment, Packaging, and Storage Facility (DOE/ORP-2003-22, Rev. 0A)

* Washington State specific codes (WT01, WT02, WP01, and WP02) that are applied at the time the waste is profiled do not render the waste unacceptable in accordance with the CH-WAC.

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	Liquids - 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	Pyrophoric materials - Non-radionuclide pyrophoric materials, such as elemental potassium	
II.C.3.c	Non-mixed hazardous wastes - Hazardous wastes not occurring as co-contaminants with TRU wastes (non-mixed hazardous wastes)	
II.C.3.d	Chemical incompatibility - Wastes incompatible with backfill, seal and panel closures materials, container and packaging materials, shipping container materials, or other wastes	
II.C.3.e	Explosives and compressed gases - Wastes containing explosives or compressed gases	
II.C.3.f	PCB Waste - Wastes with polychlorinated biphenyl (PCB) not authorized under an EPA PCB waste disposal authorization.	
II.C.3.g	Ignitable, corrosive, and reactive wastes - wastes exhibiting the characteristic of ignitability, corrosivity, or reactivity (EPA Hazardous Waste Numbers of D001, D002, or D003)	
II.C.3.h	Remote-handled transuranic waste – Remote-handled (RH) TRU mixed waste (waste with a surface dose rate of 200 millirem per hour or greater).	
II.C.3.i	Excluded Waste - 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	Headspace gas sampling and analysis - 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	Radiographic/visual examination - Any waste container which has not undergone either radiographic or visual examination.	
II.C.3.l	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
HWFP	Hazardous Waste Facility Permit
PCB	polychlorinated biphenyl
PMR	permit modification request
VOC	volatile organic compound
WIPP	Waste Isolation Pilot Plant

2.2.6 WIPP CH-WAC Requirements

(b)(5)

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.l 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 eight Hanford Site tanks (b)(5) (b)(5) and are listed in Table B-9. (b)(5)

(b)(5)

(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

The regulatory crosswalk (see Table 5) 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.

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

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

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		✓

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, Excluded waste, 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:

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

TABLE B-9
WASTE TANKS SUBJECT TO EXCLUSION

Hanford Site – 177 Tanks	
A-101 through A-106	C-201 though 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

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 8).

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).

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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.)**

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)

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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ATTACHMENTS

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ACRONYMS AND ABBREVIATIONS

CCP	Centralized Characterization Program
CFR	Code of Federal Regulations
CH	contact-handled
CH-TRAMPAC	Contact-Handled Transuranic Waste Authorized Methods for Payload Control
CH-TRU	contact-handled transuranic
Ci	curie
DQO	Data Quality Objectives
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FGE	fissile gram equivalent
HASQARD	*Hanford Analytical Services Quality Assurance Requirements Document*
HFFACO	Hanford Federal Facility Agreement and Consent Order
HWFP	Hazardous Waste Facility Permit
LWA	*Land Withdrawal Act*
mrem/h	millirem per hour
NDA	non-destructive assay
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
PMR	Permit Modification Request
PCB	polychlorinated biphenyls
^{239}Pu	plutonium-239
PE-Ci	plutonium-239 equivalent curies
RCRA	*Resource Conservation and Recovery Act of 1976*
RH	remote-handled
SST	single-shell tank
TMU	total measurement uncertainty
TRUPACT-II	Transuranic Package Transporter – Model II
TSDF	Treatment, Storage, and Disposal Facility
TWAPs	Tank Waste Analysis Plans
TWBIR	Transuranic Waste Baseline Inventory Report
WAC	Waste Acceptance Criteria
WIPP	Waste Isolation Pilot Plant

1.0 Introduction

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

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

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

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

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

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

1.1 Hanford Contact-Handled Transuranic Mixed Waste

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

(b)(5)

(b)(5)

(b)(5)

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

(b)(5)

1.2 Hanford Contact-Handled Transuranic Mixed Waste Inventory

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

	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	
241-T-110	360,060	
241-T-111	442,310	
241-T-104	322,700	
TOTAL	**1,413,630**	

* 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)

(b)(5)

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, characterization, and disposal of the Hanford CH-TRU mixed waste from the following Hanford Site SSTs:

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

(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 providedin 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, 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.

2.2.2 Hanford Site Operators

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

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 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 fuel processing; plutonium recovery and purification; cladding removal; facility decontamination; laboratory research and analysis; and uranium and radioisotope recovery operations. The tank wastes are radioactive mixed wastes (i.e., radioactive wastes that are mixed with RCRA controlled constituents), 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 (e.g., DOE Order 5820.2A, which was later superseded by DOE Order 435.1). Its predecessor agencies also segregated wastes based on waste characteristics to facilitate treatment and disposal activities. In the Hanford tank farms, this segregation was achieved by establishing separate, dedicated storage tanks for each waste type, restricting the transfer of wastes among tanks, and by subjecting tank wastes to specific administrative controls and decision-making processes. Regardless of classification, however, DOE and its contractors managed all tank wastes under the stringent standards for high-level waste in order to preclude the need to construct and maintain separate tank systems for interim storage of transuranic or other tank wastes. A single tank farm management protocol avoided the need to establish separate safety protocols for the management of different tanks, depending on whether the wastes were high-level, transuranic, or low-level (WHC-SD-WM-ES-386, 1996). The administrative controls associated with segregating the transuranic tank wastes remain in effect through the current time.

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

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

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

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

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

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

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

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

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

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

(b)(5)

(b)(5)

(b)(5)

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

2.2.2.2 Hanford Tank Waste Management Baseline

(b)(5)

(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

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

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

(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 (DNSFB) 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 HAZQARD is based on several EPA drivers including SW-846.

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 11 SSTs addressed in this document is from the Hanford Site Tank Waste Information Network System (TWINS) database (http://twins.pnl.gov/twins.htm). Current waste characterization information is provided from the TWINS-generated Auto Tank Characterization Reports that contain a description of the characterization of the wastes in the Hanford tanks addressing the physical, chemical, and radiological properties of the wastes. The current data provide a regulatory and scientific basis to be used in the identification of characteristic waste codes for eventual disposition of these waste streams at the WIPP. Confirmatory waste sampling and analysis (RPP-20268, 2004) of the packaged wastes will be conducted to verify acceptable knowledge and certify that the waste meets the CH-WAC, as set forth in the WIPP HWFP.

2.2.3.2 Origin of Waste

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

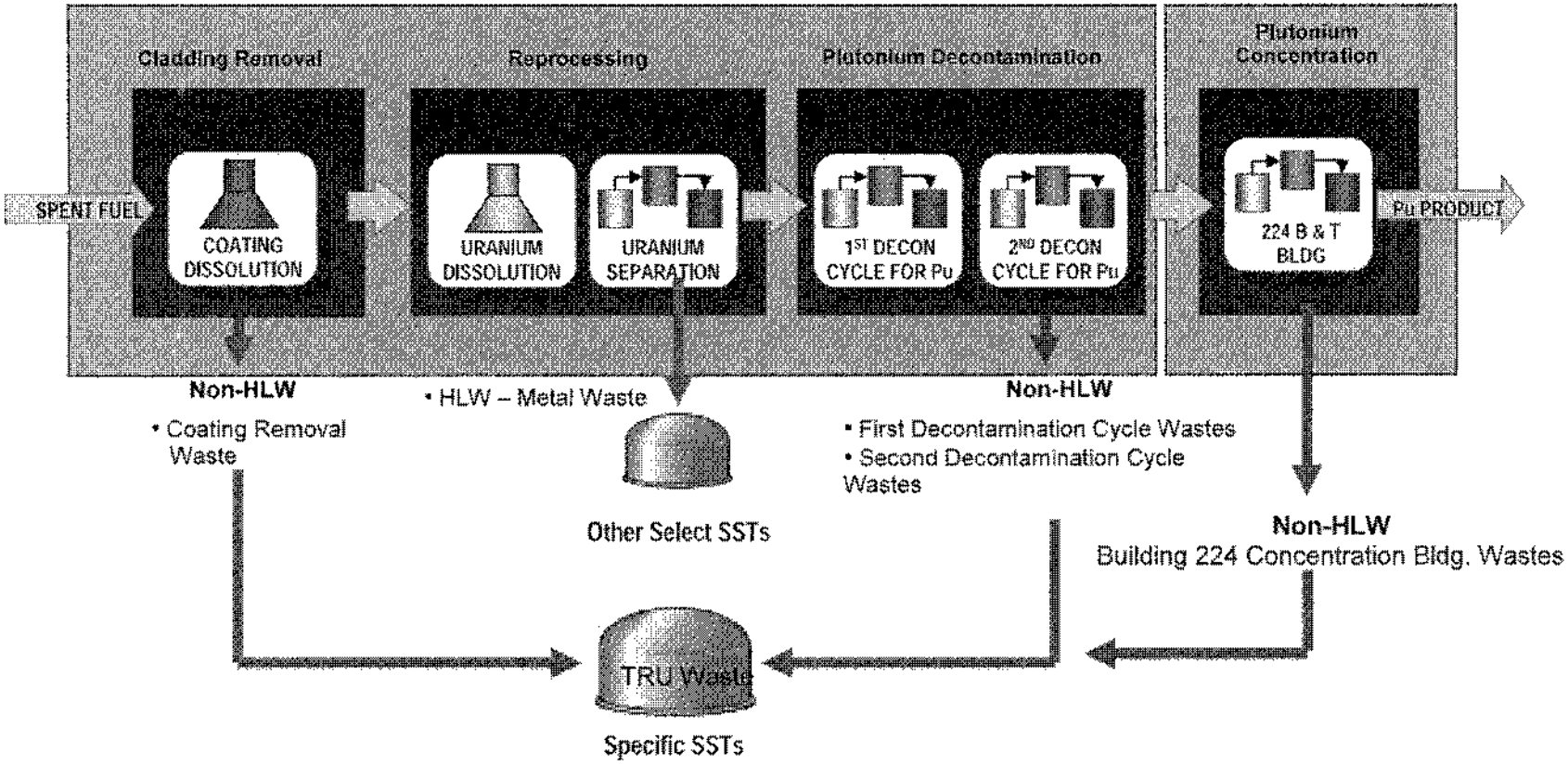
The Bismuth Phosphate process generated five distinct waste types that were transferred to the SSTs, as shown in Figure 1. These five waste types are commonly called (1) coating removal wastes, (2) metal wastes, (3) first decontamination cycle wastes, (4) second decontamination cycle wastes, and (5)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

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

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

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

Figure 1. Bismuth Phosphate Process



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

The waste solution, from the above processing step, included uranium sulfate, approximately 90 percent of the long-lived fission products, and precipitate wash solutions. These were combined and neutralized using sodium hydroxide and sodium carbonate. The combined, neutralized wastes were known collectively as metal wastes (designated as MW waste). The metal wastes contained the highly radioactive fission products and uranium that were separated from the spent fuel during reprocessing (DOE/ORP-2004-01, 2004). (b)(5) (b)(5) The metal wastes were transferred to a set of SSTs that were different than the set of SSTs that received other waste types from the Bismuth Phosphate process. The tanks that received metal wastes are not under consideration for disposal at the WIPP.

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

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

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

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

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

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

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

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

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

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

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

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

(b)(5)

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-16129

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

(b)(5)

(b)(5)

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

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

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

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

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

(b)(5)

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

(b)(5)

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

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

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

(b)(5)

2.2.4 Waste Packaging and Characterization Planning

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

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

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

(b)(5)

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

(b)(5)

(b)(5)

As has been noted, the transuranic waste tanks have historically been managed as part of a larger group of SSTs at Hanford. Although they 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 permitted for the Hanford radioactive storage tanks containing transuranic wastes include those permitted for the WIPP (RPP-20268, 2004), except for characteristic waste codes D001, D002, D003, and D041 (b)(5)

(b)(5)

(b)(5) Table 4 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

(b)(5)

(b)(5) The waste will be compliant with WIPP 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*					

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

(b)(5)

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

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	Liquids - 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	Pyrophoric materials - Non-radionuclide pyrophoric materials, such as elemental potassium	
II.C.3.c	Non-mixed hazardous wastes - Hazardous wastes not occurring as co-contaminants with TRU wastes (non-mixed hazardous wastes)	
II.C.3.d	Chemical incompatibility - Wastes incompatible with backfill, seal and panel closures materials, container and packaging materials, shipping container materials, or other wastes	
II.C.3.e	Explosives and compressed gases - Wastes containing explosives or compressed gases	
II.C.3.f	PCB Waste - Wastes with polychlorinated biphenyl (PCB) not authorized under an EPA PCB waste disposal authorization.	
II.C.3.g	Ignitable, corrosive, and reactive wastes - wastes exhibiting the characteristic of ignitability, corrosivity, or reactivity (EPA Hazardous Waste Numbers of D001, D002, or D003)	
II.C.3.h	Remote-handled transuranic waste – Remote-handled (RH) TRU mixed waste (waste with a surface dose rate of 200 millirem per hour or greater).	
II.C.3.i	Excluded Waste - 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	Headspace gas sampling and analysis - Any waste container that does not have VOC concentration values reported for the headspace.	
II.C.3.k	Radiographic/visual examination - Any waste container which has not undergone either radiographic or visual examination.	
II.C.3.l	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
EPA U.S. Environmental Protection Agency
PCB polychlorinated biphenyl
WIPP Waste Isolation Pilot Plant

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

1

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

DQO Requirements	(b)(5)
Headspace-Gas Sampling and Analysis. 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.	
Homogeneous Waste Sampling and Analysis. 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. 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.	
Radiography. 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.	
Visual Examination. 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. 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.	

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	TCLP	Toxicity Characteristic Leaching Procedure
10	VOC	volatile organic compound

11
12
13
14

2.2.6 WIPP CH-WAC Requirements

(b)(5)

2.2.6.1 Container Properties (Section 3.2 of CH-WAC)

(b)(5)

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

(b)(5)

(b)(5)

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

(b)(5)

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

(b)(5)

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

(b)(5)

Table 7. ^{239}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[1]	^{239}Pu FGE Limit[2]	
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[3]	≤ 325	
	> 1 percent by weight of the waste but ≤ 5 kg and is particulate	≤ 100	
Payload Packages	**^{239}Pu FGE Limit** (No Credit for ^{240}Pu Poisoning)	**^{239}Pu FGE Limit** (Credit for ^{240}Pu Poisoning[4])	
Applicable to Beryllium Mass ≤ 1 percent by Weight of the Waste and Non-Machine-Compacted Waste			
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
Applicable to Beryllium Mass > 1 percent by Weight of the Waste and Non-Machine-Compacted Waste			
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	

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

Table 8. ^{239}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.

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.

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

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		✓
	§264.56	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		✓

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, Excluded waste, 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:

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

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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 8).

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.

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Letter CH2M-0303490, E. S. Aromi, CH2M HILL Hanford Group, Inc., to R. J. Schepens, U.S. Department of Energy, Office of River Protection, Contract Number DE-AC27-99RL14047, Supplement Analysis of the Environmental Effects of New Information Relating to the Tank Waste Remediation System Environmental Impact Statement, DOE/EIS-0189-SA4, dated September 16, 2003.

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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.)**

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)

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)

APPENDIX C

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

12 Pages (including coversheet)