

ESTABLISHING A CONTACT HANDLED TRANSURANIC WASTE SHIPPING PROGRAM AT THE WEST VALLEY DEMONSTRATION PROJECT

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ABSTRACT

The West Valley Demonstration Project (WVDP) Act of 1980 authorized the Department of Energy (DOE) to among other things, solidify the high-level liquid radioactive waste (HLW) present at the West Valley site, along with disposing of the low-level and transuranic (TRU) wastes. Since the completion of HLW solidification in 2002, the WVDP has turned its attention to decontamination and decommissioning of Project facilities and disposing of the wastes generated throughout performance of the Project.

The TRU waste generated over the course of the Project has been placed into safe storage and is managed by the West Valley Nuclear Services Company (WVNSO) for the DOE. To address DOE's goal to accelerate site cleanup and TRU waste disposition, a strategy was developed to gain approval to ship waste to a designated DOE facility which already has the capability to characterize and certify TRU waste.

The WVDP evaluated various options for the development of a WVDP TRU Waste Program. The chosen option resulted in a program that utilizes the existing characterization and shipping program at the WVDP to interface with both the Waste Isolation Pilot Plant (WIPP) Central Characterization Project (CCP) for utilization of TRUPACT-II shipping containers and a WIPP-certified DOE facility. It is this interface that enables WVDP TRU waste to be characterized for shipment, transported to a WIPP-certified facility for final characterization, and ultimately shipped to WIPP for disposal. The following paper discusses the steps taken to develop the WVDP TRU Waste Program.

INTRODUCTION

The WVDP is part of the DOE's nationwide environmental restoration and waste management effort. The WVDP is located at the site of the only commercial nuclear fuel reprocessing facility to have operated in the United States. The WVDP is located near West Valley, New York, approximately 56 kilometers south of Buffalo, within a 13 square kilometer site owned by the New York State Energy Research and Development Authority (NYSERDA). The actual facilities are located on approximately 1 square kilometer near the center of the site in a separately fenced area.

BACKGROUND AND INTRODUCTION

The WVDP Act of 1980 authorized the DOE to solidify the high-level liquid radioactive waste present at the West Valley site.

In addition, the Act has authorized the DOE to dispose of the low-level and TRU wastes generated in performance of the Project. Since the completion of HLW solidification in 2002, the WVDP has focused its attention on decontamination and decommissioning of Project facilities and disposing of the waste in storage.

The DOE's primary goal for establishing a TRU waste program at the WVDP in the near-term is the reduction of waste in storage, freeing up storage space for ongoing waste generation activities and precluding the need to construct new storage facilities, as well as meeting DOE's complex wide goal to accelerate site cleanup. Currently, the only option for disposal of TRU waste is the WIPP facility in Carlsbad, New Mexico. Before TRU waste can be shipped for disposal at WIPP, a TRU waste generator must develop a TRU waste management program and obtain certification from the DOE Carlsbad Field Office (CBFO). A TRU waste program must demonstrate compliance with WIPP Contact Handled (CH) TRU Waste Acceptance Criteria (WAC) which incorporate the requirements of the Nuclear Regulatory Commission (NRC) for transportation, the New Mexico Environment Department (NMED) WIPP Hazardous Waste Facility Permit, the DOE/CBFO WIPP CH Safety Analysis Report (SAR), the Environmental Protection Agency (EPA) WIPP Compliance Certification Decision, and the WIPP Land Withdrawal Act.

Currently, TRU waste sites have either developed their own certified program, adopted the DOE sponsored CCP program, or have shipped their waste to a WIPP certified site for final confirmation/characterization and shipment to WIPP. The CCP has a mobile suite of characterization capabilities deployable to a generator site, including equipment and operators to performing Head Space Gas (HSG) sampling, Non-Destructive Assay (NDA), and Non-Destructive Examination (NDE), and may include a TRUPACT-II Mobile Loading Unit (MLU). All other characterization activities and support are the responsibility of the host site. The CCP has deployed and operated at the Savannah River Site (SRS), the Argonne National Laboratory – East (ANL-E), the Nevada Test Site (NTS), the Hanford site, the Lawrence Livermore National Laboratory (LLNL) and is in the process of deploying the program to the Idaho National Engineering and Environmental Lab (INEEL). The CCP program has been audited and certified several times at various sites and is therefore considered an assured, viable option for sites that need to disposition their CH-TRU waste.

WVDP TRU Waste Program Development

Defense Determination

The first step undertaken to develop the WVDP WIPP Certified TRU waste Program was to complete a defense determination for the TRU waste to provide eligibility for WVDP TRU waste to be disposed at WIPP. A defense determination document was prepared to show the relationship of the West Valley site to DOE defense activities. The defense determination document is currently being reviewed by DOE.

To shorten the overall program development timeframe, subsequent activities were started concurrently with the DOE review and approval cycle of the defense determination document.

Options, Comparison, and Selection

The second step, the development phase, included an evaluation of all possible options and the selection of the best one as it relates to the site mission. The WVDP's goal for development of a WVDP TRU Waste Program was to develop a streamlined, comprehensive, and cost effective TRU waste program. Three program types currently implemented in the DOE complex were considered as options to evaluate.

1. Development of a site-specific waste certification program: Several sites (e.g. Rocky Flats) have developed a site specific CH-TRU Waste Program that has been certified and implemented. Development of a site specific program involves a substantial expenditure of resources for procedure development, equipment selection, equipment procurement, infrastructure modifications/installation, testing, personnel training, administration, WIPP certification audit, and Project Management.
2. Utilize the CCP Standardized Program: Several sites (e.g. Savannah River Site) have incorporated the CCP program into their CH-TRU waste management programs, including deploying mobile characterization equipment and personnel to the generator site and establishing interfaces between the certified CCP program with the site specific requirements for waste management.
3. Obtain WIPP certification for transportation and ship the TRU waste to a WIPP certified site for final confirmation/characterization and shipment to WIPP.

These options were evaluated in the context of the DOE's goals to free up storage space and to further satisfy its obligations under the WVDP Act. Other factors considered included cost, schedule, and the WVDP waste inventory amount.

Inventory

Approximately 126 cubic meters (4,500 cubic feet) of CH-TRU waste is in storage at the WVDP, as reported in the 2003 TRU Waste Baseline Inventory Report (TWBIR), with approximately 440 cubic meters (15,500 cubic feet) of CH-TRU waste projected to be in storage at the end of the Project.

This inventory is comprised of debris waste generated during decontamination and decommissioning of site facilities to reduce the risk to the public and the environment associated with significant quantities of long-lived radionuclides in select site areas.

Waste generated after 2001 is packaged primarily into 55 gallon DOT 7A, Type A drums and is accompanied by comprehensive documentation on the composition of the waste and how it is packaged. Legacy waste is stored in 55 gallon drums and various sized boxes. The legacy TRU waste is slated to be sorted, repackaged, and inspected to remove prohibited items, size reduced as necessary, and pre-screened in preparation for the WIPP characterization and confirmation.

Options Comparison

Option 1, development of a site specific characterization program, was not considered economical for the relatively small inventory of waste the WVDP has projected through the end of the Project. A significant period of time and expenditure of resources would be needed to establish this type of program before implementation could proceed. In addition, labor costs are incurred regardless of the availability of waste packages to undergo final characterization and shipment. As of November 1, 2004 only approximately 10% of WVDP CH-TRU waste was ready for final characterization and disposal.

Option 2, implementation of the CCP Standardized Program, would be less expensive than Option 1 since there would be no cost to develop a site specific characterization program. However, this option also requires a full program to be implemented on site and becomes more costly if continuous processing can not be maintained (i.e., the costs to maintain the CCP personnel and equipment are expended regardless of the availability of drums to characterize and ship). This option would take less time to implement than Option 1 because of the use of an established program, but a significant amount of time would still be necessary to prepare the site for the equipment and to conduct site training. Also, it is currently projected that the CCP provided equipment and personnel are not available until fiscal year (FY) 2009.

Option 3, WIPP certification for transportation, is much more viable than Options 1 or 2. Option 3 utilizes three existing programs; the WVDP waste management program, the CCP certified transportation program, and the CCP certified waste characterization program. The costs incurred would be significantly less in this option. The transportation cost to the characterization facility would be covered by WIPP/DOE. The cost to perform characterization would be charged to the WVDP, but would be significantly less than hosting the program. In addition, this option allows for greater flexibility in scheduling (e.g., by campaign) and therefore costs are only incurred when characterization of waste off-site is performed. This option can also be developed more quickly than Options 1 and 2. Some programmatic document development and interfacing are needed, but the waste management program at West Valley is in place, the transportation system is established and available, and the characterization process would be performed at a facility that is already certified and in operation.

A more detailed evaluation was performed on Options 2 and 3. Option 1 was eliminated due to the high cost and long schedule for implementation.

The process for selecting the preferred option is presented in Tables I through III below. First, a listing of activities required to establish each Option is presented in Table 1; second, a cost and schedule comparison is provided in Table 2; and third, a list of advantages and disadvantages associated with each Option is shown in Table 3.

Table I. Activities Required Comparison

Option 2	Option 3
<ul style="list-style-type: none"> ▶ Complete defense determination document ▶ Complete AKSR and TRUPACT-II Authorized Methods for Payload Control (TRAMPAC) ▶ Establish shipping route to WIPP ▶ Complete SOW and Interface Document ▶ Select/prepare location for characterization activities: <ul style="list-style-type: none"> - Waste repackaging/visual examination - Non destructive assay - Real time radiography - Headspace gas sampling - Thermal conditioning unit ▶ Complete Authorization Basis evaluations and changes as necessary ▶ Develop operational procedures for visual examination and train personnel ▶ Develop drum tracking procedure through the characterization process ▶ Develop/revise other site procedures ▶ Mobilize and set up CCP equipment ▶ Perform readiness assessment ▶ Prepare and complete Certification audit ▶ Select location for TRUPACT-II loading activities ▶ Deploy TRUPACT-II Mobile Loading Unit (MLU) 	<ul style="list-style-type: none"> ▶ Complete defense determination document ▶ Complete AKSR and TRAMPAC ▶ Establish shipping route to a selected off-site facility- ▶ Complete SOW and Interface Document ▶ Complete Memorandum of Understanding (MOU) ▶ Select location for TRUPACT-II loading activities ▶ Complete Authorization Basis evaluations and changes as necessary ▶ Develop/revise site procedures ▶ Complete a WIPP Transportation Audit ▶ Deploy TRUPACT-II MLU

Table II. Cost/Schedule Comparison

	Option 2	Option 3
Program Development Cost Estimate	\$2.5 million FY04 \$1.5 million FY05	\$1.5 million FY04
Schedule	Equipment not available until FY09	Ready to ship November 2004 (first shipping campaign)
Operating Cost Estimate for waste characterization/con- firmation (approx. 2000 drums)	\$10 million for 2000 drums*	\$4 million for 2000 drums

* Cost will be significantly higher if continuous processing can not be maintained.

Table III. Advantages and Disadvantage for CH-TRU Waste Certification Options

OPTIONS	Option 2	Option 3
ADVANTAGES	<ul style="list-style-type: none"> - On-site capability gained to characterize and certify CH-TRU waste (i.e., not dependent on external stakeholders for characterization) 	<ul style="list-style-type: none"> - Implement program quickly - More cost efficient - Little infrastructure modification needed - Less labor, real estate, utilities needed to implement - No SAR changes necessary - Flexibility for shipping by Campaigns - Create storage space for D&D waste by shipping now
DISADVANTAGE	<ul style="list-style-type: none"> - Longer implementation schedule - Delays ability to reduce waste inventory - A costly option based on projected drum inventory - Infrastructure modifications necessary - Greater resources required - More extensive Safety basis and SAR review needed with possible changes - Possible conflict with other projects for space and resources 	<ul style="list-style-type: none"> - Dependency on external stakeholders to allow waste to be shipped to SRS

Selection

Based on this comparison, Option 3 was chosen as the best path for establishing a WIPP certified CH-TRU Waste Program at the WVDP. Option 3 will provide a program that utilizes the CCP standard process for establishing a certified shipping program at the WVDP supported by the existing WVDP waste management program, and the interface with CCP at a certified receiving facility for characterization, confirmation, certification, and shipment to the WIPP. It is this three part system that makes up the WVDP CH-TRU Waste Program.

This approach provided the most direct and cost effective option for the reduction of TRU waste on site. This option can be implemented quickly and allows for waste shipping campaigns that provide flexibility for processing.

Implementation Strategy

The third step involves strategy development and implementation for option 3.

The strategy was to utilize existing programs as much as practicable. The WVDP CH-TRU Waste Program would be comprised of interfaces between WVNSCO's established Waste Management program, CCP's standard certified shipping program, and a receiving facility's CCP certified program for final characterization, confirmation, certification, and shipment of WVDP CH-TRU waste to WIPP.

The roles and responsibilities were developed as follows:

The WVDP will complete preparation or revision of documents shown in Table I above (e.g., Acceptable Knowledge Summary Report, AKSR), confirm the readiness of WVDP personnel and procedures for characterization and shipment, complete characterization for compliance with TRUPACT-II shipping requirements, remove prohibited items from the waste containers, as needed, assist the CCP TRUPACT-II MLU team in loading operations, complete shipping documentation.

CCP will provide standardized procedures for loading and shipping certification for use at WVDP, deploy the TRUPACT-II MLU to the WVDP, train WVDP personnel to assist in loading operations, provide a standardized, certified program at off-site facility for waste characterization, confirmation, and shipment to WIPP.

The selected off-site facility will, assist WVDP to ensure the WVDP program meets the facilities waste acceptance criteria, facilitate interaction between WVDP and CCP at the facility, and support CCP operations at the facility.

The following is a list of the activities completed to successfully implement Option 3, with a brief description of each item.

- Acceptable Knowledge Summary Report (AKSR) - An AKSR was completed for the Product Purification Cell-South (PPC-S) waste stream. This document was developed to provide assurance to the off-site receiving facility that the WVDP has full knowledge of the waste stream, that the waste stream meets the WIPP requirements, and that the waste can be confirmed and shipped once final characterization/confirmation is complete. This document also supplemented the WVDP TRAMPAC document to provide the process knowledge information needed for the development of a programmatic TRAMPAC for shipping CH-TRU waste in TRUPACT-II shipping containers. This document will be submitted to CCP and the Carlsbad Field Office (CBFO) once the Defense Determination document is approved.

- WVDP Defense Determination Document – As required by the WIPP Land Withdrawal Act, waste being disposed of at the WIPP must be related to atomic energy defense activities. A defense determination document was prepared for DOE approval and is currently under review. The document provides evidence to show the relationship of the West Valley site to DOE defense activities.
- Site specific WVDP TRUPACT-II Authorized Methods for Payload control (TRAMPAC) – To ensure compliance with the Contact-Handled Transuranic Waste Authorized Methods for Payload Control (CH-TRAMPAC), a site specific TRAMPAC was completed for CH-TRU waste to be shipped from the WVDP. The purpose of the TRAMPAC is to define the applicable requirements for transporting CH-TRU waste in a TRUPACT-II and to describe the methods that the WVDP utilizes to verify compliance with those requirements. To reduce the cost and schedule associated with preparing and approving TRAMPAC documents for all WVDP CH-TRU wastes, a programmatic TRAMPAC was prepared to generically address the WIPP WAC requirements rather than preparing multiple waste stream-specific TRAMPAC documents. This document is ready to be submitted to the CBFO for approval once the WVDP defense determination document is approved.
- Interface Document and Statement of Work for WVDP TRU Waste Activities at the WVDP - These documents were created to delineate roles and responsibilities between the WVDP and CCP for waste characterization activities at the WVDP (TRUPACT-II loading and shipment to the receiving site), and for waste characterization and certification activities (container confirmation, certification, and shipment to WIPP) at the receiving site. These documents were developed from similar documents previously prepared elsewhere in the DOE Complex and tailored to the WVDP. These documents are ready to be submitted to the CBFO for approval once the defense determination document is finalized.
- Draft Memorandum of Understanding - This document was drafted to delineate the roles and responsibilities between DOE Offices for shipment of CH-TRU waste from WVDP to a receiving facility. This draft document is the basis of the discussion and negotiation among the DOE organizations for having WVDP CH-TRU waste accepted at a certified facility/CCP for certification and shipment to WIPP.
- Waste Management Program/Procedures - Site-specific waste management program/procedures were reviewed to ensure that they supported the compliance methods indicated in the programmatic documents previously described, in addition to addressing any receiving site waste acceptance criteria. To minimize the cost and time needed for implementation, the approach selected was to modify the existing waste characterization program that was approved for managing low-level waste, rather than creating a stand-alone TRU waste management program. The process for characterizing LLW and TRU waste was reevaluated to ensure consistency in quantification for the type of waste and disposal options. The updated WVDP waste management program that supports the CCP Transportation program and the receiving site characterization program. This interface ensures full compliance with the shipping requirements and successful characterization and certification of the West Valley TRU waste at the receiving facility.
- A key component for development of the TRU waste program was to select the areas at which the TRUPACT-II shipping containers would be loaded. The logistical requirements for loading areas were identified and candidate sites selected. Administrative requirements of the WVDP Authorization Basis, Industrial Hygiene & Safety, and Fire Protection programs were also reviewed and used to further narrow the candidate site list. An Unreviewed Safety Question Determination for

On-site Operations of the TRUPACT-II MLU activities was completed and the selected areas approved.

This review and the availability of areas on site led to the selection of three possible facilities for TRUPACT-II/MLU operations. Plans were then prepared for performing the necessary facility modifications pending progress on the previously noted program development activities. The plans are ready for implementation given approval to proceed.

WVDP Implementation Verification

To verify successful development and implementation of the WVDP TRU Waste Program, two separate assessments were conducted.

Due to pending approval of the defense determination, it was not possible to have an actual WIPP Certification Audit of the program.

Self Assessment

A WVDP team was established to review Quality Assurance aspects of the new program, to verify that all necessary TRU waste requirements were added to the appropriate procedures, and to verify that the procedures had been implemented for a group of 42 waste packages that would constitute the first shipment of CH-TRU waste from the site. The Self Assessment was completed in August 2004 prior to and in preparation for an Independent Assessment to be conducted by TRU waste subject matter experts external to the WVDP (see further below). The issues identified in the self-assessment were documented and were resolved prior to the independent assessment.

WIPP Independent Assessment

An Independent Assessment of the WVDP TRU Waste Program was performed by a team of experts experienced in performing WIPP program certification audits, specializing in WIPP CH-TRU waste acceptance/disposal requirements. This team evaluated the adequacy, implementation, and effectiveness of the WVDP TRU waste program, specifically addressing the same group of 42 waste packages that would constitute the first shipment. This team assessed the WVDP program against the requirements of the WIPP Hazardous Waste Facility Permit, WIPP Waste Acceptance Criteria, and the WIPP Quality Assurance Program.

The assessment confirmed that the WVDP TRU Waste Program technical and QA programs were applicable to assessed activities and satisfactory in meeting requirements. The team also concluded that overall, the defined QA and technical programs for these activities were being implemented in accordance with WIPP requirements and WVDP implementing procedures, and the processes were effective.

The assessment team identified 29 recommendations; recommendations were defined as “suggestions that are directed toward identifying opportunities for improvement and enhancing methods of implementing requirements”. The recommendations were incorporated into the WVDP programmatic documents and waste management procedures described earlier.

CONCLUSION

The TRU waste generated over the course of the Project at WVDP has been placed into safe storage. Based on DOE's goal to accelerate site cleanup within the complex a WVDP waste milestone was established to develop a TRU program that focuses on the reduction of the amount of waste stored on site freeing up storage space and preventing the need to construct new storage facilities.

A TRU Waste Program has been successfully developed that implements all the required steps to obtain the Waste Isolation Pilot Plant (WIPP) certification for shipping transuranic (TRU) waste from the WVDP. Various options for the development of a WVDP TRU Program were evaluated. An effective and efficient approach was developed utilizing the lessons learned and benchmarking of other waste generator sites that have shipped waste to the WIPP facility. The approach is for WVDP to obtain WIPP certification for transportation and prepare CH TRU waste for shipment to a certified site with an established WIPP certified TRU Waste Program for final waste confirmation, certification, and shipment to WIPP. This option interfaces three established programs to create the WVDP TRU Waste Program. This approach will save the project more than \$8 million in life cycle cost including program development, waste characterization, waste certification, and transportation costs. This program was developed and implemented in less than one year.

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