Shipping Remote Handled Transuranic Waste to the Waste Isolation Pilot Plant – An Operational Experience - 8140

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ABSTRACT

On January 18, 2007, the first ever shipment of Remote Handled Transuranic (RH TRU) waste left the gate at the Idaho National Laboratory (INL), headed toward the Waste Isolation Pilot Plant (WIPP) for disposal, thus concluding one of the most stressful, yet rewarding, periods the authors have ever experienced. The race began in earnest on October 16, 2006, with signature of the New Mexico Environment Department Secretary's Final Order, ruling that the "… draft permit as changed is hereby approved in its entirety." This established the effective date of the approved permit as November 16, 2006. The permit modification was a consolidation of several Class 3 modification requests, one of which included incorporation of RH TRU requirements and another of which incorporated the requirements of Section 311 of Public Law 108-137. The obvious goal was to complete the first shipment by November 17. While many had anticipated its approval, the time had finally come to actually implement, and time seemed to be the main item lacking. At that point, even the most aggressive schedule that could be seriously documented showed a first ship date in March 2007. Even though planning for this eventuality had started in May 2005 with the arrival of the current Idaho Cleanup Project (ICP) contractor (and even before that), there were many facility and system modifications to complete, startup authorizations to fulfill, and many regulatory audits and approvals to obtain before the first drum could be loaded. Through the dedicated efforts of the ICP workers, the partnership with Department of Energy (DOE) - Idaho, the coordinated integration with the Central Characterization Project (CCP), the flexibility and understanding of the regulatory community, and the added encouragement of DOE - Carlsbad Field Office and at Headquarters, the first RH TRU canister was loaded on December 22nd, 2006. Following final regulatory approval on January 17, 2007, the historic event finally occurred the following day. While some of the success of this endeavor can be attributed to the sheer will and determination of the individuals involved, the fact that it was established and managed as a separate subproject under the ICP, accounts for a majority of the success. Utilizing a structured project management approach, including development of, and management to, a performance baseline, allowed for timely decision making and the flexibility to adapt to changing conditions as the various aspects of the project matured. This paper provides some insight into how this was achieved, in a relatively short time, and provides an overview of the experience of start-up of a new retrieval, characterization, loading, and transportation operation in the midst of an aggressive cleanup project. Additionally, as one might expect, everything within the project did not go as planned, which provides a great opportunity to discuss some lessons learned. Finally, the first shipment was just the beginning. There are 224 additional shipments scheduled. In keeping with the theme of WM 2008, Phoenix Rising: Moving Forward in Waste Management, this paper will address the future opportunities and challenges of RH TRU waste management at the INL.

INTRODUCTION AND HISTORY

Since the first shipment arrived at WIPP in 1999, the goal has been to establish a pattern of shipment to ensure efficient use of resources both at WIPP and at generator/shipper sites. In addition, at the ICP there are two other main drivers that result in added push to keep TRU waste traveling down the road. First, the major thrust of the ICP is to protect the Snake River Plain Aquifer through remedy of legacy environmental concerns via removal of source term. Removal of RH TRU from underground storage vaults accomplishes this goal. Second, there is a 1995 Settlement Agreement that requires the DOE to remove the RH TRU waste from the INL. Specifically, the Settlement Agreement stipulates:

> "*DOE shall ship all transuranic waste … to the Waste Isolation Pilot Plant (WIPP) or other such facility designated by DOE, by a target date of December 31, 2015, and in no event later than December 31, 2018 … The sole remedy for failure by DOE to meet any of these deadlines or requirements shall be the suspension of DOE spent fuel shipments to INEL*"[1]

Other secondary drivers include DOE Order 435.1[2], which addresses TRU waste management requirements. Specifically, continued interim storage of DOE's RH TRU waste at the INL does not reduce risks to human health and the environment, and surveillance and maintenance costs will increase as container and storage systems exceed their usable design life.

Efforts related to the disposition of RH TRU were initiated in early 2000 to address retrieval, characterization, and disposition of INL stored RH TRU wastes. Some of these activities included:

- collection and summarization of acceptable knowledge source documents delineating the physical, chemical and radiological attributes of the major stored INL RH TRU waste stream;
- collection and evaluation of irradiated materials generated during hot cell examination operations that contributed to the radiological inventory;
- development of potential methodologies for performing radiological characterization;
- development of an Interim Storage Container (ISC) and shielded overpack for use in storing retrieved RH TRU waste;
- development of a prototype drum venting system
- development of retrieval capability
- obtaining Nuclear Regulatory Commission approval of shipment in the 10-160B cask
- evaluation of the consequence of hydrogen generation/deflagration in planned storage containers.

Although implementation of actual RH TRU processing capabilities was delayed pending the establishment of final regulator characterization requirements, a life-cycle plan was developed in 2001 to provide a baseline for future funding purposes. A conservative approach was used in the planning cycle of providing 100% repackaging of the waste due to the uncertainty of final transportation and disposal requirements. The envisioned approach provided for retrieval and non-intrusive characterization (real-time radiography and assay) at the Radioactive Waste Management Complex (RWMC). Intrusive characterization, repackaging, and transportation payload assembly would be performed at an existing modified hot cell at the Idaho Nuclear Engineering and Technology Center (INTEC). Shipments to WIPP would be made using the 10-160B shipping cask. Subsequent life-cycle baselines provided modifications to this base strategy such as construction of a hot cell at the Radioactive Waste Management Complex (RWMC) to perform the work.

The 2002 life-cycle strategies were re-aligned to minimize expenditures pending issuance of final characterization requirements. In May 2005, after establishment of the RH TRU Waste Characterization Program Implementation Plan requirements and award of the ICP contract, a new project strategy and baseline was established. This strategy included the following key features:

- eliminating plans to establish a site specific certification program by using the certification authority for the CCP
- performing drum venting operations using a vendor developed system
- completing retrieval and transfer of stored RH TRU waste from vaults at the RWMC to storage areas at INTEC using the ISC and shielded overpacks

[1] 1995 Settlement Agreement between US Department of Energy, US Department of Navy, and the State of Idaho.
[2] DOE Order 435.1, Radioactive Waste Management, U.S. Department of Energy, 07-09-99

- modifying an existing shielded facility to accommodate a real-time radiography system and dose-to-curie measure equipment
- modifying an existing shielded facility to provide 72B cask loading capability including canister loading and lag storage rack; cask loading platform; and cask/trailer loading capability

Even in 2005, there was still a great deal of uncertainty as to when or if RH TRU waste would be allowed to be disposed at WIPP. Contact handled TRU waste had been disposed at WIPP since 1999; however, because of the higher radiation exposure levels of the RH TRU waste, additional approvals were required. RH TRU waste was originally excluded from acceptance at WIPP because there were a variety of technical details still to be dealt with relative to characterization methods for RH TRU. As a result, RH TRU waste approval was delayed pending development of appropriate characterization methods that would be protective of workers at both the generating site and WIPP.

When approval finally came in October 2006 with the New Mexico Environment Department Secretary's decision approving the WIPP permit modification thereby clearing the way for RH TRU waste at WIPP, it quickly became apparent that the expectation of all parties was that RH TRU waste would begin flowing to WIPP immediately following the effective date of the permit (November 16, 2006). Originally, the ICP baseline had the first shipment scheduled for the last week of September 2007 and the remaining shipments extending through spring of 2010. Facility modification, equipment fabrication and installation, permitting, licensing and start-up were planned accordingly. However, when it became clear that the permit modification was going to be approved and no other site was close to being able to ship, the ICP was "chosen" by DOE to accelerate and carry the load until other sites could be up and running. Because of the magnitude of the systems and operations required for ICP characterization and certification activities, it was not quite possible to make a shipment in November, however, through heroic efforts of the ICP staff and effective partnership with DOE and CCP, the first RH TRU shipment left for WIPP on January 18, 2007 (Figure 1) – only two short months after the effective date!

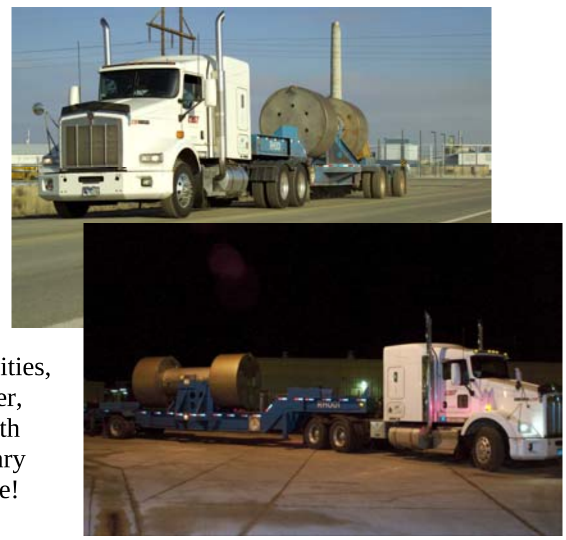

Figure 1 - Departure of First RH TRU Shipment from INL and Arrival at WIPP

INVENTORY

The INL began providing interim storage of RH TRU waste in 1976 for eventual characterization, certification, packaging, and transportation to a final disposition location. The waste was originally stored in underground storage vaults located at the Intermediate Level Transuranic Storage Facility (ILTSF) within the facility boundary of the RWMC. The ILTSF was constructed in 1976 for the purpose of providing a location for intermediate storage prior to ultimate disposition. The ILTSF consists of 256 below-grade steel vaults that can store between 5 and 11 drums each. The inventory of RH TRU waste for disposition is slightly over 80 m^3 and is summarized in Table I. Beginning in 2000, retrieval from these underground storage locations was initiated. The drums of RH TRU were retrieved and placed in temporary above ground storage in specially fabricated ISCs and/or shielded overpacks while waiting transport to INTEC for further processing.

Argonne National Laboratory-East (ANL-E) sent 617 30-gal waste drums with a total volume of 70.4 m3 waste from 1976 through 1995 to the Idaho National Laboratory. The waste consists of mixtures of combustible and noncombustible waste. The ANL-E RH TRU waste was generated at the Alpha Gamma Hot Cell Facility as result of the destructive examination of experimental fuel and associated materials at that facility between 1976 and 1995.

The Materials and Fuels Complex (MFC) generated and sent four 55-gal drums in 1988. The waste consists of glassware, paper, polyethylene, and miscellaneous laboratory waste.

From 1977 through 1981, the Naval Reactors Facility (NRF) sent 3.1 m3 of RH TRU waste to the RWMC for temporary disposal. The waste in these 27 containers includes process equipment, containers, and combustible materials.

Table I – Inventory of RH TRU

Generating Source	Storage Configuration	Quantity (drums)	Form
Argonne National Lab – East	30 gallon drum	617	Debris
Naval Reactors Facility	30 gallon drum	27	Debris
Idaho Nuclear Technology and Engineering Center	30 gallon drum	2	Debris
Materials and Fuels Complex (formerly ANL - West)	55 gallon drum	4	Debris
Reactor Technology Complex (formerly Test Reactor Area)	55 gallon drum	25	10 Homogeneous Solid, 15 Debris

Three shipments were sent from the Reactors Technology Complex (RTC) to the RWMC from 1990 through 1996, for a total of 5.2 m3 (25 containers). In 1990, 10 drums of waste from the drains of RTC Hot Cells and the Alpha Wing Laboratories were sent for disposal. In 1994, 14 drums of RH TRU waste were sent from the Advanced Test Reactor at RTC to the RWMC. The waste consisted of resin from the mixed bed ion exchange columns at RTC 605. The last shipment occurred in 1996 and consisted of several radioactive sources.

One shipment of RH TRU waste from INTEC was sent to RWMC for storage in 1978. The waste was packaged in two 30-gal drums and was generated from the analysis of irradiated fuel. The waste consists of glass, plastics, and metal; miscellaneous laboratory equipment; and diatomaceous earth.

The initial population of waste chosen for characterization and certification waste the ANL-E waste stream. This was chosen over the other waste streams because it was the largest population but also because there was videotape evidence of actual generation operations conducted at ANL-E. This provided a significant time savings advantage because the Real-Time Radiography (RTR) machine which would ultimately be used for verification of the absence of WIPP prohibited items, was at least four months away form being operational. The presence of the videotapes allowed for certified Visual Examination operators to review the tapes and certify the drums free of prohibited items. Unfortunately only 70 of the 617 containers were able to be certified under this process. The remainder required RTR.

PROJECT MANAGEMENT APPROACH

The RH TRU Waste Disposition Project was established as a sub-project under the umbrella Idaho Cleanup Project, funded under Project Baseline Summary-0013, Solid Waste Disposition. As a sub-project, key project decisions, such as approval of mission need, technological alternative selection, and establishing the project baseline remained under the control of the Idaho Operations Office. Local control allowed for streamlining of the project timeline.

One of the keys to the successful completion of the first RH TRU shipment involved the use of an integrated and structured project management approach. The approach was implemented by an Integrated Project Team, which is comprised of both federal and contractor personnel. Development and management as a project allowed focused attention to be placed on achieving the outcome and ensured that resources were effectively allocated to the task. The first step in development of the project involved development of the Work Breakdown Structure (WBS). The WBS is a product-oriented grouping of project elements that organize and define the total scope of the project. The WBS is maintained to support project management throughout the life of the project. The WBS is shown in Figure 1.

The WBS then formed the basis for development of the technical baseline, or performance measurement baseline. The technical baseline configures the projects technical work scope to ensure that defined project objectives are achieved. The technical baseline consists of a resource loaded schedule with detailed activities and milestones and detailed basis of estimate documents developed to document the resource needs and requirements.

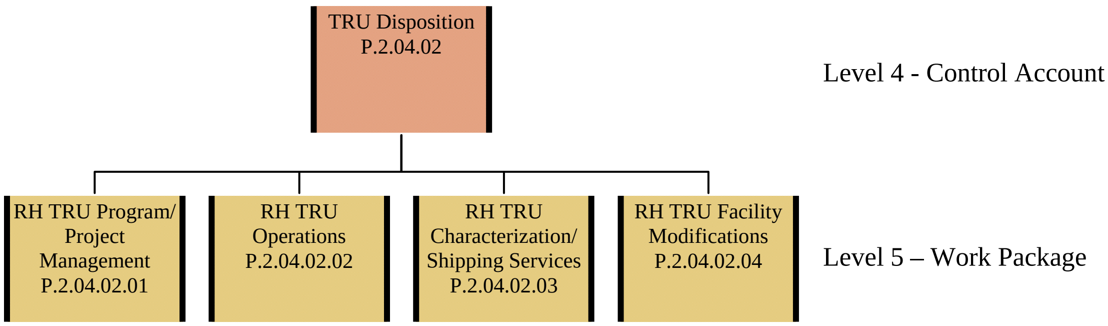

Figure 2 - RH TRU Disposition Project WBS

The schedule itself is an automated-precedence diagram method schedule (P3®). This schedule consists of the life-cycle schedules for the defined work scope and is the basis for identifying and analyzing how the RH TRU disposition project fits within the ICP project critical path. Schedule activities are integrated with the WBS and cost estimate to ensure that activity detail, logic, duration, and resources fully represent the work scope. Schedule detail is specific to the level of knowledge that is available from the estimate and actual scope understanding (rolling wave concept). Estimated resources are integrated into schedule activities, which support the analysis of critical project resources using critical path analysis. The schedule is constructed to ensure that a critical path can be identified for total ICP life cycle and for each level of the WBS. Project-logic interface ties are identified and maintained in P3® to fully integrate individual project areas, such as the RH TRU disposition project, at the ICP level.

Development of the project baseline provides the framework from which to effectively manage the project. Fortunately, a highly evolved project control system exists with the ICP to provide the tools to perform the management of the project. The project control system is an established system that accurately integrates project cost and schedule performance and tracks changes to the performance measurement baseline for the life cycle of the project. The cost and schedule control tools include hardware and software used to collect, process, and report project funding, budget, schedule, and performance data. Collectively, these tools provide information and capabilities for:

- Developing project schedules and allocating resources
- Establishing cost estimates and performance measurement baselines
- Monitoring the procurement of subcontracts, equipment, and materials
- Tracking changes to budget, scope, and schedule
- Monitoring labor hours
- Monitoring costs and commitments against available funds
- Measuring progress and performance
- Reporting monthly project status and progress.

In addition to the functional tools, the management approach initially involved weekly project team meetings to ensure the team was focused and headed in the right direction. As the project matured, daily meetings were held to identify issues and problems, develop solutions, identify resources, and assign actions to resolve the issues and problems.

Project Performance

This project is no different than any other from the perspective that financial and personnel resources are not infinite, and the time to complete the project was limited. The ability to identify and monitor project performance indicators is critical. To facilitate performance measurement, an appropriate earned value methodology is selected and established for each scheduled activity in the project baseline prior to the activity commencing. The earned value method used provides a quantitative dollar value of work scope completed to facilitate assessment of project progress. The earned value methods used are focused on ensuring that status is objectively quantified. Each accounting month, project status is reported in the project control system. Industry standard earned value techniques are implemented to report the dollar value of the work performed for each activity. Cost and schedule variances are calculated using Budgeted Cost of Work Scheduled (BCWS), Budgeted Cost of Work Performed (BCWP), and Actual Cost of Work Performed (ACWP). The ICP uses the earned value variance analysis metrics and indices recognized by DOE Order 413.3 and ANSI/EIA-748. Earned Value Management System (EVMS) indices are summarized in an earned value progress curve for each project. This curve is updated on a monthly basis. An example is shown in Figure 2.

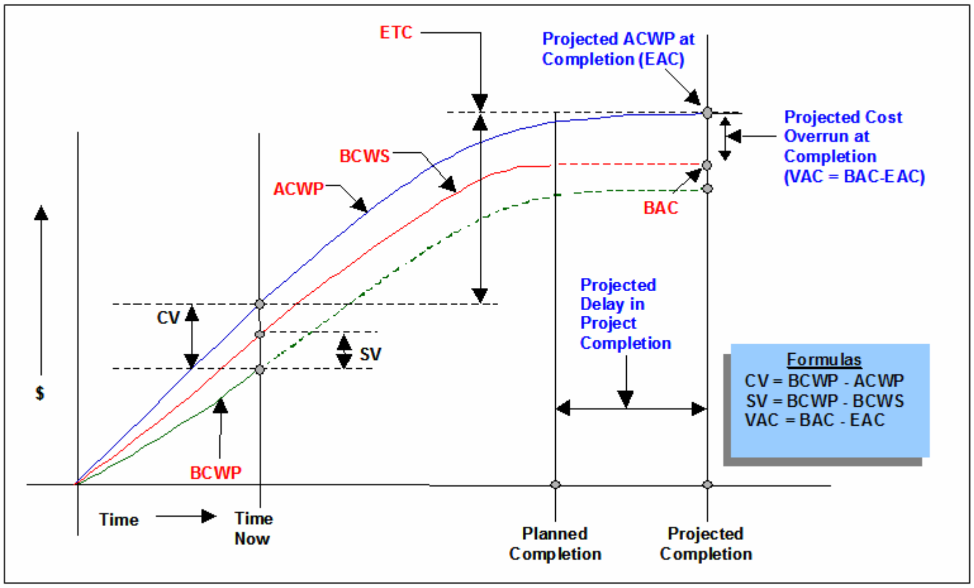

Figure 3 - Sample EVMS Control Chart

The ICP utilizes industry standard methodologies to analyze project variances. It is understood that even on the best planned projects, variances are expected. Variance analysis focuses on three key areas:

1. Cause and Effect: How and why did the variance happen?
2. Impact: What is the impact to this control account or other accounts and their respective WBS elements?
3. Correction: What is the recovery mechanism?

A variance analysis report is prepared for each monthly reporting cycle to identify the root cause(s) for the variance. The variance analysis report includes observed trends in performance, emerging or resolved issues, and changes in the assessment of project risk. Corrective actions already implemented and possible future actions required by the project team also are addressed to ensure that the variance does not have a long-term impact to the project.

Because of the significant acceleration, the RH TRU waste disposition project, as of the end of fiscal year 2007 (i.e., September 2007) is currently exhibiting a positive schedule variance relative to the baseline of $2.3 million (nearly 9% ahead of schedule).

PROJECT EXECUTION

With the project baseline established and the tools in place to manage the project, it was possible to take the steps necessary to accelerate. The previous baseline had most of the work proceeding in series. In order to accelerate, a strategy for performing multiple activities in parallel was required. Facility modifications were being performed while characterization and operating equipment was being designed and fabricated; all the while the regulatory and licensing part of the process was being developed and implemented. This approach provided the opportunity to significantly reduce the amount of time required for operational start-up.

Facility Modifications

Available facilities were assessed for modification potential and integrated functionality respective to waste characterization, lag storage, drum movement, canister loading (a canister is the container used to hold up to three drums of RH TRU waste for placement into the shipping cask), canister staging and RH 72B Cask operations. Several facilities were available that were not scheduled to be demolished as part of the overall mission of the ICP. Ultimately, the New Waste Calcine Facility (NWCF) was selected to be the center of RH TRU operations because it provided the best combination of shielded cell capability (for handling and storage of drums with potential high exposure), high bay capacity (for loading drums into canisters) and for loading canisters into the RH 72B cask. While the facility was generally acceptable for use, major modifications were necessary to configure the facility and equipment for use by this project. Major modifications included:

- Retrofit of an existing shielded cell for RTR and dose rate measurement
- Enhancement of an existing operating hot cell for drum repackaging
- Clean out and retrofit of an existing shielded cell for canister loading and lag storage
- Construction of a new access ramp for RH 72B cask ingress and egress

As the result of previous project experience (i.e., the 3,100 m^3 TRU Disposal project) facility modifications were designed to maximize the opportunity for lag storage of loaded canisters and RH 72B Casks. This has proven very effective in allowing a ramp up from 1 shipment/week to a high of 6 shipments in a single week with an overall goal of 4 shipments/week average. Facility modifications also provided for parallel processing operations versus solely sequential operations that tend to cause bottlenecks.

Equipment Installation

A variety of operational items and characterization equipment items had to be designed, fabricated, tested, accepted for use, and installed prior to undergoing final audit. Such items included:

- RTR - required significant infrastructure for power and control systems. A productivity enhancement, in the form of an automated shielded transfer port, was added that provides a seamless operation for lowering and recovering drums from the RTR cell.
- Dose measurement instrumentation - integrated with the RTR turntable allowing for near simultaneous performance of RTR and dose measurement.
- Canister loading and lag storage rack - fabricated offsite and installed in Cell 205. After installation, a 3 inch steel plate with silo access covers was placed over the rack to allow for storage of significant inventory of RH TRU waste in a contact handled environment.
- Canister inspection stand - fabricated on site and installed in the east bay
- Cask work platform - acquired from WIPP, modified and installed in the east bay.
- Remote Controlled Cameras were installed in all cells and operational areas. Small integrated camera control stations with thin screen monitors were positioned at multiple areas to provide operational flexibility and reduce worker exposure.

OPERATION

Production Strategy

One of the key aspects of designing a production process to support WIPP shipments is assuring adequate lag storage exists for each of the major processes. The desire is to prevent any one event, i.e. equipment failure, from negatively impacting the entire process. Strategically, the characterization process was separated from the shipping process, i.e., characterization ran independently from transportation activities. Canisters were loaded and staged early, casks were loaded and staged early (1 week ahead of time) and up to 3 trailers were staged waiting for pick-up the day of the scheduled shipment. By having adequate inventory staged at each point in the process, shipments were never missed as a result of a single point failure. With this philosophy and maximization of facility space, the process had the capacity to easily ramp up from the planned 1 shipment per week to six shipments per week.

Waste handling is also a very important aspect of the RH TRU machine. Concrete ISCs with the capacity to hold 4 drums were fabricated specifically for ICP use. The ISC handles both 30-gallon and 55-gallon drums. Each ISC is approximately 7' x 7' x 5' high weighing 20,000 lbs. All RH TRU drums are stored, delivered to characterization and eventually to loading and transport in these ISCs. Since the characterization and certification process is relatively lengthy, this constant shuffle of drums (i.e., "dance of the drums") back and forth from storage to characterization, back to storage, in for loading, back to repack for rework, etc. , is greatly simplified by the use of the ISC. It allows for contact-handled operations of remote-handled waste. The "dance of the drums" can be a very laborious task and the more flexibility, with relatively low dose, the better.

Start-up/Operational Readiness

The ICP, operated by CH2M-WG Idaho, LLC (CWI) for the DOE-Idaho, implemented an innovative approach to the start-up of loading and transportation operations associated with the RH TRU disposition project. A new approach was required because not all the characterization, loading and transportation components were available at the same time. As noted earlier, because acceleration was paramount, a variety of tasks were performed in parallel, including readiness activities and start-up approval. Because of the expertise and experience of ICP staff at performing similar cask loading and transportation operations, a formal Operational Readiness Review was not required. However, in accordance with DOE Order 425.1C[3], start-up authorization was required. An innovative approach was developed in cooperation with DOE to perform a phased start-up and gain approval commensurate with the phased start-up. Although not the preferred approach to starting a new operation, and in fact, such a phased approach will not likely be authorized again at the ICP, start-up was performed effectively and safely. In the end, significant time savings were realized by this approach.

The start-up plan[4] described a deliberate and managed approach to ensure that transportation operations were performed safely, using actual waste materials under expected, actual conditions. This plan described a three-stepped approach to transition operations from start-up authorization to unrestricted operations.

Strategy

Transportation Operations were conducted in accordance with the current Authorization Basis (AB)[5]. It was anticipated that Transportation Operations would start up under one or more Unreviewed Safety Question evaluations against the AB. An annual update to the AB was expected to be implemented prior to unrestricted transportation operations, which included the following:

- Canister loading operations, which would include receipt of a loaded ISC and transfer of waste containers from the ISC to a canister.
- Canister storage operations, which would include verification that loaded canisters can safely be stored in the lag storage rack located in cell 205.
- Cask loading operations, which would include opening the RH 72B shipping cask, loading the canister into the cask, closure procedures to include leak checks, and loading of the cask onto the transport trailer.

All transportation activities were evaluated to ensure readiness through a Management Self Assessment following the Management Self Assessment (MSA) Plan for the RH TRU Activities at NWCF[6]. This review included the following:

- Operations personnel training records demonstrate that they are fully trained and qualified to perform transportation activities.
- Equipment required for transportation activities has been verified by management to meet the design criteria for the activity, and a system is in place to maintain control over the design and maintenance of the system.

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[3] DOE Order 425.1C, Startup and Restart of Nuclear Facilities, U.S. Department of Energy, 03-13-03
[4] PLN-2351, Startup Plan for Removable Lid Canister Loading in CPP-659, CH2M-WG Idaho, 12-21-06
[5] SAR-103 rev. 3, Safety Analysis Report for the New Waste Calcining Facility, CH2M-WG Idaho, 02-15-07
[6] PLN-2276, Management Self Assessment Plan for the RH TRU Activities at NWCF, CH2M-WG Idaho, 12-12-06

- Operating procedures are approved and available to the operators, and have been demonstrated to be adequate in the control of safe Transportation operations.
- All other activities described in the transportation MSA activity list (Phase 1) and described in PLN-2276.

This phased approach to startup worked well. However it only worked because of the close coordination and involvement of DOE-ID, CCP, the TRU program and the NWCF facility personnel.

Partnership with the CCP

While most of the work required to make the first RH TRU waste shipment to WIPP was performed "in house" by ICP personnel, a key strategic element of the characterization/certification process involved the use of the well established CCP.

The CCP is a program designed to characterize, certify and transport TRU waste from various DOE generator/storage sites for disposal at WIPP. CCP is operated by Washington TRU Solutions (WTS) under the direction of the Department of Energy Carlsbad Field Office (CBFO). The CCP was created to centralize and integrate the characterization, certification and transportation of TRU waste to WIPP under one standardized program that can be deployed at different sites without significant alteration. The benefit of this approach is a more streamlined and cost effective approach that minimizes differences between sites when seeking regulatory approval for shipment of a waste stream to WIPP.

CBFO deployed CCP to the Idaho National Laboratory in 2006 to develop and setup the basic model by which waste characterization, certification and transportation operations for RH TRU waste will be conducted. The CCP RH TRU program developed at Idaho included the following major work scope:

- Waste Characterization
  - Acceptable knowledge - collection, compilation, review and summarization,
  - Radiological characterization - using dose-to-curie techniques,
  - Visual examination (VE) of video tape records,
  - Radiography,
  - Headspace gas sampling/analysis, and
  - Data validation and verification.
- Waste Certification
  - WIPP Waste Information System (WWIS) data entry and container certification for disposal
- Waste Transportation (using the RH 72B shipping cask)
  - Preparation and approval of content codes
  - Loading of 30-gallon and 55-gallon drums in RH TRU canisters
  - Loading of canisters into the RH TRU 72B shipping cask
  - Leak testing of casks
  - Certification of shipments

Except for the transportation portion which is directly funded by CBFO, the CCP work scope is being funded by ICP under a direct statement of work and contract between CWI and WTS. The specific interfaces and responsibilities between ICP and WTS are described in a formal interface agreement document that was reviewed and approved by both ICP and CCP. As part of this interface agreement, the CCP work scope utilizes ICP personnel in the execution of various activities under the oversight of CCP. For instance, ICP personnel are trained, qualified and used under the CCP program to perform VE, radiography and dose-to-curie waste characterization operations and perform canister and cask loading operations.

In addition to the CCP functions established, WTS also supported the ICP RH TRU disposition project by supplying various RH specific loading and handling equipment. This equipment included such items as canister grapples, cask lifting yokes, a canister loading silo, cask storage racks, etc. These items were necessary to support the ICP facility modifications and facility readiness to conduct operations. In this case, CWI funded the procurement of the equipment directly from WTS.

Because of this highly collaborative effort between ICP and CCP, the startup of shipments of RH TRU waste from Idaho to WIPP was an enormous success. This effort is expected to serve as the model for the conduct of all such RH TRU waste characterization, certification and transportation operations at other sites in the future. Table II provides a summary of the division of responsibilities between the ICP and CCP.

Table II – Scope and Resource Responsibilities

Description	ICP Roles/Responsibilities	CCP Roles/Responsibility
Overall Scope/Schedule Responsibility	Lead	
Venting/Breaching of RH TRU Drums	Lead	
RCRA Acceptable Knowledge Documentation and Report	AK collection and summary preparation support to CCP	Lead
Radiological Acceptable Knowledge Documentation and Report	AK collection and summary preparation support to CCP	Lead
Visual Examination (Videotapes)	Resource support to CCP	Lead
Visual Examination	Resource support to CCP	Lead – also provides drums, liners, and filters
Radiography	Resource support to CCP	Lead
Assay (Dose Measurement)	Resource support to CCP	Lead
Radiological Characterization Technical Report		Lead
Headspace Gas Sampling	Resource support to CCP	Lead
Headspace Gas Sample Analysis	ECL – providing services to CCP	Lead
Solids Sampling	Resource support to CCP	Lead – for samples obtained during repackaging
RCRA Solids Sample Analysis	ACL – providing services to CCP	Lead
Radiochemical Sample Analysis	RAL—providing services to CCP	Lead
Data Review, Validation, & Reporting		Lead
AK Reconciliation		Lead
Waste Stream Profile Forms		Lead
Waste Certification		Lead
Transportation Certification		Lead
Procure Canisters		Lead
Payload Assembly & Loading	Resource support to CCP	Lead
Transportation Surveys/Inspections	Resource support to CCP	Lead
Records Management		Lead
Training-CCP positions		Lead

Partnership with DOE – Start-up of a new operation

Start-up of the RH TRU facilities proceeded in four distinct phases: 1) start-up of the drum vent system 2) start-up of waste characterization activities, including RTR and dose measurement, 3) waste handling and storage operations, and 4) waste transportation. The nature of the RH TRU operations provided logical break points between successive activities. The time required for overall approval of project operations was compressed since each phase addressed common elements (e.g., emergency preparedness, training, maintenance, etc.) which only needed to be examined once, thus shortening the timeline and eliminating redundancy of effort. Each phase required

DOE and contractor readiness determinations, and approval by the Deputy Manager, Idaho Cleanup Project. Execution of the project was facilitated by the phased approach by allowing operations to proceed in the current phase, while subsequent phase was being addressed. This effort required close coordination between DOE and contractor personnel to ensure adequacy of review allowing for start-up decision authorization, while avoiding duplication and ensuring there were no gaps in the ability of operations personnel to operate safely and compliantly. This could not have happened without a devoted team of personnel interested in achieving the same goal of shipment of RH TRU to WIPP.

LESSONS LEARNED

Lag Storage Rack

A potentially devastating set-back occurred with a particular piece of equipment with no moving parts. As noted earlier, lag storage was a key part of the strategy to allow for uninterrupted shipments should another part of the system fail. A lag storage rack was fabricated to replace an existing hatch cover and fit into an existing shielded cell. The lag storage rack was designed to hang from the lip used to house the existing hatch cover and the rack would then extend below grade into the cell, providing shielded storage for 12 fully loaded canisters as well as provide a location to hold an empty canister for loading drums. By being located below grade with shielded port covers on top, it provided an ideal situation for allowing personnel to safely operate with RH TRU waste in a contact handled environment. Because the cell location originally was highly contaminated and was zoned as a High Radiation Area, access to the cell was not permitted. Additionally, there were no adequate drawings that depicted the interference, (i.e., no available "as-builts") or photos of the cell to obtain proper dimensions. After the High Radiation Area was down graded and decontamination of the cell was completed, the piping support interference was discovered. Unfortunately, the rack had already been fabricated to specifications that did not account for the clearance required to allow it to be lowered into the cell without impacting the piping. The rack was too big! In retrospect, the photos clearly show the piping support, however, from the angle (looking up, through the bottom of the cell), the obstruction blended into the surrounding cell features and appeared to be integral to the ledge that supported the original hatch cover. Fortunately, some talented individuals were able to modify the rack without having to start over and negatively impacting the project schedule. It could have been devastating to the schedule (and costly) since there was no immediate option to substitute for loading drums into an empty canister.

The following lesson was learned from the situation:

- there is no substitute for physical verification of the situation and conditions surrounding a design evolution.

Dose measurement

In May 2006, dose measurement (DM) was initiated 30-gallon drums. Between May 2006 and October 2006, DM was performed on 26 30-gallon drums and between October 2006 and January 2007, no DM was performed because facility modifications were ongoing to install and test the new integrated RTR/DM system which included accommodations for both 30-gallon drums and 55- gallon drums. Because it was known that DM would be performed on both 30-gallon drums and 55-gallon drums, different RTR turntable stops were fabricated for each drum size, and a dual position Plexiglas "jig" was fabricated to ensure that each drum size was properly located at 1 meter from the surface of the drum as required to obtain valid measurements. At various times during the period from January 19 and February 27, there is evidence that several switches were made between 30-gallon drums and 55-gallon drums, with evidence that the DM probes were in the correct position in all cases. On February 27 a final switch was made from performing DM on 30-gallon drums to 55-gallon drums; and DM was completed on 3 55-gallon drums. On the same day, due to the presence of some RTR cabling issues and possible presence of an electrical code concern, DM surveys were suspended. On March 19 DM was resumed. On this date a final 55-gallon drum was measured and then the configuration was switched to 30-gallon drums. At this point, there is no evidence that a change in the position of the "jig" was completed, i.e., 30-gallon drums were being run with the probes in the 55-gallon drum position (distance to drum surface was greater than 1 meter). On April 18, the Shift Ops Manager, in the RTR room looking at a hydraulic oil leak from the RTR oil cooler noticed the error in probe placement and stopped work.

All shipments were evaluated to determine if any drums had been shipped that might be affected by the probe misalignment – no shipments were affected. A Non-Conformance Report was immediately written on the affected drums by CCP to ensure no possible shipment to WIPP prior to resolution. Changes were initiated to both CWI and CCP procedures to require positive confirmation that the probe position was appropriate for the drum size being measured.

The following lessons were learned from the situation:

- change needs to be constantly evaluated for impact to ongoing operations
- procedural "hand-offs" needed to be strengthened - CWI drum handling procedure to CCP DM procedure back to CWI procedure.
- positive check-off required to ensure quality affecting items are confirmed
- situation would have likely been avoided with clear labeling on the jig to indicate drum being run - remote operation precluded obvious visual verification from control room

FUTURE OPPORTUNITIES AND CHALLENGES

Through November 26, 2007, a total of 92 shipments had been successfully made to WIPP, leaving 133 shipments to go. Operating experience has resulted in some valuable insight as to how to improve efficiency, however, there are still several obstacles to overcome to complete this project. First, as noted earlier, the ANL-E waste stream was chosen in large part because it was the largest waste stream. One of the biggest remaining challenges involves the collection of Acceptable Knowledge (AK) information for the low volume waste streams. The effort required for a 2 drum population (i.e., INTEC) is nearly the same as for the 600 drum ANL-E population. Additionally, the ICP is now competing for CCP personnel who are responsible for the auditable AK record at multiple RH TRU shipping sites.

Because the RH TRU disposition is being managed as a project, with a defined start and end dates, it will become increasingly important to figure out a way to retain the trained and qualified staff to complete the final shipment. As the quantities of RH TRU waste decrease, personnel will justifiably be looking for the next assignment and will be drawn out of this project (with finite life) into another project with some longevity.

One of the other challenges currently being managed involves the presence of unvented containers and/or too many layers of confinement to allow for efficient shipment. The ANL-E waste came in 30-gallon drums with smaller inner containers. In some cases, the smaller inner containers were contained in double heat-sealed polyvinyl chloride plastic bags. Because the bags are present and must be counted as additional layers of confinement, the wattage limits were so restrictive that very little of the waste in this configuration were eligible for shipment. Fortunately, an automated, semi-remote drum vent machine had been installed previously to vent the 30- and 55-gallon drums, which was also required prior to shipment. The system was modified to accommodate the installation of a long filter, allowing for penetration of both heat sealed bags, thereby reducing the layers of confinement to a minimum. Additionally, some of the ANL-E and NRF waste drums have unvented inner containers > 4 liters. The WIPP Waste Acceptance Criteria precludes the presence of containers > 4 liters unless they can be shown to be vented. Again, an innovative approach is being developed that will allow for insertion of a vent filter through the side of the 30-gallon drum into the internal can, providing a method for venting the internal containers.

Regarding future opportunities, because of the success to date of the ICP RH TRU disposition project, additional RH TRU waste disposition work is being identified. For example, the ICP will continue to provide characterization and shipping capabilities for RH TRU waste generated from future mission work at the Naval Reactors Facility. In addition, because the government has invested a great deal of time and capital to develop the characterization and shipping capabilities at the ICP, consideration should be given to making the capabilities available to offsite generators as well.. There are obvious interstate interface issues that must be addressed, but there is precedent throughout the complex for allowing smaller quantity sites to ship waste to larger quantity sites for more efficient processing. The cost to send it to Idaho may certainly be off-set by the time and effort to certify smaller isolated sites.