

WHEN 10 IS GREATER THAN 32 – CONDITIONS NEEDED FOR THE CLEANUP OF THE SMALL QUANTITY SITES

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ABSTRACT

The U.S. Department of Energy Carlsbad Field Office originally identified approximately 20 small quantity sites (SQS) that have inventories of a few containers to a few hundred cubic meters of transuranic (TRU) waste. Removal of the TRU waste from the SQS is identified as a major challenge at these sites, given the significant resources required to develop a formal and fully compliant certification program for disposal of the waste at the Waste Isolation Pilot Plant. For timely cleanup of these SQS, consolidation at approximately 10 sites is the most cost-effective and efficient option both from an SQS and overall TRU system perspective. However, challenges remain in implementing this consolidation in the form of equity issues for the receiving site, state issues and agreements, and local priorities, in addition to any technical challenges associated with transportation of the waste to a receiver site. A consolidation option for reducing the approximately 30 TRU waste sites to approximately 10 sites that “makes perfect sense” or reflects the greater good is a necessary condition, but is rarely sufficient for cleanup of an SQS and transfer of the TRU waste to a larger site. The concept of multinational repositories, being proposed in Europe given the limited space and large number of countries, and the concept of U.S. compacts for low-level wastes present some parallels to the challenges facing the SQS cleanup. The successful cleanup to date of six of the approximately 20 SQS provides useful information on the conditions needed to make an SQS cleanup feasible and successful. Among these conditions are tailored site- and waste-specific approaches to waste characterization and implementation of transportation requirements and identification of a receiving site. This paper will discuss these conditions and present a working model and guidelines that can be followed in investigating the potential cleanup of the SQS in a timely, efficient manner.

INTRODUCTION AND BACKGROUND

Transuranic (TRU) waste is generated or stored at six major U.S. Department of Energy (DOE) sites across the country that currently store approximately 97% of the TRU waste inventory. In addition, there are 20+ small quantity sites (SQS) that are storing small quantities, from a few to a few thousand containers, of TRU waste. Because the TRU waste at these sites is a small amount and not generally connected to the primary mission of the site, SQS may not have fully established certification programs required for disposal at the Waste Isolation Pilot Plant (WIPP). For example, many SQS have large low-level waste (LLW) programs or other programs that represent the majority of the workforce and funding. For characterization for WIPP disposal, the inventory from such sites will require consolidation at a receiver site and/or the assistance of the Central Characterization Program (CCP). For timely cleanup of these SQS, consolidation at approximately 10 sites that currently have the vast majority of the TRU waste

inventory is the most cost-effective and efficient option both from an SQS and overall TRU system perspective. Figure 1 presents the current waste storage locations, as well as the anticipated reduction in number of locations due to SQS cleanup and complete TRU waste cleanup.

The concept for consolidation of SQS waste at larger sites has parallels to the concepts of U.S. compacts for LLW and of multinational repositories being proposed in Europe. According to U.S. federal law, each state is responsible for disposing of commercial LLW generated within its borders. States may form compacts to share that responsibility. For example, the Midwest Compact includes Indiana, Iowa, Minnesota, Missouri, Ohio, and Wisconsin as members. For this compact, the responsibility for hosting the Midwest Compact's LLW disposal facility will rotate among the member states every 20 years. Use of the compact eases the individual burdens of the states for siting and managing the disposal facility in each state. While several states are pursuing this compact concept, no compact LLW disposal facility has yet been licensed. Based on the limited space and large number of countries in Europe, the multinational repository concept is proposed with possible advantages including improved economics, reduced environmental impact, and enhanced public acceptability. However, the multinational repository concept is complicated by the required participation and cooperation of sovereign nations.

With an operational repository for TRU waste and established certification programs at several large sites, consolidation of the SQS TRU waste inventories is a feasible and attractive option for cleanup. The DOE Carlsbad Field Office (CBFO) originally identified approximately 20 sites as SQS. To date, the waste from six SQS has been removed and consolidated at other DOE sites. Waste characterization information and associated quality information were documented in data packages and used to demonstrate compliance of the SQS waste with transportation requirements. The receiving site also may use these data packages in completing the characterization required for disposal at the WIPP.

Given the varied conditions, priorities, and TRU inventories at these SQS, cleanup of each of these sites requires site-specific strategies and identification of opportunities and conditions that can facilitate the cleanup. However, the key challenges facing each SQS cleanup can be attributed to a few important variables. The objective of this paper is to discuss a working model and guidelines that can streamline the SQS cleanup process. Recent successes with this approach are also discussed.

Strategy

While site-specific strategies are needed for the cleanup of any given SQS, the governing principles for cleanup involve common elements. The key parameters for SQS cleanup are as follows:

- Receiving site identification
- Status of the TRU waste inventory
- Options for transportation
- Analysis of “transportability.”

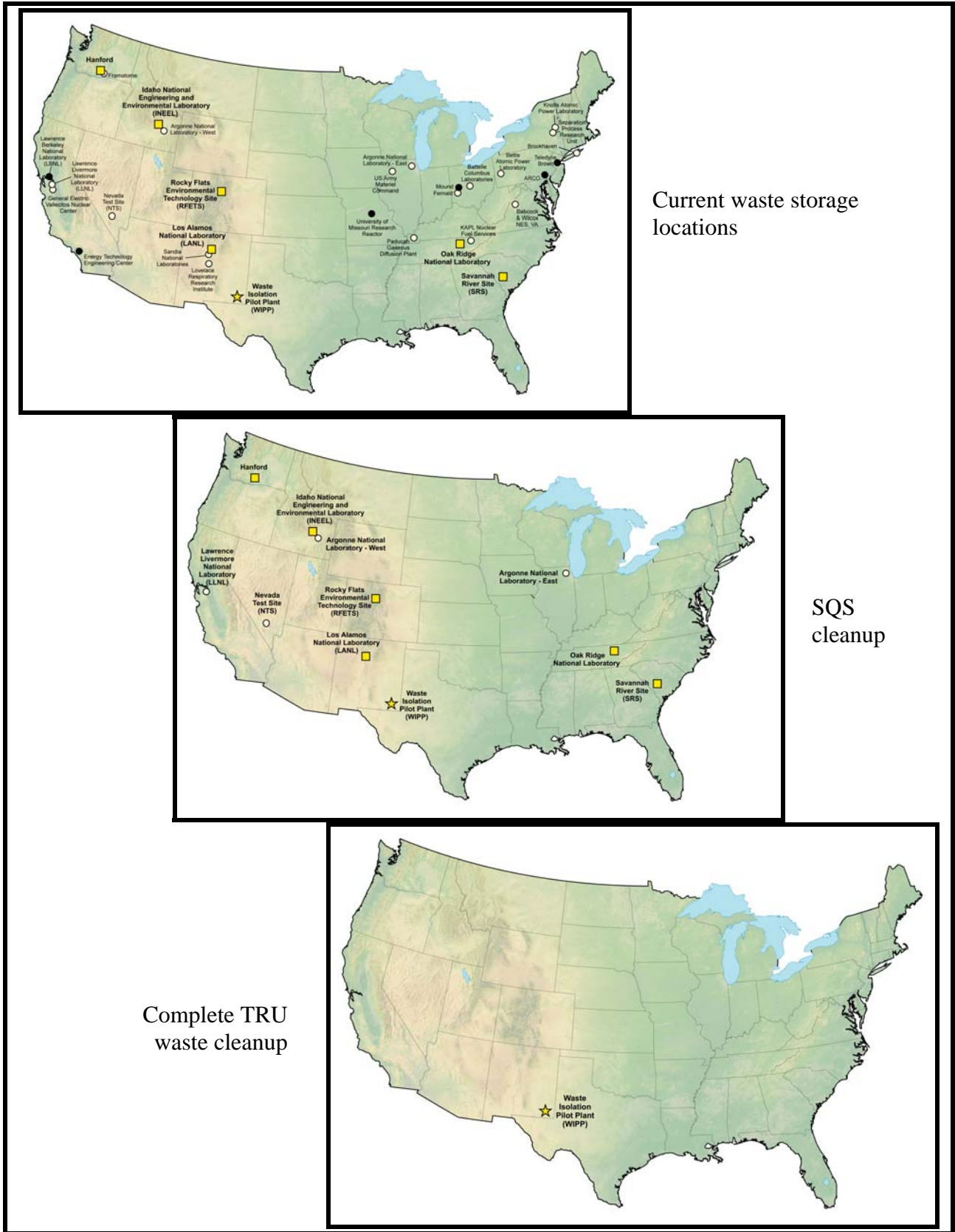


Fig. 1. Current TRU waste storage locations through complete cleanup.

Receiving Site Identification

The primary component to the development of a strategy for the removal of TRU waste from an SQS is the identification of a receiving site, unless the waste can be directly transported to WIPP for disposal. To this end, efforts are underway to reach agreement with individual major DOE TRU waste sites to accept the small waste inventories.

As one option, an established receiving-site option for TRU sealed sources included in SQS inventories is the Off-Site Source Recovery Program (OSRP) administered by the Los Alamos National Laboratory (LANL). The OSRP is chartered with the retrieval of TRU sealed sources from sites across the country [1] and has an established program for WIPP disposal characterization. The current priority of the OSRP is to recover sources from the civilian sector. DOE sources are second priority, but may be recovered along with civilian source recovery trips based on location and/or other considerations.

Establishment of larger TRU waste sites as “hubs” for the receipt of waste from the SQS located within specific regions is currently a conceptual receiving-site option for many SQS. Following agreement of the larger TRU waste site to become a hub site, the following actions must be taken to implement consolidation of SQS waste at each regional hub:

- Perform a Supplement Analysis (SA) to amend the Record of Decision (ROD). The SA shall contain sufficient information for DOE to defend the SA in lieu of preparing a Supplemental Environmental Impact Statement (SEIS) or new Environmental Impact Statement (EIS).
- The cognizant DOE organization will make a determination to concur with the SA.
- DOE will issue the ROD after satisfactory review by the cognizant organizations, including general counsel.
- WIPP can consolidate waste at regional hubs upon approval of the ROD.
- Establish Memorandum of Understandings with the regional hub for inventory balance [i.e., similar to the Savannah River Site (SRS)/Mound agreement in which for receipt of Mound waste, SRS was allowed to expedite SRS waste shipments].

As determined by the DOE-CBFO National Environmental Policy Act (NEPA) Compliance Officer, additional NEPA documentation may be required for transportation. NEPA analyses for transportation possibly could be addressed with an SA, which can be completed relatively quickly, because the analysis can tier off of existing NEPA documents (e.g., Programmatic Waste Management EIS and WIPP SEIS II).

A third option for a receiving site could be any site with a TRU certification program being administered by the site or CCP. The participation of CCP at a site like Lawrence Livermore National Laboratory (LLNL), for example, facilitated cleanup of Lawrence Berkeley National

Laboratory (LBNL) with waste consolidation at LLNL with subsequent shipment to WIPP. Alternatively, CCP could assist an SQS in characterizing the waste for direct shipment to WIPP.

Status of the TRU Waste Inventory

The SQS are currently storing contact-handled (CH) and remote-handled (RH) TRU waste inventories. In addition, some SQS are projected to generate additional TRU waste in the future. The status of the TRU waste inventory, including its current storage and/or packaging configuration and the status of information available to demonstrate transportation compliance, is important to assessing its readiness for shipment. Primarily, this assessment pertains to the SQS ability to demonstrate compliance of the TRU waste inventory with transportation requirements defined for the selected packaging (see Options for Transportation below). However, in addition to the identification of a receiving site and the determination of transportation compliance for the SQS waste inventory, other efforts may be required as dictated by the receiving site and/or the DOE-CBFO. The receiving site must ensure that any waste received complies with that site's waste acceptance criteria. The DOE-CBFO coordinates shipments of TRU waste to WIPP and between sites. Therefore, the receiving site and DOE-CBFO may require the completion of specific activities prior to the approval of the shipment to and acceptance of the waste at the receiving site. These activities may include preparation of the following:

- Acceptable Knowledge (AK) Summary Document – The WIPP U.S. Resource Conservation and Recovery Act (RCRA) Hazardous Waste Permit requires that a record of characterization information is collected, reviewed, and managed for TRU waste destined for WIPP disposal. This record of information is referred to as AK. The AK summary report describes information relevant to the characterization of the waste, which is then confirmed as part of the WIPP disposal characterization process.
- RCRA Hazardous Waste Determination Documentation – Information from which a hazardous determination for the waste may be made must be provided by the SQS so that the receiving site can evaluate compliance with any relevant permits governing waste storage and characterization activities.
- Defense Determination Documentation - The WIPP is authorized only for the disposal of defense-related TRU wastes [2, 3]. Therefore, documentation of defense determination for waste to be disposed of at WIPP is required.

Options for Transportation

For the purpose of removing waste from the SQS, compliance determinations with respect to the transportation requirements are of primary importance. It is assumed that, in most cases, other final compliance determinations (required for WIPP disposal characterization requirements) will be made by the receiving site or CCP. The baseline transportation packaging licensed for the shipment of TRU waste are the TRUPACT-II, HalfPACT, CNS 10-160B Cask, and the 72-B Cask. For each transportation packaging, a “waste-specific data package TRAMPAC” must be prepared to document the evaluation of waste data for compliance with the payload requirements specific to the packaging. For the CNS 10-160B Cask and the 72-B Cask, the addition of

authorized contents from specific sites requires U.S. Nuclear Regulatory Commission (NRC) approval of final waste form and packaging configuration(s). As such, applications to the NRC may be required prior to the shipment of TRU waste from the SQS using these casks. Table I lists the requirements documents that define the payload authorized for each transportation packaging.

Table I. Transportation Packagings and Authorized Payloads

Packaging	Authorized Payload		Payload Requirements Document
TRUPACT-II	CH-TRU waste	14 55-gallon drums 14 Pipe overpacks 8 85-gallon drums 6 100-gallon drums 2 Standard waste boxes 1 Ten-drum overpack	CH-TRU Waste Authorized Methods for Payload Control (CH-TRAMPAC) [4, 5]
HalfPACT	CH-TRU waste	7 55-gallon drums 7 Pipe overpacks 4 85-gallon drums 3 100-gallon drums 1 Standard waste box	
CNS 10-160B Cask	CH-TRU waste RH-TRU waste	10 55-gallon drums	Appendix 4.10.2, “TRU Waste Payload Control,” of 10-160B Cask SAR [6]
72-B Cask	RH-TRU waste	1 RH-TRU canister (may be directly loaded or may contain 3 55-gallon drums)	Appendix 1.3.7, “RH-TRU Waste Authorized Methods for Payload Control (RH-TRAMPAC),” of 72-B Cask SAR [7]

Analysis of Transportability

In evaluating the potential to transport SQS TRU waste inventory in one of the packagings discussed above, the following are considered:

- Classification as CH- or RH-TRU waste
- Current storage and/or packaging configuration
- Status of information available to demonstrate transportation compliance.

The classification of an SQS TRU waste inventory as CH- or RH-TRU waste can impact the identification of a receiving site. A receiving site will be best served to accept waste that is similar to their own TRU waste inventory (e.g., a large site with only CH-TRU waste would most likely not be interested in receiving RH-TRU waste). Because the regulatory requirements for the transportation and disposal characterization of CH-TRU waste are clearly established, CH-TRU waste removal from SQS is easily evaluated. The transportation compliance evaluation of SQS data for CH-TRU waste is a straightforward process that is defined by the CH-TRAMPAC or the 10-160B Cask SAR, depending on the transportation packaging selected.

The regulatory requirements for the transportation of RH-TRU waste are established, and inter-site shipments of RH-TRU waste to date have been completed in the CNS 10-160B Cask. The transportation compliance evaluation of SQS data for RH-TRU waste is defined by the

RH-TRAMPAC or 10-160B Cask SAR, depending on the transportation packaging selected (i.e., the 72-B Cask or the CNS 10-160B Cask). The WIPP is not yet authorized to receive RH-TRU waste from any site. However, the U.S. Environmental Protection Agency has recently approved the characterization plan for RH-TRU waste. The New Mexico Environment Department is expected to provide an administrative decision in the form of a Notice of Deficiency on the RCRA Hazardous Waste Facility Permit modification request proposing a waste analysis plan for RH-TRU waste. As such, potential receiving sites will have the knowledge to evaluate the data available for RH-TRU waste from a particular SQS with respect to the anticipated waste certification program to be established at the receiving site for RH-TRU waste.

With respect to the current storage and/or packaging configuration of the waste and the status of information available to demonstrate transportation compliance, if the waste is packaged and transportation compliance is easily demonstrated, the waste can be readily shipped following the identification of a receiving site. The effort required to make the waste shippable increases in cases where waste packaging (e.g., for waste that is buried or in hot cells and not yet packaged for transportation) or repackaging (e.g., waste is packaged in non-compliant containers) may be required for transportation compliance.

While smaller sized waste forms may be repackaged in compliant payload containers for shipment in the currently approved packaging, a baseline transportation packaging for shipping oversized containers (i.e., large boxes) is not yet available. The currently licensed packagings cannot accommodate SQS CH-TRU waste inventories that are packaged in oversized boxes. These boxes are nominally 4- x 4- x 7-feet, 5- x 5- x 8-feet, or larger in size. A new packaging, the TRUPACT-III, is being considered for the transport of these oversized boxes with a certification application for the TRUPACT-III is currently being evaluated. While the use of the TRUPACT-III is the optimal mode of transport for oversized box inventories, other potential options may exist for the removal of this waste from SQS. The SQS may decide to repackage the CH-TRU oversized boxes into smaller containers authorized for transport in the TRUPACT-II, HalfPACT, or CNS 10-160B Cask. One SQS, Mound, transported oversized boxes to the SRS using a time-sensitive exemption for the ATMX railcar. The option of using a similar ATMX railcar exemption or other available packagings for limited SQS waste quantities may be investigated for other SQS with oversized boxes and receiving sites that can be accessed by rail.

Key Players in the SQS Cleanup Effort

Organizations, other than the shipping and receiving sites, with formal roles in the SQS cleanup effort are listed below. The definition of roles and responsibilities with respect to the removal of TRU waste from a particular SQS will depend on the amount of information available for that SQS and the level of effort required to accomplish the shipment.

Central Characterization Project

CCP, administered by Washington TRU Solutions LLC (WTS), has developed a mobile TRU waste certification program that is not associated with a particular site or waste population. The DOE- CBFO has approved the CCP TRU waste certification program for the characterization, certification, and transportation of waste for WIPP disposal. Because the program is not location

or waste specific, the CCP TRU waste certification program may be implemented at any site after required approvals are obtained. The CCP program is well-suited for implementation at the larger SQS, whose waste volumes are greater than other SQS, but whose infrastructures do not easily accommodate the development of full WIPP TRU waste certification programs for the still limited quantities of waste.

The CCP or portions of the CCP program may be implemented at SQS. The CCP may assist SQS in compiling and evaluating AK information, including making defense determinations and hazardous waste determinations. The CCP also may assist SQS by certifying individual payload containers for transportation, assembling payloads, and performing the transportation package loading/unloading activities using mobile loading equipment.

The CCP is currently certified only for the characterization, transportation, and certification of CH-TRU waste. The CCP does not have an RH-TRU waste program that can be applied to SQS with RH-TRU waste.

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WTS, as the management and operating contractor for WIPP, will assist SQS in identifying an appropriate transportation packaging, evaluating any waste repackaging/remediation required for transportation, and compiling data for documenting compliance with applicable transportation requirements.

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DOE-CBFO is responsible for approving all AK determinations (defense and hazardous waste determinations) and the transportation compliance determinations necessary to complete the SQS shipment to the receiving site. The DOE-CBFO also coordinates access to the shipping corridor, required shipment notifications, and other federal and state arrangements required for the shipment.

Progress to Date

To date, TRU waste has been removed from the following SQS:

- ARCO Medical Products Company
- Energy Technology and Engineering Center (ETEC)
- LBNL
- Lovelace Respiratory Research Institute (LRFI)
- Mound
- University of Missouri Research Reactor (MURR).

The ARCO Medical Products Company waste located in West Chester, Pennsylvania, consisted entirely of sealed sources and was consolidated at LANL for characterization under the OSRP. This consolidation of TRU waste made use of the receiving site defined for sealed sources. No TRU waste remains at ARCO.

The ETEC CH- and RH-TRU waste located in Canoga Park, California, was consolidated at the Hanford site through actions including negotiations between the DOE and the State of Washington and Hanford acceptance of the waste based on documented waste stream knowledge. As discussed above, Hanford is a potential hub site. The 10-160B Cask was used to complete these shipments. No TRU waste remains at ETEC.

The LBNL waste located in Berkeley, California, was consolidated at LLNL, a receiving site located in Livermore, California, approximately 30 miles from LBNL. Sealed sources removed from the containers of non-mixed CH-TRU waste were set aside at LBNL for recovery under the LANL OSRP. LLNL was agreeable to the receipt of LBNL waste because CCP was already set up at LLNL and characterizing CH-TRU waste in drums. The receipt of the LBNL waste had to be timed to coincide with the CCP presence at LLNL so that the LBNL drums could be characterized for WIPP disposal along with the LLNL waste.

The LRRI waste was consolidated at Sandia National Laboratories (SNL) pending transport, along with the SNL TRU waste inventory, to LANL for characterization prior to disposal at WIPP. A total of 29 55-gallon drums of CH-TRU waste were generated by the LRRI, located on the Kirtland Air Force Base (KAFB) in Albuquerque, New Mexico. In 1995, 26 of the drums generated by LRRI were moved to the SNL, which is also located on the KAFB. The agreement of SNL to receive the remaining three drums provides SNL with an incentive and impetus to pursue the shipment of the entire CH-TRU waste population generated by LRRI to LANL.

The Mound waste located in Miamisburg, Ohio, was consolidated at SRS. Mound transported its remaining TRU waste to the SRS using a time-sensitive exemption for the ATMX railcar. SRS was able to receive this waste per an agreement that established shipment priorities to assist SRS to ship twice the amount of waste that it received from Mound to WIPP. By agreeing to receive the Mound waste, SRS is able to reduce its overall TRU waste inventory.

CCP was essential to the consolidation of the MURR CH-TRU waste located in Columbia, Missouri, at Argonne National Laboratory-East (ANL-E). CCP shipped the MURR waste to ANL-E, where it was already characterizing ANL-E CH-TRU waste inventory for shipment directly to WIPP. Subsequently, the ANL-E and MURR CH-TRU wastes were characterized and transported to WIPP under the CCP program. RH-TRU waste remains at ANL-E.

SUMMARY

As detailed in this paper, any number of strategies may be useful in accomplishing the removal of SQS TRU waste inventories. Nearly every strategy involves some degree of effort in ensuring favorable conditions exist for removal of waste from one site and acceptance of waste by the other. These efforts include receiving site equity arrangements and proper use of available opportunities. The fact that technical solutions exist (e.g., transportation packagings and characterization capabilities exist) is not sufficient to solve the SQS cleanup issue. Positioning to take advantage of a unique set of conditions, including receiving site identification, availability of technical support, SQS priorities, and state(s) and DOE-CBFO support, is required for each SQS seeking to realize cleanup.

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