The National Transuranic (TRU) Program – 14069

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ABSTRACT

The U. S. Department of Energy (DOE) Carlsbad Field Office (CBFO) has successfully shipped and disposed of over 12,000 loads of radioactive waste generated from the cold war production of nuclear weapons. This radioactive waste, known as Transuranic (TRU) waste, has been disposed and permanently isolated from the accessible environment in the world's only deep geologic repository known as the Waste Isolation Pilot Plant (WIPP). The DOE National TRU Program (NTP) has safely and effectively characterized and transported this radioactive waste across the country, logging over 14,000,000 miles on U. S. Highways without a significant accident, spill, or release to the environment or exposure to the public. The NTP model is based on the integration of DOE waste management programs, contractors and subcontractors, and national laboratories as partners through individual agreements. It provides a turn-key service business model and could be adapted to solve similar radioactive waste issues in the U. S. and worldwide.

INTRODUCTION

When WIPP opened in 1999, the DOE determined that some of its sites in the Nuclear Weapons Complex were not prepared to meet the WIPP requirements to ship their TRU waste. TRU waste is radioactive waste that is contaminated with TRU elements from defense-related activities generated and stored at many DOE sites. It was clear to the DOE that a national priority and focus on packaging and characterizing TRU waste for WIPP disposal was necessary. To resolve this issue, the DOE Office of Environmental Management established NTP and assigned the management of the program to CBFO. The purpose of NTP was to integrate DOE TRU waste sites nation-wide to align budget, equipment, and personnel resources with a focus on full utilization of WIPP, which was the only approved permanent disposal system for TRU waste.

One of the main approaches that the NTP established to resolve issues was a national system of centralized, standardized, and efficient characterization and loading systems. This system has been successfully established and implemented at TRU sites that ship TRU waste to WIPP. WIPP has successfully operated for over 14 years. The waste containers and trailers that DOE uses for highway transport of TRU waste are licensed by the Nuclear Regulatory Commission. The containers and trailers must pass stringent tests and be maintained with high quality under the licenses. The truck drivers are some of the best qualified drivers in the country and have to meet stringent standards to transport TRU waste to WIPP. WIPP trucks are equipped with satellite tracking systems using the TRANSCOM system, which is managed by NTP for the federal government. NTP schedules WIPP shipments and communicates those schedules to state organizations along the shipping routes so they can be prepared with emergency response systems and so they can inspect the shipments along the way. NTP monitors the weather along the routes closely and carefully controls the departure of shipments when weather is questionable anywhere along the planned route.

NATIONAL PROGRAM

NTP is an integrated national program made up of DOE office and facilities, DOE contractors and national laboratory partners. The program provides turn-key services for the disposition of nuclear waste including packaging, characterizing, certifying and transporting TRU waste to WIPP for disposal. The program operates under DOE nuclear facility safety and quality standards and transportation standards keeping safe, compliant and efficient operations facilitating the clean-up of nuclear facilities all across the weapons complex.

PROGRAM CERTIFICATIONS

In addition to the services provided to assist TRU waste generator sites, the NTP in combination with the CBFO Quality Assurance team, certifies and maintains oversight of the programs that characterize and transport TRU waste to WIPP. The certifications are official declarations from CBFO to the WIPP regulatory agencies and the public that the programs characterizing and transporting TRU waste to WIPP meet all of the applicable regulatory requirements. Certification and oversight of these programs provides assurance to the public and agencies overseeing WIPP that TRU waste is transported and disposed safely and in compliance with requirements, and provides a mechanism for those stakeholders to transparently see for themselves the results of the operation. This method of open and transparent communication with stakeholders has created a significant new level of trust between the public, state and federal regulatory agencies and the DOE.

PROGRAM MODEL

The NTP model may be useful in other situations where radioactive material and waste, no longer needed for their intended purposes, can be dispositioned permanently. The cost of storing nuclear material and waste is very high. And, the cost of maintaining nuclear facilities until a disposition path is created is very high. The longer nuclear material and waste that is no longer needed is stored, the greater the risk of a natural disaster threat or terrorist threat causing unnecessary releases to the environment exists.

The phases of the model include:

1. Need - Define the need for the disposition of nuclear material or waste
2. Integrate - Create an integrated team of resources to take the material or waste in its' current form, or some future form and prepare it for a final destination
3. Plan - Utilize a variety of mechanisms to define roles and responsibilities such as agreements, contracts, orders, or other written commitments to define which entities make up the integrated team, who will perform what work and provide what equipment, and when each entity will perform their part
4. Define - Define the inventory of material or waste and develop a work-off plan and schedule to meet site-specific needs and drivers such as regulatory milestones and court orders
5. Standardize - Develop a standard set of universal methods, plans, procedures, training and documentation that can be used by the team at multiple facilities to fulfill their roles
6. Manage - Apply project management techniques for the planning, executing, tracking and completing goals and objectives

7. Execute – Systematically work-off the inventory utilizing multiple disposition process lines in parallel to achieve the most efficient and effective results
8. Establish – Establish a fleet of certified vehicles and packages necessary to transport the various configurations of material and waste to the various disposition destinations
9. Communicate – Inform the stakeholders for all sites involved of the plans and schedules for disposition of the material or waste and on the progress as the execution occurs
10. Customer Service - Provide a flexible approach to resolving challenges within the framework of the requirements

PROGRAM ELEMENTS

- **Inventory**

  Much information about the inventory of material or waste to be dispositioned is necessary to plan and properly execute the plan in the most efficient way. Knowledge of the waste form, its radioactive and hazardous properties, and the possibility of any characteristics that may be prohibited in any of the processes downstream is critical to planning and execution. I well known inventory will allow for thorough planning, full resource utilization, minimal worker exposures to hazards, and reduction in the possibility of requiring any rework of the waste streams.

  For example, a debris waste form contaminated with transuranics may yield radioactive properties when packaged in certain containers that would exceed requirements for transport or disposal. Sorting and segregating may be necessary to increase the containerized waste to avoid further processing to be transported and disposed. This approach would facilitate lower worker exposures and reduce risks associated with handling.

- **Container**

  If the material or waste currently resides in a container, an evaluation on the acceptability of that container in any of the processes downstream will be necessary. The evaluation may reveal a need to re-containerize the material or waste so that it is acceptable. If the material or waste is not currently containerized, an evaluation of the downstream processes required for final disposition will be necessary to determine the container, if available that will be compatible with all processes. Use of standard and currently approved containers will provide the most efficient disposition overall. If a variety of containers will be necessary to manage the material or waste from one process to the next, then it would be productive to search for containers that can be placed inside other containers (over-packing) up to final disposition.

  For example, selecting the best container that is approved for processing downstream, up front will prevent the need to re-work the waste form in to another container.

- **Treatment**

  Not all material or waste must be treated in order to meet specifications for final disposition. But, if treatment is necessary it should be planned with the recommendations on inventory and containers mentioned in the previous paragraphs. And, just as mentioned in the inventory paragraph, information on the final form and composition of the treated material or waste is very important to downstream processes.

  For example, a treatment method may be used that ensures the waste new form will be certifiable downstream.

- **Characterization**

  Material or waste characterization is defined as the methods used for determining the characteristics of the material or waste form and composition. The results of these methods should then lead to decisions on whether or not the material or waste meets the requirements for packaging, loading, transport, and/or disposal in the downstream processes. Material or waste that does not meet the requirements may have to be returned to inventory, container, or treatment processes until the requirements can be met.

  For example, methods used to visually verify that no items prohibited from transport or disposal are present in the waste form must be credible and clearly document conclusions that can later be verified by outside agencies.

- **Certification**

  Certification is an official declaration that the material or waste, as containerized meets the requirements for transport and disposal downstream. The certification process must be backed by a program that maintains the appropriate quality pedigree to ensure that decisions made in the processes and data utilized for making the decisions are credible.

- **Packaging**

  Special or unique packaging of the containerized material or waste may be required for loading, transport or disposal.

  For example, transport containers have bounding specifications for their content and that often includes packaging to keep the “load” from moving or shifting during transport or in an accident.

- **Loading**

  Loading systems can either be fixed as part of a facilities infrastructure or portable for providing mobility and flexibility for use in multiple locations. If loading will be frequent and recurring over years of operation, it is recommended that a fixed system be used to increase reliability. And, if loading is infrequent or non steady, a mobile system for loading may be practical overall. Mobile systems allow for flexible use in multiple

locations and over time reduce the capital costs in infrastructure at facilities.

- **Transport**

  Transport of radioactive and hazardous waste across U. S. Highways from DOE sites is available through contract carriers. This transportation system is an integrated system of carriers, inspectors, state and regional group coordinators and emergency responders. The system is safe, secure and is well-equipped with trained staff for responding to accidents, spills or unplanned events. Every shipment is well-planned and is dispatched if weather and other conditions along the entire route are safe and secure.

- **Storage or Disposal**

  The final destination for much of the radioactive material and waste in the weapons complex is disposal. Planning and nation-wide, if not world-wide integration throughout the entire lifecycle of a waste stream ending in storage or disposal, is critical when the desired result is the most efficient and effective system possible.

CONCLUSION

The National TRU Program has successfully shipped and disposed of over 90,000 cubic meters of radioactive waste, traveling over 14,000,000 loaded miles across the country, without any significant safety or compliance issues or any releases to the environment. This national model has been tested for 15 years and has adapted to changing conditions during that time period. It will likely continue to change to adapt to conditions in the next 30 years. The concept can be applied to similar situations and to resolve similar needs. The key to success in the model is to understand the entire life-cycle of waste streams from generation to final disposition, and integrating a program to address major phase along the way. By understanding the entire cycle, the integrated program can pool resources and anticipate needs on down the cycle and work together to be timely and efficient.

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