THE ADVANCED MIXED WASTE TREATMENT PROJECT: MOVING FORWARD

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ABSTRACT

After tackling design, schedule, and regulatory hurdles as well as public controversy, the Advanced Mixed Waste Treatment Project (AMWTP) is moving forward. In 1996, the U.S. Department of Energy (DOE) awarded BNFL Inc. and its teammates a privatized, fixed-price contract to design, permit, construct, and operate a mixed transuranic waste treatment facility at the Idaho National Engineering and Environmental Laboratory.

The primary purpose of the AMWTP is to utilize BNFL's nuclear waste management expertise to meet court-mandated milestones in the Settlement Agreement between DOE, the State of Idaho, and the U.S. Navy. In accordance with the Settlement Agreement, 65,000 cubic meters of transuranic and low-level mixed waste currently stored at the INEEL will be retrieved, characterized, and packaged in a safe, stable form for permanent disposal at New Mexico's Waste Isolation Pilot Plant no later than December 31, 2018.

To meet the milestones, BNFL Inc. undertook an aggressive schedule, designing the facility and obtaining the required seven environmental permits and authorizations in less than four years. Working closely with DOE and the regulators, AMWTP received a Facility Siting License, Air Permit, and Hazardous Waste Management Act permit from the State of Idaho; approval of the AMWTP Environmental Safety and Health Program Operating Plan and AMWTP Preliminary Safety Analysis Report from DOE; a National Environmental Policy Act Environmental Impact Statement Record of Decision; and construction approval of National Emissions Standard for Hazardous Air Pollutants from the Environmental Protection Agency.

Design challenges include finding ways to optimize the process and reduce risk. The project's original process flowsheet included supercompaction, macro- and micro-encapsulation, vitrification, and incineration. The flowsheet was modified, eliminating encapsulation and vitrification. In addition, the estimated amount of waste requiring thermal treatment was significantly decreased to approximately 2%.

As the project was nearing completion of the permitting phase, an unexpected burst of public opposition arose from the Jackson, Wyoming, area. Jackson residents feared that the incineration process would result in air contamination which would pose a significant health risk. Outreach efforts, including open houses, tours, and one-on-one meetings, were initiated to get information to interested citizens and answer their questions. In response to a lawsuit against DOE filed by the opposition, a Settlement Agreement was signed, allowing the non-thermal portion of the project to proceed. A Blue Ribbon Panel was appointed by DOE to evaluate alternatives to incineration. Results of the panel are pending.

With the signing of the Settlement Agreement, the project was allowed to move forward. Construction commenced in August and the facility is forecast to be completed in late 2002. Retrieval operations are expected to begin in late 2002, and waste shipments are scheduled to begin in 2003 and be completed by December 2015.

INTRODUCTION

The purpose of the Advanced Mixed Waste Treatment Plant (AMWTP) is to retrieve, treat, and prepare transuranic waste at the Idaho National Engineering and Environmental Laboratory (INEEL) for shipment to the Waste Isolation Pilot Plant (WIPP) repository in Carlsbad, New Mexico. The majority of this waste requires sorting and compaction, although a portion of the waste will be packed and shipped directly. This paper reviews the history of the project briefly, and then provides the current status as well as an overview of the project's plans through initial operations.

BACKGROUND

In 1995 the State of Idaho, Department of Energy (DOE), and U.S. Navy signed an agreement that outlined court-mandated milestones for treatment of waste at the INEEL while allowing continued shipments of spent fuel into the State. This agreement has become known as the Settlement, or Governor's, Agreement. The agreement requires that 65,000 cubic meters of transuranic and low-level alpha mixed waste currently stored at the INEEL be shipped out of Idaho for final disposal at WIPP no later than December 31, 2018.

The DOE entered into a competition for the retrieval, treatment, and packaging of this waste in 1996, and in December of that year awarded BNFL Inc. a privatized, fixed-price contract to design, construct, and operate the AMWTP at INEEL. The terms of the contract require BNFL to fund construction and operation of this project to completion. BNFL's expenses incurred in construction and operation and any profit are recovered through payments by DOE on a unit price per volume of waste processed basis.

In 1999 the Keep Yellowstone Nuclear Free group filed a lawsuit with respect to the proposed use of an incinerator in the AMWTP. The Secretary of Energy in resolving the lawsuit agreed to defer the incinerator until a Blue Ribbon Panel reviewed and made its recommendations regarding treatment processes available to treat the 2% of the waste slated for incineration.

PROJECT DESIGN

The AMWTP is divided into three phases. Phase I consisted of preparing all the safety plans and completing the necessary preliminary permits and approvals required for construction. This phase was successfully completed on August 20, 2000 with the issuance of the Hazardous Waste Permit and the Permit-to-Construct. A total of seven environmental permits or authorizations were obtained during Phase I. Phase II includes completion of detailed design, equipment development and procurement, and facility construction running through October 2003. Phase III comprises waste retrieval and facility operations and runs from the end of commissioning through a planned contract completion in 2012. A Phase IV exists for facility closure and decontamination and decommissioning within two years of closure; however, that phase requires a separate bid process.

The waste to be treated was received from throughout the DOE Complex but primarily from the Rocky Flats Production Site. The waste covers a spectrum from alpha low-level to transuranic. The waste is characterized and is a mixture of physical forms including organic, inorganic, metal, and debris. The waste is contained in 152,337 drums and 11,064 boxes that are anticipated to be in good condition. The waste is presently stored in two locations at the Radioactive Waste Management Complex (RWMC). 11,000 cubic meters of waste is readily retrievable in RCRA-compliant storage modules above ground. The remaining 54,000 cubic meters is stored under a

3-foot earthen berm inside the metal retrieval enclosure. Figure 1depicts the location of the major buildings as well as an artists concept of the AMWTP facility.

Fig. 1. Artist's rendition of the AMWTP facility at the INEEL's Radioactive Waste Management Complex.

The technology to be employed is based on existing BNFL operational plants such as the Waste Technology Complex and the Waste Monitoring and Compaction Plant at Sellafield in the United Kingdom. Within the AMWTP there is widespread use of existing and proven hardware such as the supercompactor and box sorting line floor-mounted manipulators. The AMWTP is primarily a waste sorting and compaction plant.

The process flow is fairly simple and outlined in Figure 2. Waste is retrieved and characterized to determine its chemical and radiological components. This ensures that the facility safely processes the waste within its authorized safety envelope. Once characterized, the waste follows two primary paths.

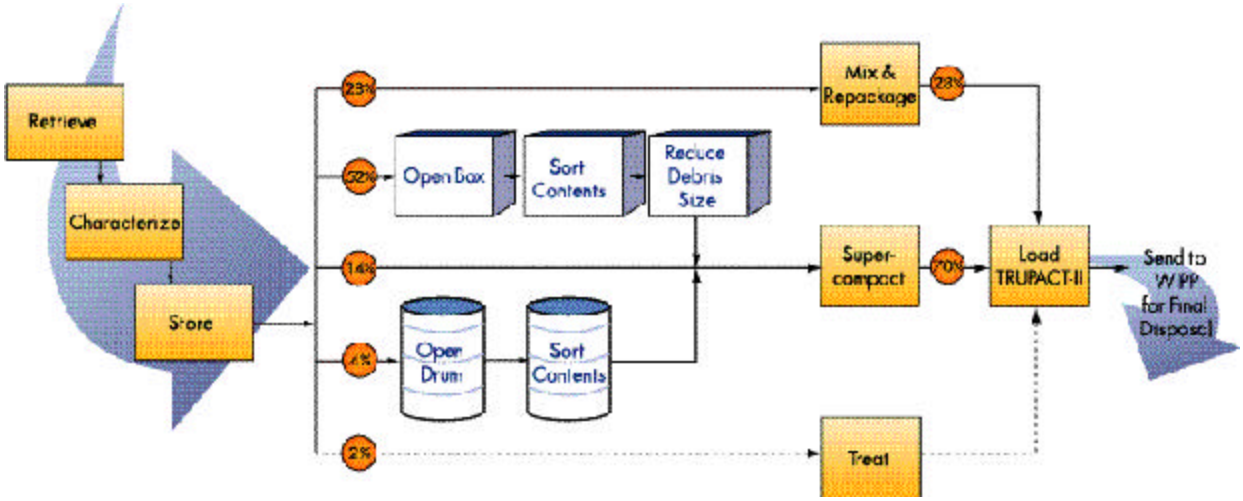

Fig. 2. AMWTP process.

Waste that meets the WIPP waste acceptance criteria without further processing is packaged for direct shipment to WIPP. The remaining waste is stored for further processing in the facility.

Boxes are brought into the facility where the lid is removed remotely, the contents of the box sorted through, and then repackaged in 55-gallon drums remotely. This process minimizes exposure to the work force from radioactive and chemical constituents contained in the waste. Once repackaged, the waste is re-assayed as part of criticality control and also to ensure compliance with WIPP requirements.

The repackaged waste as well as drums that can be processed directly without further sorting are routed to the supercompactor. The supercompactor then volume reduces the waste such that 4 to 5 resultant drum pucks can be loaded in an overpack. This allows maximum utilization of the TRUPACT transporter minimizing cost for the DOE over the life of the project.

Any remaining waste in drums that is incompatible with WIPP disposal requirements is opened in a glovebox. The offending items(s) is removed, the drum repacked, and ultimately sent to the super compactor for processing.

There is approximately 2% of the waste, or about 1500 cubic meters, that was going to be treated by an incinerator because of the level of PCBs and volatile organic chemicals contained in the waste. This waste will now be set aside until the DOE decides on a course forward based on the recommendations of a Blue Ribbon Panel established by the Secretary of Energy in May 2000.

PROJECT STATUS

The AMWTP has been moving forward meeting an aggressive schedule. Within three days of the last two permits going into effect groundbreaking was completed and construction started. Excavation and backfilling were planned to be completed in 45 days. Due to good weather, competent crews, and excellent coordination by the construction subcontractor, Washington Group International, this activity was completed in late September 2 weeks early.

Construction has continued at a frantic but controlled pace with the first concrete pour of 800 cubic yards placed October 25, 2000 (2 weeks early). Seven pours were completed as of February 1, for a total of 6300 cubic yards. The first cast-in-place walls were poured at the end of January. Work is planned to continue throughout the next two winters.

In November the building site was enclosed in an all-weather fabric tent that allows completion of the concrete pours during this first winter. The goal is to have the base pad completed by early Spring 2001.

The supercompactor completed final factory tests in Holland at the manufacturer. The procurements for the drum assay and crate assay equipment were released to Canberra and BNFL Instruments Inc. , respectively. The procurement for the real-time radiography units is progressing at the vendor, V.J.Technologies. Other major procurements for gloveboxes and support equipment for the box line have been placed and are progressing at the vendors. The final design is 80% complete with the goal of wrapping up the design effort in July 2001.

PATH FORWARD

The concrete slab foundation is scheduled to be completed by March 2001. The cast-in-place wall placement will continue through the Spring and Summer of 2001 with the goal of enclosing the building by November of 2001. During the second Winter, the process equipment will be placed, services connected, and the inside of the facility finished. The penthouse and any remaining external work will be completed in the Spring of 2002. Construction testing will commence leading to turnover to commissioning. The goal is to have a completed and tested facility ready for operational testing and readiness reviews by August 2002.

In parallel with construction of the main facility, modifications to the retrieval enclosure will be completed, crews will be hired, procedures developed/tested, and crews trained with the goal of starting retrieval of waste in the fall of 2002. The intent is to have a backlog of characterized waste ready for processing in the plant when it becomes operational in late 2003. Waste that meets WIPP disposal requirements will be prepared for and shipped directly to WIPP after retrieval and characterization.

Key dates in this aggressive schedule are:

- Complete Construction of Process Plant — August 2002
- Start Retrieval Operations — October 2002
- WIPP Certification Audit — January 2003
- First Shipment to WIPP — March 2003
- Start Process Operations — October 2003

This schedule allows the project to meet or beat the Settlement Agreement milestones associated with the processing and removal of transuranic waste from the INEEL.

STAKEHOLDER INTERACTION

The State of Idaho Department of Environmental Quality has been extraordinary in their support of the project. The permit application and associated process were conducted in record time. Other stakeholders such as Butte County Commissioners have been equally supportive of the project and extremely professional in their dealings. The AMWTP team has endeavored to

quickly integrate itself into the community and become responsible supporters of the surrounding communities.

BNFL Inc. is providing economic development support to both Butte County and the Eastern Idaho Economic Development Council. In addition to this financial support, employees continue to volunteer their time to numerous activities throughout the area. BNFL Inc. is committed to being corporate leaders in the Eastern Idaho region.

Various local civic organizations have also played a vital role in ongoing support for the project. One representative summed up his views of the project by stating "This is the most activity I've seen in one place at the INEEL ever."

SUMMARY

The project has worked aggressively to minimize the technical and financial risks to the project. This is a unique contract within the DOE complex that requires BNFL to privately finance the construction and operation of the facility. Revenues are generated through payment by DOE for waste processed. The project team is working on an aggressive construction and commissioning schedule that will ultimately lead to plant operations 3 years from the ground breaking ceremony.

The project team is continuously looking for ways to improve process efficiencies and increase operational performance while minimizing impacts to the construction schedule. The team is committed to moving forward and achieving the aggressive baseline and delivering a productive and highly successful project.