



U.S. Department of Energy
Office of Inspector General
Office of Audits and Inspections

Audit Report

Tank Waste Feed Delivery System Readiness at the Hanford Site

OAS-L-12-09

August 2012



Department of Energy
Washington, DC 20585

August 23, 2012

MEMORANDUM FOR THE MANAGER, OFFICE OF RIVER PROTECTION

A handwritten signature in black ink, appearing to read "David Sedillo".

FROM: David Sedillo, Director
Western Audits Division
Office of Audits and Inspections
Office of Inspector General

SUBJECT: INFORMATION: Audit Report on "Tank Waste Feed Delivery System Readiness at the Hanford Site"

BACKGROUND

The Department of Energy's largest cleanup task involves the treatment, immobilization and disposal of 56 million gallons of hazardous and highly radioactive waste at the Hanford Site, located in Southeastern Washington State. As part of this effort, the Department is constructing the Waste Treatment and Immobilization Plant (WTP) to treat and immobilize the waste in preparation for permanent disposal in a geological repository. The total cost to construct the WTP currently is estimated at \$12.2 billion. Bechtel National Inc. (BNI), the contractor for design and construction of the WTP, is now involved an effort to re-baseline the estimated project cost.

To support the operation of the WTP, the Department will need to complete a system to deliver waste to the WTP. As now conceived, the waste feed delivery system is a series of 30 discrete subprojects involving tasks such as waste retrieval; mixing/blending of waste types; characterization and analysis of waste properties; and, transferring of waste. Responsibility for the design, construction, and operation of the system, as well as operation of the tank farms where the waste is currently stored, has been contracted to Washington River Protection Solutions (WRPS). As part of the American Recovery and Reinvestment Act of 2009, the Department awarded WRPS approximately \$324 million to accelerate completion of WTP related infrastructure upgrades for the Hanford Site tank farms.

Although portions of the waste feed delivery system are in place, much still needs to be installed. Portions of the existing system will also require upgrades before the system can support WTP startup and operations. Because of the Department's priority in cleaning up high-level waste and the role of the WTP in accomplishing the cleanup mission, we initiated this audit to determine whether the Department will complete the waste feed delivery system in time to support WTP operations when it begins in 2019.

CONCLUSIONS AND OBERVATIONS

The Department made progress in completing the waste feed delivery system to support operations of the WTP. We found that the Department completed a number of waste feed delivery sub-projects earlier than planned and was on track to complete other critical path activities. We noted, however, that a number of challenges remain for completing the construction and operation of the waste feed delivery system. Specifically, the Waste Acceptance Criteria (WAC) that defines the specific WTP waste feed criteria and associated controls had not yet been finalized. Uncertainties with tank waste mixing and sampling could also impact the delivery of waste to the WTP. The Department was aware of these problems and told us that it had plans and strategies in place to mitigate the associated risks.

System Readiness and Schedule

The Department completed a number of waste feed delivery upgrades with Recovery Act funds and reported that it is generally on schedule to complete the remaining sub-projects. Specific upgrades were prioritized by tank farm and aligned with the WTP schedule for commissioning in 2018. Waste feed delivery upgrades completed using Recovery Act funds included infrastructure upgrades, upgrades to tank farm ventilation systems, tank farm transfer lines, upgrades to the 222-S Laboratory, and design of the submersible mixer pumps. Many of these upgrades were not scheduled to be completed until later in the contract but were accelerated and completed with Recovery Act funds.

Despite its progress, the Department is behind schedule on a near-term priority to procure submersible mixer pumps that are used to mix tank waste prior to feeding waste to the WTP Pretreatment facility. Mixing/sampling demonstration activities are also behind schedule and over budget. As of May 2012, WRPS's Earned Value Management System (EVMS) indicated that submersible mixer pump procurements were behind schedule. These procurements were behind schedule because corrosion/erosion test results were completed later than planned and delayed the subcontract award for pumps. According to the waste feed delivery Federal Project Director, the test results had since been completed and the subcontract was ready for award. However, the lack of available funding has delayed the procurement of the mixer pumps until Fiscal Year 2013.

Additionally, the schedule and budget for the waste feed delivery mixing/sampling demonstration activities have been impacted by a recent requirement to designate the Tank Farm ventilation systems as Safety Significant Systems.¹ WRPS is monitoring the issue and expects the mixing/sampling demonstration activities to be delayed for approximately one year. At this time, Office of River Protection (ORP) officials do not expect the delay to impact the overall waste feed delivery actions that support startup of the WTP.

¹ Safety Significant structures, systems and components are those whose failure could irreversibly impact worker safety such as a fatality, serious injury, or significant radiological or chemical exposure.

According to ORP senior management, baseline activities for waste feed delivery are on schedule to support meeting the legally binding Consent Decree with the State of Washington. This decree requires the Department to achieve "Hot Start of Waste Treatment Plant" by December 31, 2019. Upgrades to support waste feed delivery are scheduled to be completed in time to support the start of WTP operations by 2019.

Waste Acceptance Criteria

Although the waste feed delivery system is aligned with the current baseline schedule to permit completion in time to support commissioning of the WTP, we are concerned that the WAC for the WTP had not been finalized by the time our review was completed. The lack of established criteria increases the risk or uncertainty as to whether the tank farm will be able to provide feed to the WTP. The Department recognized this issue and took actions to mitigate the risk by committing to defining and finalizing the WAC in 2015 as part of its Implementation Plan to address Defense Nuclear Facilities Safety Board Recommendation 2010-2, *Pulse Jet Mixing at the WTP*. According to WRPS officials, there would be adequate time to formulate the waste to meet the WAC if the criteria are finalized by 2015. WRPS will be required to meet the WAC once it is defined.

To the Department's credit, it has chartered a Waste Feed Technical Resolution Team, consisting of members from ORP, BNI and WRPS, to provide timely resolution of process issues and challenges that impact the WTP. The technical resolution team is charged with identifying, prioritizing, assembling and providing guidance to technical tasks teams in support of technical issue resolution. The technical resolution team will consider issues such as the WAC and Data Quality Objectives development, the Implementation Plan for Defense Board Recommendation 2010-2, Waste Feed Delivery interfaces, interface controls, sampling and analysis, mission planning, and simulant development. Additionally, the Department has formed a team of high-level experts to assist in resolving technical issues and making recommendations for improvements related to the WTP "black cells." The recently formed black cell review team's recommendations may impact the waste feed delivery approach. Black cells are enclosed rooms where inspection, maintenance, repair or replacement of equipment or components is impractical because there is no engineered access. In April 2012, the Office of Inspector General issued *The Department of Energy's \$12.2 Billion Waste Treatment and Immobilization Plant – Quality Assurance Issues – Black Cell Vessels*, (DOE/IG-0863), that identified weaknesses in quality assurance records pertaining to the black cells.

SUGGESTED ACTIONS

The Department's ongoing actions to address risks with the WAC and tank waste feed and characterization are proactive. However, given the importance of treating, immobilizing and disposing of hazardous and highly radioactive waste, we suggest that the Manager, Office of River Protection closely monitor:

1. The WTP WAC, to include the necessary studies as required by the Implementation Plan for Defense Nuclear Facilities Safety Board Recommendation 2010-2, *Pulse Jet Mixing at the WTP*;

2. The procurement and fabrication of the in-tank submersible mixer pumps; and,
3. The contractor's EVMS waste feed delivery activities and take timely actions to address unfavorable variances to cost and schedule.

On August 8, 2012, the Defense Nuclear Facilities Safety Board sent a letter to the Department expressing concern about certain design issues associated with the WTP's slurry transport system and hazards associated with potential plugging of waste transport lines and potential problems with waste pumps. It is important to note that we did not review the WTP's waste slurry transport system that is being designed by BNI. Rather, this audit examined issues associated with plans for the Tank Waste Feed and Delivery System that is being designed by WRPS. Nonetheless, the Department's Deputy Federal Project Director for Waste Feed Delivery confirmed that the issues in the Board's August 8, 2011 letter did not apply to the project under review in this audit.

We coordinated closely with management officials during the course of our review. We appreciate the cooperation of all involved in this audit.

Attachments

cc: Deputy Secretary
Associate Deputy Secretary
Under Secretary for Nuclear Security
Senior Advisor for Environmental Management
Chief of Staff

OBJECTIVE, SCOPE AND METHODOLOGY

OBJECTIVE

The objective of this audit was to determine whether the Department of Energy (Department) will complete the waste feed delivery system in time to support operation of Waste Treatment and Immobilization Plant (WTP) when it begins operations in 2019.

SCOPE

This review was performed between September 2011 and August 2012, at the Department's Office of River Protection (ORP) in Richland, WA. The scope of our audit included a review of the Department's waste feed delivery system to support startup and operation of the WTP in 2019.

METHODOLOGY

To accomplish the objective of this audit, we:

- Obtained and reviewed Department Orders, laws and regulations relevant to the waste feed delivery system and the WTP;
- Obtained and reviewed the Department, ORP, and Washington River Protection Solutions (WRPS) policies and related to the waste feed delivery system;
- Reviewed findings from prior audits regarding waste feed delivery system activities to process facilities;
- Reviewed the WRPS contract with Department;
- Held discussions with Department and contractor officials regarding the waste feed delivery system; and,
- Reviewed and compared the critical path activities for the waste feed delivery system to the startup and operation of the WTP.

We conducted this performance audit in accordance with generally accepted Government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objective. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objective. Accordingly, the audit included tests of controls and compliance with laws and regulations to the extent necessary to satisfy the objective. In particular, we assessed the implementation of the *GPRA Modernization Act of 2010* and found that the Department had established performance measures related to the Waste Feed

Delivery System. Because our review was limited, it would not necessarily have disclosed all internal control deficiencies that may have existed at the time of our audit. We did not rely upon computer-processed data to accomplish our audit objective.

Management waived an exit conference.

PRIOR REPORTS

Office of Inspector General Reports

- Audit Report on [*Management of the Tank Farm Recovery Act Infrastructure Upgrades Project*](#), (OAS-RA-L-11-03, February 9, 2011). The audit found that the Department selected Recovery Act funding that supported the goal of upgrading tank farm infrastructure and waste feed delivery systems. Additionally, the Department was on schedule to complete the Recovery Act upgrades by September 30, 2011 as planned, and at less cost than the estimated costs. Due to a lack of contract proposal detail, however, we were unable to verify whether all of the Recovery Act funded work represented an acceleration of overall workscope.
- Audit report on [*The Department of Energy's \\$12.2 Billion Waste Treatment and Immobilization Plant – Quality Assurance Issues – Black Cell Vessels*](#), (DOE/IG-0863, April 25, 2012). The audit revealed a number of instances where quality assurance requirements were not completely followed for processing vessels installed in black cells and/or hard-to-reach areas. Specifically, the WTP contractor had not obtained or maintained: weld maps, identifying the specific location of each weld; information on welding procedures, the qualifications of the welder, materials used in the vessels and non-destructive examinations (NDE); and, positive material tests, which ensure that the materials used to fabricate the vessels were compatible with expected operating conditions. Weaknesses in quality assurance records associated with black cell and hard-to-reach processing vessels occurred because of deficiencies in the WTP contractor's implementation of a quality assurance program and inadequate Department oversight.

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