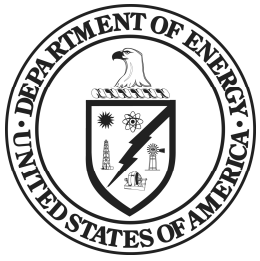

U.S. Department of Energy
Office of Inspector General
Office of Audits and Inspections

Audit Report

Department of Energy Quality Assurance: Design Control for the Waste Treatment and Immobilization Plant at the Hanford Site

DOE/IG-0894 September 2013

Department of Energy
Washington, DC 20585

September 30, 2013

MEMORANDUM FOR THE SECRETARY

FROM: Gregory H. Friedman
Inspector General

SUBJECT: INFORMATION: Audit Report on "Department of Energy Quality Assurance: Design Control for the Waste Treatment and Immobilization Plant at the Hanford Site"

INTRODUCTION AND OBJECTIVE

The Department of Energy is constructing the $12.2 billion Waste Treatment and Immobilization Plant (WTP) to vitrify approximately 56 million gallons of radioactive and chemically hazardous waste stored at the Hanford Site. To ensure the vitrification process is safe for workers, the public and the environment, the Department required the contractor for the WTP, Bechtel National Inc. (Bechtel), to develop and follow a quality assurance program based on the American Society of Mechanical Engineer's *Quality Assurance Requirements for Nuclear Facility Applications* (NQA-1) Standard.

Proper design control information for an NQA-1 compliant facility includes the original design, design changes and approved design deviations. Design control must be robust to preserve alignment between WTP construction and the "Authorization Basis," the Department's process for ensuring the safe operations of the facility once construction is completed. The Authorization Basis is the aggregate of all safety related elements of the project, including hazard assessments and procedures to mitigate identified safety hazards. A well-developed and properly functioning quality assurance process is critical to ensuring that workers and the public are adequately protected from nuclear and other hazards when facility operations begin.

The Office of Inspector General received an allegation that Bechtel was missing design control documentation for the WTP and as such, could not demonstrate that equipment was appropriately manufactured. In response, we initiated an audit to determine whether design changes were approved and documented.

RESULTS OF AUDIT

We substantiated the allegation. Our review revealed significant shortcomings in the Department's process for managing the design and fabrication changes of waste processing equipment procured for the WTP. Specifically, the Department had not ensured that Bechtel:

- Subjected design changes requested by suppliers to the required review and approval by Bechtel's Environmental & Nuclear Safety Group (Nuclear Safety), the organization responsible for ensuring that design changes do not impact facility safety. Early in our review, in September 2012, we brought several instances in which design

changes requested by suppliers had not received required safety reviews to the attention of the Department and Bechtel. Bechtel confirmed the issue and performed an "extent of condition" review of certain design changes to determine the scope of the problem. In its review of a sample of 235 of 4,028 supplier design documents spanning a 3-year period, Bechtel discovered that more than a third of the changes made to supplier design documents had not received the required Nuclear Safety review and approval, and, that the problems were systemic.

- Properly verified that deviations from design requirements that could affect nuclear safety were implemented. Bechtel could not demonstrate that it had verified suppliers' actions to address deviations from design. For example, we identified that Bechtel approved action to repair a Low-Activity Waste melter lid that did not meet design specifications. Bechtel was unable to provide evidence that: (1) the supplier had made the necessary repairs to the lid; and (2) it had reexamined the repair to ensure that it met requirements. Neither Bechtel nor the Department could confirm that the design changes were actually completed and met safety related design requirements. In this regard, the absence of affirmation that the changes were completed as required carried with it potentially serious implications. In short, quality reviewers were unable to determine, with certainty, whether the Low-Activity Waste melter lid would successfully perform its safety function to confine harmful by-products (nitrogen oxide gases) produced during the waste vitrification process.

Department Oversight

The Department's oversight of Bechtel's quality assurance program lacked focus. In our view, the depth and breadth of the Department's oversight was not sufficient to identify weaknesses in the implementation or adequacy of Bechtel's procedures. For example, we found that the Department's review activity was not sufficiently detailed to identify that Bechtel was not always following its procedures for requiring the review of design changes by Nuclear Safety. Additionally, although the Department reviews and approves Bechtel's quality policies, it did not review and approve implementation procedures. Further, the Department's oversight activities failed to identify the fact that Bechtel's procedure governing design changes did not meet NQA-1 requirements for quality assurance. Finally, we found that responsible Federal officials were not aware of Bechtel's inadequate support for accepting equipment with design changes that impacted safety.

Bechtel Quality Assurance

For its part, Bechtel had also not effectively implemented its own quality assurance procedures. The exclusion of Nuclear Safety from the design change process can be traced to poor implementation of existing procedures. According to Bechtel officials, procedures governing Nuclear Safety review provided "opportunities for interpretation" that led to "incorrect assumptions" by its engineers. These assumptions led Bechtel's engineering group to incorrectly conclude that design changes would not affect the Authorization Basis and, as such, that it was appropriate to bypass Nuclear Safety.

Additionally, Bechtel did not have quality control procedures or processes to ensure that deviations from design or specifications were documented to support product fabrication and delivery. Furthermore, Bechtel did not require suppliers to submit reports detailing actions taken to address needed deviations, documents that would have provided additional confidence that needed design changes and/or repairs were properly completed.

Design Vulnerabilities

Collectively, these problems led to the creation of major design vulnerabilities. We found that Bechtel did not always comply with internal Bechtel procedures and failed to adequately and consistently document supplier initiated design changes. Proper design control is essential to ensure that critical equipment is properly fabricated to specifications and will perform its safety function. The lack of a robust design control process makes it difficult to ascertain whether all necessary safety-related design activities are adequate and that workers, members of the public, and the environment are adequately protected. Without improvements to design control, confidence that procured equipment meets requirements for the safe operation of the WTP will erode.

Other major Department projects have experienced similar quality control concerns. For example, quality control issues resulted in a schedule delay of approximately 5 months for the Sodium Bearing Waste Treatment Project in Idaho. Due to the inadequate closure of nonconformance reports for this project, which is also known as the Integrated Waste Treatment Unit Project, the Department had to cut and replace questionable welds and processing pipelines from the facility. The Department's March 2012 report, *Integrated Waste Treatment Unit Project, Lessons Learned* determined that documentation from the vendors as well as receipt inspections and field inspections were incomplete, missing or lost. The report concluded, among other things, that "Because of quality issues, verification proved to be time consuming and costly."

Our current findings parallel quality assurance problems observed during two other audits of WTP construction activities. In our report, *The Department of Energy's $12.2 Billion Waste Treatment and Immobilization Plant—Quality Assurance Issues—Black Cell Vessels*, (DOE/IG-0863, April 2012), we reported the Department had procured and installed vessels in WTP that did not always meet quality and/or contract requirements. These vessels, known as black cells, are enclosed rooms where inspection, maintenance, repair or replacement of equipment or components is not practicable because there is no engineered access. In our report, *Quality Assurance Standards for the Integrated Control Network at the Hanford Site's Waste Treatment Plant*, (DOE/IG-0764, May 2007), we identified that the Integrated Control Network, affecting the immobilization of high-level radioactive waste, was procured commercially and did not meet quality assurance standards for nuclear facilities. The network provided the central communication of the Plant's pumps, valves, and instruments, and interfaces for operators to control plant activities. Although management reported that it had resolved the specific issues discussed in these reports, our most recent work demonstrates that additional attention to quality assurance is necessary. As such, we made several recommendations designed to help strengthen design control at the WTP.

MANAGEMENT REACTION AND AUDITOR COMMENTS

Management concurred with the report's recommendations and indicated, in some cases, that it had already taken actions to address specific weaknesses identified in our report. In other instances, management detailed planned steps it will take to address the remaining concerns. We consider management's comments and planned corrective actions to be fully responsive to our findings and recommendations. Management's comments are included in Appendix 3.

Attachment

cc: Deputy Secretary
Acting Under Secretary for Nuclear Security
Senior Advisor for Environmental Management
Chief Health, Safety and Security Officer
Chief of Staff

REPORT ON DEPARTMENT OF ENERGY QUALITY ASSURANCE: DESIGN CONTROL FOR THE WASTE TREATMENT AND IMMOBILIZATION PLANT AT THE HANFORD SITE

TABLE OF CONTENTS

Design Control for the Waste Treatment and Immobilization Plant

Appendices

DEPARTMENT OF ENERGY QUALITY ASSURANCE: DESIGN CONTROL FOR THE WASTE TREATMENT AND IMMOBILIZATION PLANT AT THE HANFORD SITE

Background

The Department of Energy's (Department) Waste Treatment and Immobilization Plant (WTP) is a $12.2 billion construction project managed by Bechtel National, Inc. (Bechtel). The WTP mission is to vitrify approximately 56 million gallons of radioactive and chemically hazardous waste stored at the Hanford Site. The vitrification process begins by separating the radioactive liquid waste into two categories at a Pretreatment Facility. The separated waste is pumped in batches to its respective vitrification facility, High-Level Waste Facility or Low-Activity Waste Facility. Samples of the batch are then analyzed to determine the appropriate formulation of the glass mixture. Using this data, the glass formers (sand, silica, etc.) and liquid radioactive waste are pumped into the melters to be vitrified into large stainless steel containers for permanent disposal.

To ensure the vitrification process is safe to workers, the public and the environment, the Department required Bechtel to develop and follow a robust quality assurance program based on the American Society of Mechanical Engineer's *Quality Assurance Requirements for Nuclear Facility Applications* (NQA-1) Standard. Bechtel's quality assurance program defines policies and procedure requirements to ensure alignment between the constructed design and the Authorization Basis for safe operations. The Authorization Basis is the aggregate of all elements, including hazard assessments and safety procedures, designed to mitigate identified safety hazards. The Department relies on adherence to the Authorization Basis to ensure safety when the facility begins operations. To maintain alignment with the Authorization Basis, Bechtel's design control procedures require that design changes receive the same level of review as the original design and that changes to design requirements are approved and verified. All suppliers providing safety related equipment are also required to comply with NQA-1, as well.

Because the WTP is a design-build construction project, Bechtel is designing key parts to the facility, systems and processing equipment as it builds the facilities. Bechtel develops specifications and conceptual drawings for the systems and equipment, and then orders the items from suppliers with detailed specifications and other parameters established in the drawings. Based on this, the suppliers develop the final design documents for Bechtel's review. If Bechtel finds the design document acceptable, the document is stamped with an acceptance status that gives the supplier authority to move forward with fabrication of the equipment.

Generally, the supplier is expected to build to Bechtel's approved design documents or specifications. However, during the fabrication and construction phase, it sometimes becomes necessary to make changes to account for unforeseen issues. If deviations occur during fabrication, the supplier is required to create a "nonconformance report" that documents the issue. The supplier is also required to inform Bechtel of the deviation and submit a Supplier Deviation Disposition Request detailing proposed design changes for Bechtel's approval. Once approval is granted and the repair is completed, the supplier is required to perform a reexamination of the equipment to ensure it continues to serve its safety function. This reexamination is documented on the nonconformance report and is supported by records such as

test results and calibration records. The quality record package provides physical evidence that quality objectives were met and that the equipment will perform its safety function. Once Bechtel receives these records, its quality assurance program requires it to verify and document the supplier implementation of the approved disposition. These design change documents, including accepted deviations and nonconformances, reflect the actual physical configuration of the equipment. Design, deviations, fabrication, inspection and verification activities performed by suppliers and quality assurance personnel should be included in a quality record package and submitted to Bechtel.

Design Control

The Department had not ensured that the design changes for the WTP were appropriately approved and adequately documented. Specifically, Bechtel approved design changes to equipment without obtaining the required safety review to determine the impact of changes on the safety of the facility. Additionally, Bechtel did not properly verify that deviations from designs made by suppliers conformed to design requirements. Therefore, neither Bechtel nor the Department could substantiate that the design changes and/or repairs made in response to required deviations to equipment were properly completed.

Nuclear Safety Reviews

Bechtel approved design changes requested by suppliers without obtaining the required review from its Environmental & Nuclear Safety Group (Nuclear Safety). Bechtel's procedures required that changes to design receive the same rigor of review as the original design. That is, design documents that could affect the Authorization Basis and were originally reviewed by Nuclear Safety, required the same group's review for any changes.

As part of our review, we sampled Supplier Deviation Disposition Requests, and identified 15 instances in which it appeared that supplier deviations were approved without the required review of Bechtel's Nuclear Safety. In September 2012, we brought these instances to the attention of the Department and Bechtel. Bechtel's Engineering group reviewed the 15 Supplier Deviation Disposition Requests and agreed that 9 required a Nuclear Safety review. These requests had been submitted by suppliers requesting to deviate from a design specification for pressure vessels that were designed to confine dangerous processing fluids, gasses and vapors during plant operations. Because of the issues we identified, Bechtel launched a review of supplier design documents submitted in the last 3 years. In a population of 4,028 supplier design documents, 1,425 (approximately 35 percent) had not received the required Nuclear Safety review. Based on our referral and the subsequent review, Bechtel determined that there was a systemic problem and a breakdown in controls over the review of design changes. In response, Bechtel took compensatory steps by suspending all approvals of supplier generated design changes and suspending all shipments of quality level parts from suppliers to the WTP construction site for 12 days to allow for corrective actions.

Verification of Design Changes

Bechtel did not properly verify that deviations from designs made by suppliers were effectively implemented. Specifically, Bechtel could not demonstrate that it had always verified that suppliers had made and tested repairs to equipment that may affect nuclear safety. For example, Bechtel had not developed a methodology for its Supplier Quality Representatives located at supplier facilities requiring them to verify repairs to design deviations made by the supplier. We identified a Supplier Deviation Disposition Request to repair the Low-Activity Waste melter lid that had become distorted during fabrication. Bechtel's disposition of the deviation required the supplier to excavate two welds and reapply the filler material utilizing a specific procedure in an effort to straighten out the deformed lid. Quality was critical because the Low-Activity Waste melter lid's safety function was to confine harmful byproducts of nitrogen oxide gases produced during the vitrification process. However, Bechtel could not demonstrate that the Low-Activity Waste melter lid was repaired and was capable of its safety function.

Our review of the quality record package provided no evidence that Bechtel's Supplier Quality Representative verified and documented the supplier's repair. We could not determine if the Supplier Quality Representative reviewed the weld record for the repair to ensure that the agreed upon disposition for the Supplier Deviation Disposition Requests in fact occurred. Specifically, the Supplier Quality Representative should have reviewed the weld record for the repair to ensure the correct procedure was used, the individual who performed the weld was qualified and the filler material was traceable to work performed, or reviewed the reexamination records to ensure the quality of the welds. Bechtel only required Supplier Quality Representatives to sign the cover page of the quality record package prior to shipment of equipment to signify the acceptance that all Supplier Deviation Disposition Requests were verified as closed. Our review of the quality record package could not specifically determine what actions were taken to resolve the melter lid problem. In fact, Bechtel procedures do not specify what the Supplier Quality Representative should do during verification. The lack of any documentation supporting what was done in verification increased the risk that suppliers had not made or tested repairs to nonconforming equipment.

Bechtel also did not obtain evidence needed to verify that approved actions to address deviations from equipment designs were effectively implemented and met safety requirements. We found Bechtel did not obtain nonconformance reports from its suppliers as a part of the quality record package. This practice does not align with NQA-1, which considers suppliers' nonconformance reports, together with records and data supporting the reexamination, as a typical lifetime record. A properly closed out nonconformance report provides additional evidence that the supplier implemented Bechtel's approved repair of the deviation. This documentation demonstrates that the supplier had reexamined the repair and confirmed that the equipment met its safety requirements together with test data supporting the reexamination.

Bechtel's lack of supplier nonconformance reports adversely impacts its ability to ensure that suppliers have made agreed-upon repairs and tested the repairs for conformance with design requirements. For example, Bechtel accepted shipment of equipment used to retrieve waste samples that had a known approved deviation. Nevertheless, there was not a Supplier Quality Representative assigned to the supplier to perform verification activities. Bechtel relied on its

Receipt Inspection process at WTP to verify that the design deviation had been properly addressed. However, Bechtel did not require the supplier to submit associated nonconformance reports and Bechtel's Supplier Deviation Disposition Requests submitted by suppliers do not document the reexamination of the repair. Thus, without the supplier nonconformance report Bechtel's Receipt Inspection process is not effective in ensuring the deviation was closed. We also found that, in addition to the lack of nonconformance reports, Bechtel had not obtained the equipment calibration records and results from the suppliers needed to verify that the repair continued to meet design requirements. Further, because the completed suppliers' nonconformance reports were not a required quality record deliverable, neither the Department nor Bechtel will be able to verify closure of the nonconformance.

Missing Design Documentation

During our review, we substantiated the allegation that Bechtel did not always have supporting documentation for design changes made to the WTP. Specifically, as previously discussed, Bechtel had not obtained supporting documentation from equipment suppliers for changes initiated by the supplier and made to the design of equipment. Bechtel also could not confirm that repairs to equipment were verified to meet design requirements. Although the Department had not required Bechtel to provide the design documentation until after the end of construction, we noted that such practice, in our view, increases the risk that Bechtel will be unable to provide the required documentation at the end of construction, currently scheduled for 2019. We noted that Bechtel does not require suppliers to retain quality records, and in one example, we discovered that a major supplier only retained records for 5 years. Such information regarding the disposition of design deviations is supporting information for design drawings of the WTP and is essential for the Department to authorize start-up operations of the facility when completed. Without complete design documentation, the WTP is likely to face delays and increased costs during the operational readiness reviews, activities that specifically use design documents to test compliance with design control requirements prior to approving the start of facility operation.

Design Control Oversight

The Department's lack of focus on closely overseeing Bechtel's quality assurance program likely contributed to these problems. In our view, the depth and breadth of the Department's oversight was not sufficient to identify weaknesses in the implementation or adequacy of Bechtel's procedures. For example, we found that the Department did not perform adequate reviews to identify that Bechtel was not following its procedures for requiring the review of design changes by Nuclear Safety. Additionally, although the Department reviews and approves Bechtel's quality policies, it did not review and approve implementing procedures. The Department's oversight activities were not sufficient to identify that Bechtel's procedures governing design changes did not meet NQA-1 requirements related to verification that design deviations were properly addressed. Additionally, due to limited Departmental oversight activities, Federal officials were not aware of Bechtel's inadequate support for accepting equipment with design changes affecting safety. Recognizing that the WTP is likely to be a 20-year construction project during which time countless design changes are likely to occur, as well as the fact that Bechtel may not operate the facility and not be available throughout the life cycle of the WTP, we concluded that increased Department oversight was warranted.

Bechtel Implementation of Design Change Controls

Further, Bechtel had also not effectively implemented its quality assurance procedures. The exclusion of Nuclear Safety from the design change process can be traced to poor implementation of existing procedures. According to Bechtel officials, procedures governing Nuclear Safety review provided "opportunities for interpretation" that led to "incorrect assumptions" by its engineers. These misassumptions led Bechtel's engineering group to incorrectly conclude that design changes would not affect the Authorization Basis and therefore that it was appropriate to bypass Nuclear Safety.

Additionally, Bechtel did not have documented processes or controls to ensure that supplier initiated design changes were effectively implemented by suppliers. Specifically, Bechtel did not have written procedures that required its own on-site supplier quality representative, the individual responsible for point-of-delivery quality control, to verify and document that design changes were properly implemented, tested and verified to meet performance specifications. Furthermore, Bechtel did not require suppliers to submit nonconformance reports, which would provide additional confidence to assure necessary repairs were completed.

Design Vulnerabilities

As a result, major design vulnerabilities were created. We found that Bechtel did not always comply with internal procedures and failed to adequately and consistently document supplier initiated design changes. The lack of a robust design control process makes it difficult to maintain the Authorization Basis, an activity critical to ensuring the safety of workers, the public and the protection of the environment. Without improvements to design control, confidence that procured equipment meets requirements for the safe operation of the WTP will erode and may result in delays of the Department's Operations Readiness Review approval for WTP start-up.

Similar issues identified in this report resulted in a schedule delay of approximately 5 months for the Sodium Bearing Waste Treatment Project in Idaho. For example, due to the inadequate closure of nonconformance reports for this project, also known as the Integrated Waste Treatment Unit Project, the Department had to cut and replace questionable welds and processing pipelines from the facility. The Department's March 2012 report, *Integrated Waste Treatment Unit Project, Lessons Learned*, determined that documentation from the vendors as well as receipt inspections and field inspections were incomplete, missing or lost. The report concluded, among other things that "Because of quality issues, verification proved to be time consuming and costly."

To address the problems we discovered, the Department issued a letter on October 10, 2012, ordering Bechtel to develop a comprehensive corrective action plan to address the systemic weaknesses in its approval process for design changes made by suppliers. Bechtel informed us that, corrective actions should be completed no later than September 30, 2013, for design change documents lacking Nuclear Safety review and December 2014, for verification activities for supplier initiated design changes.

RECOMMENDATIONS

Although the Department and Bechtel have taken actions to address some of the deficiencies that we identified, we believe that additional actions are necessary to ensure design control for the WTP is maintained and provides the confidence needed for reliance that the design meets the Authorization Basis for safe operations. Accordingly, we made several recommendations to strengthen the Department's quality assurance processes for design control. To address the issues identified in this report, we recommend that the Senior Advisor for Environmental Management:

1. Take the appropriate corrective actions necessary to ensure that Bechtel:

    - Obtain reviews from the appropriate organizations of supplier requests for design deviations that may affect safety;

    - Requires suppliers to provide documentation to support that equipment repairs have been implemented and tested to confirm they meet safety requirements;

    - Develops and implements procedures to verify suppliers implementation and testing of equipment design deviations; and

    - Reviews its supplier requirements for document retention to ensure that the original design along with all design changes and approved design deviations can be provided to the Department as required.

2. Restructure Federal surveillance, inspection, assessment and audit programs to ensure that the Department determines the adequacy of Bechtel's procedures for flowdown of quality requirements.

3. Perform oversight activities of the corrective actions that Bechtel has already begun, to ensure completion.

MANAGEMENT REACTION

The Office of Environmental Management concurred with the report's findings and recommendations and provided corrective actions that have been taken or are planned to address the issues identified in this report. Management stated that due to the significance of safety-related design change documents not reviewed by Bechtel's Nuclear Safety group, Bechtel took immediate action during our audit to address the issue and determine the extent of condition. In addition, management stated that it will direct Bechtel to perform corrective actions to address the lack of quality records that provides confidence that equipment repairs were verified and continue to meet safety requirements in addition to strengthening procedures. These corrective actions will be monitored until closure, at which time the Office of River Protection will perform effectiveness reviews to verify if the actions taken were effective in addressing the issues identified in this report. Further, management committed to expanding the quality assurance process to provide enhanced verification of the flow down and implementation of NQA-1 requirements into Bechtel's procedures.

AUDITOR COMMENTS

The Department's corrective actions, taken and planned, are fully responsive to our recommendations.

Management's comments are included in Appendix 3.

Appendix 1

OBJECTIVE, SCOPE AND METHODOLOGY

OBJECTIVE

To determine whether the Department of Energy (Department) is effectively managing changes made during design and fabrication of waste processing equipment procured for the Waste Treatment and Immobilization Plant (WTP).

SCOPE

We conducted this audit from May 2012 to July 2013, at the Hanford Site in Richland, Washington. The scope of the audit was to review Bechtel National, Inc.'s (Bechtel) design control for equipment relied on for safety for the WTP. Our review focused on the issues contained in the allegations made to the Office of Inspector General and management of design changes of equipment provided by subcontractors to Bechtel.

METHODOLOGY

To accomplish the audit objective, we:

- Obtained and reviewed Bechtel's Quality Assurance Manual and policies and procedures to determine how Bechtel manages design changes proposed by suppliers;

- Obtained and reviewed procurement documentation for equipment relied on for safety;

- Sampled a universe of safety related equipment installed in the WTP, supplied to us by the contractor on a master list. We then separated this list into three major means of procurement – where Bechtel contracted both the design and fabrication, where Bechtel hired a design agent but the fabrication was performed by another entity hired by Bechtel, and where Bechtel hired a design agent who then hired the fabricator. We then selected seven major pieces of equipment that represented each procurement approach. We also took into consideration Bechtel's fee for installing these major pieces of equipment, deeming that fee may drive risk. We tested these procurements to ensure that the specifications flowed correctly to the various suppliers. For each procurement, we then identified design changes and tested to ensure that those changes flowed through the procurement documentation correctly, and that the changes were properly approved by the appropriate parties. When we identified errors, we brought them to Bechtel to discuss. Based upon the errors we identified, Bechtel then performed its own statistical sample to determine extent of condition;

- Researched Federal and Department regulations, policies and procedures; and

- Interviewed key personnel in the Office of Environmental Management, Office of Health, Safety and Security, Office of River Protection and Bechtel.

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 objectives. We believe the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. Accordingly, we assessed significant internal controls and compliance with laws and regulations to the extent necessary to satisfy the audit objective. In particular, we assessed the Department's implementation of the *GPRA Modernization Act of 2010* and determined that it had established performance measures for the management of the Program. 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. Finally, we did not rely on computer-processed data to accomplish our audit objective.

An exit conference was held with the Federal Project Manager on September 25, 2013.

Appendix 2

PRIOR REPORTS

- Audit Report on *The Department of Energy's $12.2 Billion Waste Treatment and Immobilization Plant-Quality Assurance Issues – Black Cell Vessels* (DOE/OIG-0863, April 2012). The Office of Inspector General received allegations concerning aspects of the quality assurance program at the Department of Energy's (Department) Waste Treatment and Immobilization Plant (WTP) project. Our review substantiated the allegation. It was determined that the Department had procured and installed vessels into WTP that did not always meet quality assurance and/or contract requirements. For the vessels that we reviewed, multiple instances were identified in which quality assurance records were either missing or were not traceable to the specific area or part of the vessel. Weaknesses in quality assurance records associated with black cell and hard-to-reach processing vessels occurred because of deficiencies in Bechtel National Inc.'s implementation of its quality assurance program and a lack of Department oversight.

- Audit Report on *The Procurement of Safety Class/Safety-Significant Items at the Savannah River Site* (DOE/IG-0814, April 2009). The audit found that the Department had procured and installed safety-class and safety-significant structures, systems and components that did not meet the American Society of Mechanical Engineer's *Quality Assurance Requirements for Nuclear Facility Applications* Standard. These failures occurred because Departmental controls were not adequate to prevent and/or detect quality assurance problems. Additionally, management did not effectively communicate quality assurance concerns between the several Departmental program elements operating at the Savannah River Site. The procurement and installation of these nonconforming components resulted in cost increases. In general, the internal control weaknesses we discovered could have permitted, without detection, the procurement and installation of safety critical components that did not meet quality assurance standards. In a worst case scenario, undetected, nonconforming components could fail and injure workers or the public.

- Audit Report on *Quality Assurance Standards for the Integrated Control Network at the Hanford Site's Waste Treatment Plant* (DOE/IG-0764, May 2007). The audit found that the WTP control system acquired by the Department did not meet applicable quality assurance standards – specifically, those required for "an activity affecting the immobilization of radioactive high-level waste." As a result, the system does not meet the stringent procedures, plans, specifications or work practices associated with nuclear quality standards. Under the circumstances, we concluded that the Department cannot be sure that the Plant's current system is suitable for processing nuclear waste.

MANAGEMENT COMMENTS

Department of Energy
Washington, DC 20585

September 24, 2013

MEMORANDUM FOR RICKEY R. HASS
DEPUTY INSPECTOR GENERAL
FOR AUDITS AND INSPECTIONS
OFFICE OF INSPECTOR GENERAL

FROM: DAVID HUIZENGA
SENIOR ADVISOR
FOR ENVIRONMENTAL MANAGEMENT

SUBJECT: Management Response to the Office of Inspector General Draft Audit Report on "Department of Energy Quality Assurance: Design Control for the Waste Treatment and Immobilization Plant at the Hanford Site," Inspector General-30 (A12RL034)

The Office of Environmental Management (EM) appreciates the opportunity to review the subject Office of Inspector General (OIG) draft report. The issues contained in the draft OIG report concerned two important functions: Environmental and Nuclear Safety (E&NS) review and concurrence with safety-related design changes and lack of adequate documentation of Waste Treatment and Immobilization Plant (WTP) contractor verification of vendor noncompliances with purchase order requirements. These functions are vital to EM's assurance that the WTP meets important safety and quality requirements. EM agrees with the facts and conclusions presented in the draft report and, as described below, will take prompt actions to address the issues identified. The draft OIG report also identified three recommendations. EM agrees with these recommendations and has attached a summary of the actions planned to address each of the recommendations.

The draft OIG report underscores the need for EM to improve its efforts to ensure nuclear quality standards are appropriately flowed down to WTP contractor procedures. As outlined in the attached response, the U.S. Department of Energy, Office of River Protection (ORP) will establish clearer roles, responsibilities, accountabilities, and authorities for each organization within ORP to clearly state their oversight responsibilities. The ORP quality assurance audit process will be expanded to include review of implementing procedures to evaluate the flow-down of quality requirements (adequacy) within the scope of the triennial audits conducted by ORP. Triennial audits are intended to ensure these requirements are adequately flowed down to WTP contractor implementing procedures. These audits will also be expanded to provide enhanced verification, on a sampling basis, of implementation for each of these requirements and evaluate the effectiveness of the implemented processes. Furthermore, ORP will direct

the WTP contractor to perform its own assessment of procedure quality assurance requirement flow-down.

Early in the subject OIG audit, the auditors brought to ORP's attention the issue with the WTP contractor approving changes to vendor safety-related design documents without obtaining procedure-required E&NS review and concurrence. This function is important to ensure design changes continue to meet safety basis requirements. Because of the significance of this issue, ORP took immediate actions to direct the WTP contractor to fully investigate and address this issue. As indicated in the OIG report, the WTP contractor suspended issuing vendor safety-related design changes until actions were taken to retrain applicable staff emphasizing the need for E&NS review of all safety-related vendor design changes, and performed an extensive extent of condition review.

The WTP contractor took immediate action and investigated these issues and determined engineering staff consistently misinterpreted procedure requirements for submitting design changes to E&NS for review and concurrence. Engineering staff inappropriately concluded safety document changes, not affecting safety-related equipment, did not need E&NS review and concurrence. The WTP contractor subsequently selected a sample of 2,080 records from a population of 20,409 representative engineering work products, and found 480 documents that conservatively should have had E&NS review but did not. These change documents were subsequently reviewed by E&NS; none were found to have resulted in a safety basis impact. Once the WTP contractor completes its corrective actions (currently scheduled to be completed by September 30), including revising process/procedure requirements to more clearly specify change documents requiring E&NS review, ORP will perform an assessment to verify adequate corrective action completion and effectiveness.

Lack of adequate documentation of WTP contractor verification of vendor nonconformances was identified late in the OIG audit. ORP will direct the WTP contractor to fully investigate and address this issue, including performing an extent of condition review and causal analyses. EM agrees with the OIG audit conclusions regarding the importance of this issue and potential impact this issue could have at project completion if it is not thoroughly addressed at this time. ORP will implement a routine oversight program, to closely monitor the WTP contractor's efforts to address this issue and will perform a subsequent effectiveness review to ensure these actions will result in sustained compliance with requirements.

If you have any questions, please contact me or Mr. Kenneth G. Picha, Jr., Deputy Assistant Secretary for Tank Waste and Nuclear Material, at (202) 586-2003.

Attachment

Attachment – Management Response to the Recommendation of the Office of Inspector General Draft Report on "Department of Energy Quality Assurance: Design Control for the Waste Treatment and Immobilization Plant at the Hanford Site"

Recommendations:

1. **Take the appropriate corrective actions necessary to ensure that Bechtel National Inc. (Bechtel):**

   - **Obtain reviews from the appropriate organizations of supplier requests for design deviation that may affect safety.**

     On October 12, 2012, the U.S. Department of Energy (Department), Office of River Protection (ORP) directed Bechtel, the WTP engineering, procurement and construction contractor, to fully investigate and address this issue. The WTP contractor took immediate actions including suspending issuance of vendor safety-related design changes until actions were taken to retrain applicable staff emphasizing the need for Environmental and Nuclear Safety (E&NS) review of all safety-related vendor design changes, and performing an extensive extent-of-condition review.

     The WTP contractor determined engineering staff consistently misinterpreted procedure requirements; they inappropriately concluded safety document changes not affecting safety functions did not need E&NS review and concurrence. The WTP contractor subsequently selected a sample of 2,080 records from a population of 20,409 engineering work products (representing all engineering documents requiring E&NS review over the last three years) and found 480 documents that conservatively should have had E&NS review but did not. The sample of 2,080 records is statistically representative of the 20,409 records, and provides at least a 95% confidence level that any issues with the nuclear safety basis would have been identified.

     These change documents were subsequently reviewed by E&NS; none was found to have resulted in a safety basis impact. Once the WTP contractor completes its corrective actions (currently scheduled to be completed by October 25, 2013), including revising process/procedure requirements to clearly specify change documents requiring E&NS review, ORP will perform an assessment to verify adequate corrective action completion and effectiveness. ORP plans to perform a separate nuclear safety review of specific records from the 480 records to confirm they did not adversely affect the safety basis. ORP will also review selected records from the 20,409 records discussed above that were not part of the 2,080 records reviewed by the WTP contractor to ensure the sample selected by the contractor was representative of the overall population of engineering work products. If issues are

identified during the review, ORP will ensure the contractor takes appropriate action to review past engineering work products.

This ORP review is planned to be completed by December 2013.

- **Requires suppliers to provide documentation to support that equipment repairs have been implemented and tested to confirm they meet safety requirements.**

  When the subject OIG audit report is issued to DOE, ORP will direct the WTP contractor to perform an investigation of the issues associated with not requiring vendors to submit nonconformance documents and associated quality-related documentation.

  ORP will also require a written response describing: (1) the immediate and remedial actions to correct the specific issues described in the OIG report; (2) the extent of condition, including a summary of how it was established; (3) a causal analysis of the issues, corrective actions to correct the causes; (4) the date when all the corrective actions will be completed and verified; and, (5) the date when the contractor will achieve compliance with requirements.

  ORP will direct the WTP contractor to perform this investigation within 60 days of receiving the OIG report.

- **Develops and implements procedures to verify suppliers' implementation and testing of equipment design deviations.**

  ORP will ensure the WTP contractor's corrective actions include addressing any needed vendor oversight process and procedure improvements to ensure vendor nonconformance (including related quality documentation) are submitted to the WTP contractor, and documented WTP contractor verifications of completed noncompliance dispositions are performed.

- **Reviews its supplier requirements for document retention to ensure that the original design along with all design changes and approved design deviations can be provided to the Department as required.**

  ORP will verify the WTP contractor addresses their processes for ensuring vendors provide all necessary quality and design-related documentation.

2. **Restructure Federal surveillance, inspection, assessment and audit programs to ensure that the Department determines the adequacy of Bechtel's procedures for flowdown of quality requirements.**

   ORP will direct the WTP contractor to perform and document an assessment of the adequacy of its procedures intended to implement its quality assurance manual requirements.

The ORP quality assurance audit process will be expanded to include review of implementing procedures to evaluate the flow-down of quality requirements (adequacy) within the scope of the triennial audits conducted by ORP. Triennial audits (one third of the NQA-1 criteria verified each year) are intended to ensure these requirements are adequately flowed down to WTP contractor implementing procedures. These audits will also be expanded to provide enhanced verification, on a sampling basis, of implementation for each of these requirements and evaluate the effectiveness of the implemented processes.

Separately, EM will review ORP surveillance, inspection, and audit programs.

These activities will be initiated by January 2014. Due to the significant effort involved in the WTP contractor's QA requirements flow-down review, their effort is expected to take a year or more to complete.

3. **Perform oversight activities of the corrective actions that Bechtel has already begun, to ensure completion.**

ORP will periodically assess the WTP contractor's actions to address the issues identified in the draft OIG report. When corrective actions are completed, ORP will perform closure assessments to verify all planned corrective actions are completed. Six to twelve months after completing the two issue area corrective actions, ORP will perform effectiveness reviews to verify the actions taken by the WTP contractor are institutionalized and effectively being implemented.

In addition to the ORP December review described in 1 above, ORP has schedule quarterly reviews starting in February 2014, and will continue them until the effectiveness reviews are performed as described above.

IG Report No. DOE/IG-0894

CUSTOMER RESPONSE FORM

The Office of Inspector General has a continuing interest in improving the usefulness of its products. We wish to make our reports as responsive as possible to our customers' requirements, and, therefore, ask that you consider sharing your thoughts with us. On the back of this form, you may suggest improvements to enhance the effectiveness of future reports. Please include answers to the following questions if applicable to you:

1. What additional background information about the selection, scheduling, scope, or procedures of the audit or inspection would have been helpful to the reader in understanding this report?

2. What additional information related to findings and recommendations could have been included in the report to assist management in implementing corrective actions?

3. What format, stylistic, or organizational changes might have made this report's overall message more clear to the reader?

4. What additional actions could the Office of Inspector General have taken on the issues discussed in this report that would have been helpful?

5. Please include your name and telephone number so that we may contact you should we have any questions about your comments.

Name _____ Date _____

Telephone _____ Organization _____

When you have completed this form, you may telefax it to the Office of Inspector General at (202) 586-0948, or you may mail it to:

Office of Inspector General (IG-1)
Department of Energy
Washington, DC 20585

ATTN: Customer Relations

If you wish to discuss this report or your comments with a staff member of the Office of Inspector General, please contact our office at (202) 253-2162.

This page intentionally left blank.

The Office of Inspector General wants to make the distribution of its reports as customer friendly and cost effective as possible. Therefore, this report will be available electronically through the Internet at the following address:

U.S. Department of Energy Office of Inspector General Home Page

http://energy.gov/ig

Your comments would be appreciated and can be provided on the Customer Response Form.