

**Office of Enterprise Assessments
Assessment of the Hanford Site
Waste Treatment and Immobilization Plant
Construction Quality**



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Acronyms

AMWSC	Assistant Manager for WSC
AMWTP	Assistant Manager for WTP
ASME	American Society of Mechanical Engineers
BNI	Bechtel National, Inc.
BOF	Balance of Facilities
CAS	Contractor Assurance System
CFR	Code of Federal Regulations
CM	Commercial Grade
CMMS	Computerized Maintenance Management System
COD	WSC Commissioning, Maintenance, and Operations Division
CR	Condition Report
CRAD	Criteria and Review Approach Document
CTN	Component Tag Number
CVP	Certification and Verification Plan
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
EA	Office of Enterprise Assessments
EMF	Effluent Management Facility
EPC	Engineering, Procurement, and Construction
FMIS	Field Material Inventory Specialist
FSE	Facility Startup Engineer
HLW	High-Level Waste Facility
IOS	Integrated Oversight Schedule
LAB	Analytical Laboratory
LAW	Low-Activity Waste Facility
LBL	LAW Facility, Balance of Facilities, and Laboratory
LMRB	Line Management Review Board
LTPM	Long-Term Preservation Maintenance Plan
NQA	Nuclear Quality Assurance
ORP	Office of River Protection
PMTF	Periodic Maintenance and Surveillance Task Form
psi	Pounds Per Square Inch
PTF	Pretreatment Facility
PvM	Preservation Maintenance
Q	Quality Related
QA	Quality Assurance
QAM	BNI Quality Assurance Manual
QC	Quality Control
RI&T	Receiving, Inspection, and Testing
SSCs	Structures, Systems, and Components
WCD	ORP WTP Construction Oversight and Assurance Division
WSC	WTP Startup, Commissioning, and Integration
WTCC	Waste Treatment Completion Company
WTP	Waste Treatment and Immobilization Plant

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EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE) Office of Nuclear Safety and Environmental Assessments, within the independent Office of Enterprise Assessments (EA), conducted an assessment of construction quality and the implementation of the quality assurance program at the Hanford Site Waste Treatment and Immobilization Plant (WTP) from March 5 to 8, 2018. EA performed this assessment in the broader context of an ongoing program of quarterly assessments of construction quality at the WTP construction site.

The scope of this EA assessment included observing ongoing structural and mechanical construction work activities, and reviewing the program that Bechtel National, Inc. and its subcontractor, Waste Treatment Completion Company, use for storage and preservation of stored and installed equipment. Additionally, EA evaluated Federal oversight of contractor activities.

Overall, construction quality is satisfactory in the areas of pressure testing, concrete placement, instrument line installation, and preservation maintenance and protection of stored and installed equipment. Federal oversight of construction quality at WTP is also generally satisfactory for the areas reviewed.

In the area of subcontract equipment turnover and acceptance, EA identified some process documentation and implementation inadequacies. As a previously identified Office of River Protection (ORP) issue, ORP is not fully utilizing the contractor assurance system when tailoring its oversight activities, as intended by DOE Order 226.1B. ORP is developing improvement actions.

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1.0 PURPOSE

The U.S. Department of Energy (DOE) Office of Nuclear Safety and Environmental Assessments, within the independent Office of Enterprise Assessments (EA), conducted a focused assessment of construction quality at the Hanford Site Waste Treatment and Immobilization Plant (WTP). The onsite portion of this assessment was conducted from March 5 to 8, 2018. This EA assessment was performed within the broader context of an ongoing program of assessments of construction quality at DOE major construction projects. Because of the safety significance of WTP facilities, EA plans to continue these ongoing quarterly assessments at the WTP construction site to ensure that construction contractors meet the requirements of 10 CFR 830, Subpart A, *Quality Assurance Requirements*.

2.0 SCOPE

EA conducted this assessment of WTP construction quality processes in accordance with the *Plan for the Office of Enterprise Assessments Assessment of the Hanford Site Waste Treatment and Immobilization Plant Construction Quality – March 2018*. This quarterly assessment evaluated construction quality by observing ongoing structural and mechanical construction work activities and by reviewing the procedures that Bechtel National, Inc. (BNI) and its subcontractor, Waste Treatment Completion Company (WTCC), use for storage and preservation of stored and installed equipment. Additionally, EA evaluated Federal oversight of contractor activities. Design and procurement programs were not included in this assessment.

3.0 BACKGROUND

The DOE Office of River Protection (ORP) manages the 56 million gallons of liquid or semi-solid radioactive and chemical waste, stored in 177 underground tanks at the Hanford Site, and WTP, an industrial complex for separating and vitrifying the radioactive and chemical waste in the underground tanks. WTP is in the design and construction phase. ORP staff members, primarily WTP Construction Oversight and Assurance Division (WCD) staff, provide oversight of construction activities at WTP.

BNI manages design and construction activities at WTP under contract to ORP. The quality assurance (QA) program requirements for design and construction of WTP referenced in the preliminary documented safety analysis, and cited in the BNI contract, are American Society of Mechanical Engineers (ASME) Nuclear QA (NQA)-1-2000, *Quality Assurance Requirements for Nuclear Facility Applications*, and DOE Order 414.1C, *Quality Assurance* (in the contract). BNI Document 24590-WTP-QAM-QA-06-001, *Quality Assurance Manual*, provides a detailed description of the application of the 18 NQA-1-2000 requirements at WTP. The BNI Quality Assurance Manual (QAM) establishes a management system of planned and systematic actions necessary to ensure that structures, systems, and components (SSCs) perform satisfactorily in service.

In March 2017, BNI Construction and AECOM, the contractor responsible for maintenance and commissioning systems after turnover from BNI Construction, formed a joint venture. The new organization, WTCC, is a subcontractor to BNI and is contracted to complete construction, conduct

startup, and commission WTP. WTCC is required to follow the QAM. BNI Construction personnel, including craft, field engineers, quality control (QC) inspectors, administrative personnel, and managers, became employees of WTCC on March 31, 2017. BNI is under contract to complete the design of the WTP complex and is responsible for delivering equipment and materials necessary for completion of WTP. Administrative changes have been implemented to transition BNI Construction procedures into WTCC construction procedures for control of site work activities.

The WTP complex consists of the Pretreatment Facility (PTF), for separating the waste into low-activity waste and high-activity waste; the High-Level Waste Facility (HLW), where the high-level waste will be immobilized in glass; the Low-Activity Waste Facility (LAW), where the low-activity waste will be immobilized in glass; the Analytical Laboratory (LAB) for sample testing; and the balance of facilities (BOF), which will house support functions.

Construction work is essentially complete for the LAB and most BOF buildings. The majority of the electrical equipment in BOF Buildings 87 and 91 has been turned over from Construction to Startup.

Construction work activities are deferred in the PTF pending satisfactory resolution of technical questions regarding separation and processing of the waste and the design life of PTF equipment. Construction was slowed in HLW pending resolution of technical issues involving the waste treatment process; however, in late 2016 DOE decided to curtail construction of HLW and concentrate on completing LAW and the Effluent Management Facility (EMF) in order to begin processing low-activity waste using direct feed from the Tank Farms by 2022.

Construction of EMF began in 2016 to process the effluent remaining after the low-activity waste is processed in LAW. Effluent from LAW will be transferred via buried piping to EMF, where it will be processed to separate non-radioactive liquids' byproducts from radioactive byproducts. Radioactive byproducts will be transferred from EMF, via a designated piping system, back to LAW for vitrification or return to the Tank Farms.

4.0 METHODOLOGY

The DOE independent oversight program is described in and governed by DOE Order 227.1A, *Independent Oversight Program*. EA implements the independent oversight program through a comprehensive set of internal protocols, operating practices, assessment guides, and process guides. Organizations and programs within DOE use varying terms to document specific assessment results. In this report, EA uses the terms “deficiencies, findings, and opportunities for improvement (OFIs)” as defined in DOE Order 227.1A. In accordance with DOE Order 227.1A, DOE line management and/or contractor organizations must develop and implement corrective action plans for the deficiencies identified as findings. Other important deficiencies not meeting the criteria for a finding are also highlighted in the report and summarized in Appendix C. These deficiencies should be addressed consistent with site-specific issues management procedures.

As identified in the assessment plan, this assessment considered the requirements of 10 CFR 830, Subpart A, and DOE Order 414.1C, which specify that the contractor must use appropriate national consensus standards to implement DOE QA requirements.

EA used the following criteria and review approach documents (CRADs):

- CRAD 45-52, *Nuclear Facility Construction – Piping and Pipe Supports*
- CRAD 31-17, *Nuclear Facility Construction – Structural Concrete*

- CRAD 45-21, *Feedback and Continuous Improvement Assessment Criteria and Approach – DOE Field Element*
- CRAD 64-20, *Feedback and Continuous Improvement Inspection Criteria and Approach – Contractor.*

EA reviewed procedures, specifications, drawings, and records; interviewed personnel responsible for construction and inspection work activities; and conducted several walkdowns at the WTP construction site with WTCC personnel and the WCD staff to determine whether work activities were completed in accordance with the appropriate design drawings, specifications, and procedures.

EA observed two pneumatic pressure tests; a commercial grade (CM) concrete placement; and two preservation maintenance (PvM) activities. EA performed walkdowns of the Yakima Warehouse, the South 40 Laydown Yard, the WTP Site T52 Warehouse engineered structures, and instrument sensing lines at the LAW. EA also reviewed concrete batch tickets, installation and inspection records of instrument tubing, self-assessment reports, various procedures, work packages, condition reports (CRs), subcontract equipment acceptance procedures, and material storage program documents.

The members of the EA assessment team, the Quality Review Board, and EA management responsible for this assessment are listed in Appendix A. A list of the documents reviewed, personnel interviewed, and observations made during this assessment, relevant to the findings and conclusions of this report, is provided in Appendix B.

5.0 RESULTS

5.1 Pressure Testing Program

This section discusses EA’s assessment of the pressure testing of CM and quality-related (Q) instrument tubing that is performed to verify that the installed tubing systems are leak tight.

Criterion:

Construction and pre-operational tests, such as pressure testing operations for instrument and air supply tubing systems, shall be conducted in accordance with methods approved by the design organization. Test procedures shall include test requirements, acceptance criteria, test prerequisites, inspection hold points, and instructions for recording data. Testing shall be observed by qualified inspection personnel. Test results shall be recorded and evaluated by qualified personnel. (NQA-1, Requirement 11; Policy Q-11.1 of the QAM; and DOE Order 414.1C)

WTCC Construction Procedure 24590-WTP-GPP-CON-3504, *Pressure Testing of Piping, Tubing and Components*, specifies the generic work process and quality requirements for pressure testing, including the test requirements, prerequisites, sequence, hold points, inspection requirements, instructions for recording and evaluating data, and acceptance criteria. This procedure references the appropriate code requirements (ASME Code B31.3, Paragraph 345.5, *Pneumatic Testing*) and is approved by BNI design engineering. EA evaluated this procedure and determined that it is adequate.

EA observed two pneumatic pressure tests:

- Pneumatic pressure test performed on Q instrument line tubing that supplies plant service air for the operation of valves in the LAW offgas system, recorded on document numbers 24590-LAW-PPTR-CON-17-0200 and -0201. No leaks were observed.

- Pneumatic pressure test performed on the steam condensate water system instrument tubing, recorded on document number 24590-LAW-PPTR-CON-18-0014. No leaks were observed.

EA attended the pre-test briefings, reviewed drawings and test data sheets, examined the testing apparatus, verified that the calibration stickers on the test pressure gauges were current, and verified that whip restraints were installed on pressure hoses. Before the pressure tests, EA examined the instrument tubing sections within the pressure test boundaries and verified that valve positions (open or closed) were as specified on the test data sheets and that pressure test tags were attached to the valves indicating the correct test position (open or closed).

EA witnessed the test pressurization sequence during each pressure test and verified that the systems being tested were pressurized to the designated test pressures. The pneumatic test pressures were 110 percent of the piping (tubing) system design pressure as specified in BNI Design Guide 24590-WTP-GPG-M-017, *Design Parameters & Test Pressures for Equipment and Piping*. EA verified that the required test pressures were maintained for the required hold time (10 minutes) before the WTCC field engineers initiated the system walkdown to inspect the tubing for leakage; that the test pressure was maintained during the walkdowns; and that WTCC QC inspectors witnessed the pressure test on the Q instrument tubing and performed a system walkdown after the hold time to inspect the Q tubing for leakage as required by QC inspection procedures.

EA observed the walkdowns and inspections performed by the WTCC field engineers and QC inspectors. WTCC test engineers declared the tests successful. EA reviewed the completed test records and verified that the test data is being accurately recorded and approved by qualified personnel. Based on the sample that EA reviewed, the pressure testing program is satisfactory.

5.2 Concrete Placement Activities

This section discusses EA's assessment of the preparation for and placement of concrete in walls of the EMF to verify that the concrete placement operations were performed in accordance with design specification requirements and industry standards specified in American Concrete Institute recommended practices.

Criterion:

Work, such as concrete construction, shall be performed in accordance with approved procedures, design drawings, manufacturer's instructions, and other design basis documents, including applicable codes and standards. The procedures, instructions, and drawings shall include or reference appropriate quantitative or qualitative acceptance criteria for determining that prescribed results have been satisfactorily attained. (NQA-1, Requirement 5; Policy Q-5.1 of the QAM; and DOE Order 414.1C)

EA observed a CM concrete placement in sections of interior and exterior walls in the EMF, placement number EMF 12122. Specification No. 24590-WTP-3PS-DB01-T0001, *Engineering Specification for Furnishing and Delivering Ready-Mix Concrete*, and Specification No. 24590-WTP-3PS-D000-T0001, *Engineering Specification for Concrete Work*, cite the requirements for concrete quality and concrete work activities at WTP. Specification No. 24590-WTP-3PS-C000-T0001, *Engineering Specification for Material Testing Services*, cites the frequencies for sampling and testing the freshly mixed concrete to verify that the concrete conforms to project quality and design requirements. The codes and standards for concrete testing are referenced in this specification. EA evaluated the three specifications and determined that they are adequate.

The EMF wall design criteria for interior walls specify a concrete mix with an unconfined compressive strength of 5,000 psi at 28 days after placement. The design criteria for concrete in exterior walls specify air-entrained concrete with an unconfined compressive strength of 5,000 psi at 28 days after placement. Concrete in exterior walls that will be exposed to weather conditions is required to be air entrained to resist the effects of freeze/thaw conditions. Therefore, an air-entrained 5,000 psi mix, mix number 358129, was developed by the concrete supplier, Central Pre-Mix, to meet the concrete properties specified for the exterior EMF walls. This mix is acceptable for use in both exterior and interior walls.

EA reviewed the concrete pour card and verified that it was signed to document that all required construction work and inspections were completed prior to the start of concrete placement. The concrete mix specified on the pour card for this placement was mix number 358129. Because the EMF walls are classified as CM, in accordance with WTP project procedures, WTCC field engineers performed the inspections of concrete placement and consolidation activities. EA observed acceptance testing of the fresh concrete for slump, temperature, entrained air content, and unit weight by the materials testing subcontractor; review of concrete batch tickets and acceptance test results by the WTCC QC inspectors; placement of the concrete in the forms; and consolidation of the concrete.

The concrete batch tickets indicated that the proper concrete was being delivered. Testing of the concrete was performed in accordance with ASTM International standards specified in the project procedures. Test results showed that the delivered concrete met project requirements for slump, entrained air content, and temperature. Concrete samples were obtained from the end of the pump line as required by the project specifications for sampling and testing concrete with entrained air, and for molding of cylinders for unconfined compression testing.

Concrete forms were secure and cleaned (debris removed) prior to concrete placement, and the equipment for delivering the concrete to the forms was suitable. A sufficient number of vibrators were used for consolidating the concrete. There was sufficient access to the placement for vibrator operators, other construction craftsmen, and WTCC field engineers. Concrete drop distances were within specification requirements, vibrators were properly used, and excess water did not accumulate in the forms during placement and consolidation.

The EMF concrete placement activities, including preparation and planning, delivery of the concrete, sampling and testing the freshly mixed concrete, and concrete placement and consolidation are satisfactory.

5.3 Instrument Line Installation

This section discusses EA's assessment of the completed and accepted instrument tubing associated with sensing instruments in the LAW to determine whether the tubing is sloped as required by design criteria, and whether the records documenting installation of the instrument tubing comply with QA requirements.

Criteria:

Work, such as installation of instrument systems, shall be performed in accordance with approved procedures, design drawings, manufacturer's instructions, and other design basis documents, including applicable codes and standards. The procedures, instructions, and drawings shall include or reference appropriate quantitative or qualitative acceptance criteria for determining that prescribed results have been satisfactorily attained. (NQA-1, Requirement 5; Policy Q-5.1 of the QAM; and DOE Order 414.1C)

Records shall furnish documentary evidence that items or activities meet specified quality requirements. (NQA-1, Requirement 17; Policy Q-17.1 of the QAM; and DOE Order 414.1C)

Specification No. 24590-WTP-3PS-JQ08-T0001, *Engineering Specification for Construction and Installation of Controls and Instrumentation*, cites the criteria for installing instrument tubing and instrumentation at WTP. WTCC Construction Procedure 24590-WTP-GPP-CON-3401, *Controls and Instrumentation Installation*, specifies the requirements for installing and inspecting instrument tubing, and the instructions for recording the completed installation work. The design requirements for instrument line slope in this specification are based on the recommendations of the International Society of Automation (formerly the Instrument Society of America), published in ANSI/ISA-67.02.01-1999, *Nuclear Safety-related Instrument Sensing Line Piping and Tubing Standards for Use in Nuclear Power Plants*, and ANSI/ISA-S67.10-1994, *Sample-Line Piping and Tubing for Use in Nuclear Power Plants*. For gas or vapor sensing lines, the instrument tubing is required to be sloped up from the process connection point to the instrument to allow liquids or condensate to drain back into the process. Liquid and steam sensing lines are required to be sloped down from the process connection to the instrument to allow gas or vapor to vent back to the process. In locations where the instrument tubing cannot be sloped, high point vents are required to be installed on liquid systems and low point vents on gas systems. Section 3.2.3 of this specification appropriately requires that the instrument tubing be installed with a minimum slope of ¼ inch per foot, in the direction noted on the design drawings.

Appendix 3 of Construction Procedure 24590-WTP-GPP-CON-3401 requires the responsible field engineer to verify that installed tubing is sloped in accordance with the design drawings and the criteria cited in Specification No. 24590-WTP-3PS-JQ08-T0001. QC inspectors also verify that the tubing slope complies with Specification No. 24590-WTP-3PS-JQ08-T0001 and the design drawings for Q instrument tubing.

EA, accompanied by a WTCC field engineer, performed a walkdown in the LAW to determine whether instrument tubing associated with instrument sensing lines was sloped in accordance with the design criteria. EA measured the slope of randomly selected instrument tubing connected to approximately 50 sensing instruments on 3 elevations in the LAW; all met or exceeded the design criteria. Vents were installed in locations where the minimum slope could not be attained. When questioned about the methods used during tubing installation when the minimum slope could not be attained, the field engineer stated that if the tubing could not be re-routed to obtain the minimum slope, a field change request was prepared and transmitted to the BNI Design Engineering organization requesting a design modification, as required by the QAM.

EA reviewed a random sample of approximately 60 completed instrument and tubing inspection records documenting inspections performed by field engineers for CM tubing and inspections performed by field engineers and QC inspectors for Q tubing. Tubing clamps and supports and tubing components are inspected for attributes that include material, internal cleanliness, connections, surface defects, tubing slope, sample line, drain, and vent installation, and configuration and location. Inspection acceptance criteria are specified in Appendix B of Construction Procedure 24590-WTP-GPP-CON-3401.

The specification and procedure for construction and installation of instrument tubing are adequate. For the sample of instrument tubing selected by EA, the slope of the instrument lines complies with the design criteria. Installation records reviewed by EA are adequate.

5.4 Preservation Maintenance and Protection of Stored and Installed Equipment

This section discusses EA's assessment of BNI's processes and procedures for ensuring that equipment procured from subcontractors is appropriately accepted and entered into the BNI inventory; BNI's methods for storing and maintaining equipment for use in facility construction; and BNI's methods for maintaining installed equipment.

Criterion:

Equipment that performs a safety function shall be sufficiently maintained before, during, and following installation to ensure it provides the necessary reliability and availability to perform its intended safety function, and to prevent damage, loss, or deterioration. Storage, housekeeping, and preservation of items shall be controlled to prevent damage or loss and to minimize deterioration. (NQA-1, Requirement 13; Policy Q-13.1 of the QAM; and DOE Order 414.1C)

Subcontract Equipment Turnover and Acceptance

EA reviewed applicable BNI and WTCC procedures associated with subcontract equipment acceptance and inventory for PvM. EA interviewed BNI/WTCC personnel involved in recent equipment acceptance and TEAMWORKS (a construction database)/CMMS (Computerized Maintenance Management System) database activities, and traced sample accepted construction subcontract equipment items in these databases to ensure planned PvM in accordance with manufacturer's recommendations.

BNI procedures, including 24590-WTP-GPP-CON-4101, *Subcontract Management*, and 24590-WTP-GPP-CON-4103, *Subcontract Surveillance, Inspection, and Quality Verification*, provide a mostly adequate framework for subcontract accepted equipment item management. BNI responded appropriately to CR 16-00524, *Subcontract Equipment – Preservation and Preventive Maintenance*, significance level B (level A is the highest issue significance level). This CR involved the inadequate data migration of 772 out of 2,918 accepted equipment item component tag numbers (CTNs) from 6 subcontractors into TEAMWORKS and the inadequate entry of this equipment data into the CMMS database, resulting in 52 accepted equipment items with overdue PvM requirements. BNI's detailed and thorough apparent-cause analysis found data migration and equipment PvM concerns recurring over 10 years, despite corrective efforts. BNI also found an additional 210 accepted CTNs that needed to be migrated to CMMS. Subsequent migration to CMMS and evaluation determined that all 210 CTNs were fire protection-related equipment items and none required PvM activities. Corrective actions, including the identification and resolution of 982 CTN inadequate migrations to CMMS, a revised implementing procedure with improved specificity, and a thorough effectiveness review, demonstrate that BNI has made adequate corrections.

During an interview with the WTCC subcontract staff and manager, a WTCC subcontract coordinator, responsible for accepting subcontractor equipment turnovers, was knowledgeable of CR 16-00524, communicated the improvement actions, identified the specific procedural changes adopted, and described the training received. However, the subcontract coordinator accepted two equipment items on January 2, 2018, but has not yet implemented the new procedure to trigger the TEAMWORKS data for automatic migration to CMMS. This individual noted that these two CTNs (24590-LAW-C5V-YD-2330 and 24590-LAW-C5V-YD-2324) were already in CMMS but did not know how that happened. The TEAMWORKS database specialist was not available during the site visit, and the other staff members and the manager could not describe how WTCC enters subcontractor equipment item CTNs into TEAMWORKS. WTCC agreed that other accepted subcontracted equipment items for PvM evaluations and performance could be missed, like the CR 16-00524 issue, if this process is not accurate and consistent. Contrary to NQA-1, Requirement 5, "Activities affecting quality and services shall be prescribed by and performed in accordance with documented instructions, procedures, and drawings," WTCC has not defined the process for entering accepted subcontractor equipment CTNs into TEAMWORKS. **(Deficiency)** Inadequate subcontract equipment acceptance procedures can result in inconsistent performance and subcontract accepted equipment items not receiving requisite PvM, as previously experienced. The BNI subcontracts manager committed to revising CON-4101 to address this missing procedural instruction.

Material Storage

EA reviewed the governing material storage plan and procedures; interviewed material storage and surveillance personnel; reviewed past storage area surveillances/assessments; walked down facility storage conditions at the Yakima Warehouse (Level B), the South 40 Laydown Yard (Level D), and the WTP Site T52 Warehouse engineered structure (Level C); and observed a BNI storage observation surveillance of the South 40 Laydown Yard row 6N.

BNI effectively implements a four-level (Levels A, B, C, and D) graded storage control program for safety and non-safety equipment. Level A storage, the highest level, requires temperature and humidity controls, whereas Level D is an outside unprotected environment. The BNI material storage plan, 24590-WTP-PL-MATL-07-0002, *RPP/WTP [River Protection Project/Waste Treatment Project] Storage Plan*, and implementing procedures (24590-WTP-GPP-RAPS-MM-1102, *Field Material Inventory Management*, and 24590-WTP-GPP-PSQ-052, *Receiving Inspection & Test Surveillances*) provide an overall framework consistent with NQA-1, Subpart 2.2, Section 600, *Material and Equipment Storage*. The plan and procedures appropriately address storage levels, storage area access, non-conformance report segregation, housekeeping, marking/tagging, fire prevention, shelf-life control, PvM, and inspection.

In response to a November 2015 Defense Nuclear Facilities Safety Board (DNFSB) review that found numerous WTP storage area issues, BNI has improved its internal oversight program and performance. A BNI field material inventory specialist (FMIS) leads a team that performs surveillances of each WTP storage area four times a year in accordance with procedure 24590-WTP-GPP-RAPS-MM-1102, *Field Material Inventory Management*. These surveillances use Form 24590-GCB-F00002, *Storage Observation Checklist*, providing a more consistent and thorough self-assessment approach than before the form's introduction. BNI Field Material Management personnel explained that surveillance teams include craft personnel who specialize in the inspected material. For example, the surveillance team for rows of pipe spools include pipe fitters, and row inspections of steel components include iron workers. This approach is appropriate because it ensures that proper experts evaluate the material storage conditions and provide remedial action or recommendations, as necessary. However, EA noted that 24590-WTP-GPP-RAPS-MM-1102 does not address surveillance team composition or identify participating craft specialties.

FMIS surveillance performance is fully responsive to BNI requirements for quarterly surveillance, as evidenced by standardized report listings in iDocument (the WTP controlled document system) addressing the Material Handling Facility, S40 individual rows, T52 warehouse, 4/1/2 Laydown yard, and the Yakima storage facility since December 2015. The content of the 80 surveillance reports that EA reviewed consistently demonstrates thorough inspections of the WTP storage areas and resolution of identified storage issues.

The BNI Field Material Receiving, Inspection, and Testing (RI&T) organization also performs annual independent self-assessments of WTP storage areas surveillances, which satisfy NQA-1, Subpart 2.2, Section 604.1 inspection requirements. Certified receiving inspectors, who are knowledgeable but not responsible for the storage area work, conduct these annual independent surveillances. Standardized report listings in iDocument confirm that RI&T has consistently conducted the required annual independent surveillances since December 2015. The content of the six reports that EA reviewed was adequate. In addition, the BNI QA organization occasionally performs independent assessments of the WTP storage areas. The most recent BNI/QA oversight of storage areas includes 24590-WTP-IAR-QA-15-0007, *Internal Audit of Handling, Storage, and Shipment*, and 24590-WTP-SV-QA-16-0088, *Field Material Management – Outdoor Piping Storage/Staging Area*. Both reports are thorough and effectively communicate results based on observations and documentation. BNI security protocols enacted in late

2017 resulted in some surveillances (e.g., SV-PSQ-17-004 and SV-PSQ-17-006) marked as “sensitive” and not available electronically through iDocument. EA will follow up on this protocol during the next assessment.

Several South 40 Laydown Yard material storage rows continue to exhibit driving sand and tumbleweed intrusion. A BNI Field Material Management manager reported that BNI is procuring over 40 tons of gravel for placement throughout the South 40 Laydown Yard. EA noted that row 14N storage items were moved to an adjacent row to prepare for grading and gravel installation. EA observed the storage observation surveillance team, which included two pipe fitters, walking down the South 40 Laydown Yard row 6N consisting of pipe spools. The FMIS methodically recorded all observed deficiencies (e.g., missing tag numbers, faded tags, sand/tumbleweed accumulation) and corresponding item locations. Laborers resolved some issues on the spot (e.g., moving pipe spools to avoid contact with one another).

The Yakima Warehouse, mostly used to store HLW and PTF construction items, was tidy and well organized. Hundreds of pipe spools (pipe lengths with custom bends) with attached valves were positioned on plywood floor covering to prevent contact with the concrete floor surface to preclude item degradation. EA observed no pipes without required pipe caps or any stored items without appropriate labeling. Consistently separated pipe spools from adjacent pipe spools preclude dissimilar-metal electrolytic corrosion. Temperature data for the past 12 months confirmed adequate control within designated storage limits (40-140 degrees Fahrenheit). Six BNI surveillances since January 2015 identified ceiling leaks from rain or melted snow. Two CRs document successive leaks and attempts to work with the facility owner to repair new/recurring leaks. BNI facility management personnel showed EA three current roof leak locations (dry at the time of observation), which BNI is monitoring to determine whether leak repairs were effective. Movement of stored items from these leak areas precludes any water damage to stored items. One leak occurred through an exterior wall over the top of the temperature recording module; temporary plastic covering adequately protects this equipment. BNI facility managers indicated that if leaks continue, BNI will initiate another CR and further interactions with the facility owner.

The DNFSB staff previously identified rips and tears in tents (engineered structures) used for WTP material storage. A walkdown of the WTP Site T52 Warehouse engineered structure found a well maintained structure consistent with WTP Level C storage requirements: “a fire-resistant, tear-resistant, weather-tight, and well-ventilated building or equivalent enclosure.”

Preservation Maintenance of Equipment

EA reviewed 24590-WTP-PD-RAPM-PM-0001, *Long-Term Preservation Maintenance Program [LTPM] Description*; the WTCC PvM implementing procedure; and the resolution of self-identified issues with 6,500 periodic maintenance and surveillance task forms (PMTFs). EA also observed two scheduled PvM activities.

Recognizing the extended duration of the contract, BNI appropriately developed 24590-WTP-PD-RAPM-PM-0001 and sought DOE/ORP concurrence. This comprehensive approach addresses uninstalled components and commodities, installed components and commodities, facility maintenance and upkeep, other government assets, and supplier and subcontract stored assets. During EA’s site visit, the LTPM Program Manager was on travel. EA will follow up on LTPM plan performance in a future assessment.

The BNI PvM procedures document an effective process for the population of BNI purchased equipment item CTNs in the CMMS database, initial review of equipment items for manufacturer’s recommendations, development of a PvM strategy and PvM actions, and PvM scheduling. AECOM’s efforts to review self-identified issues with about 6,500 PMTFs by October 2017 (CR 16-01004) were

successful and have effectively resolved this issue through direction from and approval of the BNI System Engineer.

EA observed WTCC performing PvM activities on three safety significant LAW exhausters (24590-LAW-EXHR-00001A, B, and C) under work package PWO-CMNT-18-0281. EA verified that work package instructions were consistent with the PMTF (24590-WTP-PMTF-CMNT-13-0071, *Generic - LAW LVP [LAW Secondary Offgas System] Exhausters*), which documents the WTCC technical evaluation of the LAW exhausters based on manufacturer's recommendations and engineering judgment. The pre-job briefing was constructive, with three craft personnel freely raising questions and comments with the supervisor to ensure instruction clarity. BNI had recently updated this work package to conform to a new template, which was unfamiliar to the craft personnel. Work package execution was adequate, with craft demonstrating proper use of hold points and read/repeat-back instructions before performing the step.

Near the end of the work performance, workers properly entered a work timeout in response to work package instruction misalignment and notified the supervisor. The supervisor and work planner arrived at the job site, reviewed the improper procedural instructions with the craft, and resolved the procedural instructions to flow through completion, properly recording pen-and-ink changes. The observed behaviors were consistent with BNI/WTCC's five Performance Based Quality Absolutes, which appropriately focus employee attention on pre- and post-job briefings, procedural adherence, hold points, stopping work when unsure, and job ownership with their signature at the completion of the job.

The second observed PvM activity, under work package PWO-CMNT-18-0286, involved inspections of various PTF shield doors and one PTF motor in storage. Two of the three craft workers involved in the LAW exhauster PvM activity performed this work. The pre-job briefing demonstrated more intense scrutiny of the work package instructions, given the work package instruction misalignment noted above. The craft workers and supervisor effectively discussed the work instructions until all were satisfied they understood the instructions. Work execution was methodical and consistent with the work package instructions. PvM work performance post-job documentation appropriately identified inconsistencies in PvM among similar items, demonstrating a questioning attitude by craft and a commitment to quality work performance. For example, the work package identified a specific shield door for inspection but did not include a larger shield door in the same area and another larger shield door on the outside of the PTF exposed to the elements. EA will follow up on these inconsistencies during the next assessment.

Preservation Maintenance and Protection of Stored and Installed Equipment Conclusions

Although WTCC achieved subcontract equipment turnover and acceptance system improvements stimulated by CR 16-00524, consistent performance requires further process documentation and implementation adherence. Overall, observed storage areas confirm that BNI Field Material Management personnel adequately maintain the requisite protection for stored items through well documented NQA-1 compliant processes and effective implementation by properly skilled personnel. South 40 Laydown Yard improvements under way to distribute gravel will reduce the infiltration of blowing sand among stored items. BNI oversight provides additional perspective on equipment item storage performance, thereby enhancing proper equipment item storage. Two observed PvM activities demonstrate adequate worker conformance with work instructions and behaviors consistent with BNI/WTCC's five Performance Based Quality Absolutes.

5.5 Federal Oversight

The objective of this portion of the assessment was to verify that ORP has established and implemented an effective oversight program consistent with DOE Policy 226.2, *Policy for Federal Oversight and*

Contractor Assurance Systems, and DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*. In addition to assessing ORP's overall oversight program, EA assessed ORP's oversight of the engineering, procurement, and construction (EPC) completion, startup testing, and readiness to start cold commissioning operations for the LAW, BOF, and LAB, collectively referred to as LBL.

Criteria:

DOE field element line management has established and implemented oversight processes that evaluate contractor and DOE programs and management systems, including site assurance systems, for effectiveness of performance (including compliance with requirements). Such evaluations are based on the results of operational awareness activities; assessments of facilities, operations, and programs; and assessments of the contractor's assurance system. (DOE Order 226.1B, 4.b.(1))

DOE field element line management maintains sufficient technical capability and knowledge of site and contractor activities to make informed decisions about hazards, risks, and resource allocation; provide direction to contractors; and evaluate contractor performance. (DOE Order 226.1B, 4.a.(2))

DOE field element line management has effective processes for communicating oversight results and other issues in a timely manner up the line management chain, and to the contractor as appropriate, sufficient to allow senior managers to make informed decisions. (DOE Order 226.1B, 4.d)

DOE field element line management oversight processes are tailored according to the effectiveness of contractor assurance systems, the hazards at the site/activity, and the degree of risk, giving additional emphasis to potentially high consequence activities. (DOE Order 226.1B, 4.b.(5))

Overall Oversight Program

ORP has established processes and procedures that adequately define an oversight program that meets the DOE field element expectations and requirements of DOE Policy 226.2 and DOE Order 226.1B. ORP's oversight program includes processes for conducting assessments, surveillances, QA audits and surveillances, and management assessments; performing and documenting operational oversight activities; formalizing annual oversight plans and schedules; managing issues; and communicating results of oversight activities. Procedure TRS-OA-IP-01, *Integrated Oversight Process*, is the nucleus of ORP's program and delineates the processes for establishing oversight priorities, activities, and schedules. ORP has adequately incorporated into this process the DOE Order 226.1B requirement to tailor ORP oversight based on "the effectiveness of contractor assurance systems, the hazards at the site/activity, and the degree of risk" (DOE Order 226.1B, 4.b.(5)).

To evaluate the adequacy of the implementation of ORP's oversight program, EA reviewed the current Integrated Oversight Schedule (IOS); documentation of completed assessments and surveillances (including management and self-assessments); documentation for operational awareness activities; correspondence to BNI communicating the results of ORP oversight; ORP performance metrics; and the issues management system. ORP adequately uses the IOS process to prioritize, schedule, and track oversight activities. The assessment and surveillance reports reviewed by EA were generally thorough and in many cases identified substantial issues. ORP adequately communicates the results of its oversight to BNI; some ORP divisions use monthly and bi-monthly reports, and other divisions transmit the results of oversight activities individually. ORP-identified issues are adequately tracked to closure in the Issues Management System. ORP uses a performance metric that tracks the number of IOS scheduled oversight activities completed when scheduled, extended, rescheduled, or canceled. The metric indicates that a significant number of scheduled oversight activities are being rescheduled or canceled. For the fiscal year

2018 IOS, a DOE oversight hiatus for WTP during the first quarter was the primary reason for most of the rescheduled and canceled oversight activities. The metric also indicates the challenges that ORP is having, given its current staffing levels, balancing its scheduled oversight activities with other more urgent responsibilities.

Overall, ORP has established and implemented an oversight program that meets the expectations of DOE Policy 226.2 and the requirements of DOE Order 226.1B. However, EA concluded that four of the six ORP divisions/groups assessed were not meeting the expectation of DOE Policy 226.2 to utilize and leverage “the outcomes and information from effective Contractor Assurance Systems (CAS) to inform the Government’s oversight” and the DOE Order 226.1B requirement for ORP oversight to “be tailored according to the effectiveness of contractor assurance systems.” ORP senior management confirmed that they were aware of this shortcoming and were developing actions to make improvements. EA will continue to monitor the issue as a follow-up for future assessments.

Oversight of EPC Completion, Startup Testing, and Readiness to Start Cold Commissioning

ORP oversight to date has primarily focused on design, safety basis development, and construction safety and quality. With construction nearing completion for the LBL, and the project moving more substantially into startup testing, ORP is refocusing its oversight toward the more operational aspects of startup testing and ultimately cold and hot commissioning. EA evaluated ORP’s oversight of this phase of the project in four areas: (1) startup testing, (2) readiness to begin commissioning of the LBL, (3) verification of BNI’s completion of key contractual construction milestones, and (4) EPC alignment and completion.

ORP’s WTP Startup, Commissioning, and Integration (WSC) organization has the lead role in support of the Assistant Manager for WTP (AMWTP, who is also the Federal project director) in overseeing the startup testing of the LBL. MGT-PM-PL-12, *Waste Treatment and Immobilization Plant Project Startup and Staffing Plan*, describes ORP’s current strategy for overseeing the startup testing of the LBL. The plan establishes an effective oversight strategy for WSC and the WSC Commissioning, Maintenance, and Operations Division (COD) in particular. It defines the roles and responsibilities of the key WSC positions, such as the Assistant Manager for WSC (AMWSC), the Startup Manager, and Facility Startup Engineers (FSEs); an approach for prioritizing the limited resources of WSC on BNI’s startup activities; a staffing plan for ORP to support oversight of startup testing and cold commissioning; and training and qualification expectations for the FSEs. The plan is less effective at integrating the non-WSC ORP oversight of startup activities. EA interviewed the COD Director and the three FSEs, and observed one FSE performing daily routines. The Director and the three FSEs are experienced and knowledgeable of BNI’s startup processes and activities. FSE oversight is effectively documented and formally communicated in bi-monthly reports. WSC is effectively using general support service contractors to supplement and complement its Federal staff.

ORP has developed a well-considered strategy in MGT-PM-PL-17, *Waste Treatment and Immobilization Plant Operational Readiness Certification and Verification Plan [CVP]*, to evaluate readiness to begin LBL commissioning operations. The key aspects of the CVP strategy are to (1) structure and coordinate ORP’s oversight around the core requirements of DOE Order 425.1D, *Verification of Readiness to Start Up or Restart Nuclear Facilities*; (2) designate leads for each of the core requirements responsible for developing specific oversight strategies; and (3) manage the overall process from start to finish using a line management review board (LMRB). EA could not evaluate the effectiveness of the CVP approach because of its early stage of implementation. The leads for each of the core requirements are in the process of developing the specific oversight strategies, which are envisioned to be “living documents” that evolve as the LBL approaches readiness for commissioning. The LMRB consists of the AMWTP, the AMWSC, and the Assistant Manager for Technical and Regulatory Support. The LMRB is

responsible for ensuring that the objectives of the CVP are met by evaluating the effectiveness of the core requirement oversight strategies and the adequacy of the oversight results. The LMRB is ultimately responsible for providing the Startup Authority with the recommendation that ORP and BNI are ready to commence LBL commissioning activities.

ORP did not include the ORP oversight associated with LBL design verification and construction completion in the CVP and LMRB scope; these are being managed directly by the AMWTP. The WTP contract includes a series of progressive milestones for LBL construction completion. EA reviewed the process and resulting documentation of ORP's validation of BNI's attainment of the contractual milestones for completing the LAW final assembly of Melter Lid #1 and #2. ORP's validation process was thorough and effective. In interviews, ORP stated that the success of its validation was substantially facilitated by the clarity and specificity of the milestones, as well as BNI's milestone verification process and documentation. The next major construction-related contractual milestone is "LBL Physical Plant Complete," which is more challenging to validate due to the complex (addresses the entirety of the LBL) and less specific (includes numerous exclusions) contract language defining the milestone. The AMWTP has also initiated "EPC complete" reviews by ORP multi-discipline teams, focusing on documented safety-analysis-credited safety systems and key process control systems. EA did not evaluate the effectiveness of ORP's "LBL Physical Plant Complete" milestone review or the EPC reviews because both were at an early stage of development and implementation.

Federal Oversight Conclusion

Overall, the ORP oversight processes adequately implement the expectations and requirements of DOE Policy 226.2 and DOE Order 226.1B. The ORP oversight processes provide DOE line management with sufficient knowledge of site and contractor activities to understand and make informed decisions about hazards and risks and to ensure that site operations are performed safely and in compliance with applicable requirements. ORP's strategies for validating LBL EPC completion, overseeing startup testing, and determining readiness to start LBL commissioning are maturing. EA determined that ORP's use of the CAS to tailor and inform Federal oversight does not adequately implement the requirements of DOE Order 226.1B. ORP had previously recognized this non-compliance and is developing improvement actions.

6.0 FINDINGS

EA did not identify any findings during this assessment.

7.0 OPPORTUNITIES FOR IMPROVEMENT

EA did not identify any opportunities for improvement during this assessment.

8.0 ITEMS FOR FOLLOW-UP

EA will examine these items: (1) BNI security protocols enacted in late 2017 that require marking some surveillances (e.g., SV-PSQ-17-004 and SV-PSQ-17-006) as "sensitive" and not available electronically through iDocument, (2) the BNI LTPM plan performance, and (3) consistency in PTF/HLW Shield Doors PvM.

In future assessments, EA will follow up on the effectiveness of ORP's improvement efforts to use the BNI CAS for outcomes and information from BNI's CAS to tailor ORP's oversight.

Appendix A Supplemental Information

Dates of Assessment

Onsite Assessment: March 5-8, 2018

Office of Enterprise Assessments (EA) Management

William A. Eckroade, Acting Director, Office of Enterprise Assessments
Thomas R. Staker, Director, Office of Environment, Safety and Health Assessments
William E. Miller, Deputy Director, Office of Environment, Safety and Health Assessments
C.E. (Gene) Carpenter, Jr., Director, Office of Nuclear Safety and Environmental Assessments
Kevin G. Kilp, Director, Office of Worker Safety and Health Assessments
Gerald M. McAteer, Director, Office of Emergency Management Assessments

Quality Review Board

John S. Boulden III
Steven C. Simonson
Michael A. Kilpatrick

EA Site Lead for Hanford Office of River Protection

Samina Shaikh

EA Assessors

Samina Shaikh – Lead
Joseph J. Lenahan
Michael A. Marelli
Ronald G. Bostic

Appendix B
Key Documents Reviewed, Interviews, and Observations

Documents Reviewed

- 24590-WTP-GPP-CON-4101, Rev. 14, *Subcontract Management*, March 27, 2017
- 24590-WTP-GPP-CON-4103, *Subcontract Surveillance, Inspection, and Quality Verification*, Rev. 13, May 25, 2017
- 24590-WTP-GPP-RACT-TO-0101, Rev. 0, *WTP Turnover Process*, February 22, 2018
- 24590-WTP-GPP-CON-1602, Rev. 8, *System and Area Completion and Turnover*, February 25, 2018
- 24590-WTP-GPP-RAPS-MM-1102, Rev. 0, *Field Material Inventory Management*, November 1, 2017
- 24590-WTP-PL-MATL-07-0002, Rev. 6, *RPP/WTP Storage Plan*, March 27, 2017
- 24590-GCB-F00002, Rev. 9, *Storage Observation Checklist*, July 26, 2017
- 24590-WTP-GPP-PSQ-052, Rev. 6, *Receiving Inspection & Test Surveillances*, March 27, 2017
- 24590-WTP-IAR-QA-15-0007, *Internal Audit of Handling, storage, and Shipment*, September 23, 2015
- 24590-WTP-SV-QA-16-0088, *Field Material Management – Outdoor Piping Storage/ Staging Area*, August 22, 2016
- BNI Procedure 24590-WTP-GPP-RAMN-WC-0004 Rev 1, *Periodic Maintenance and Surveillance and Administrative Tickler Process*, March 27, 2017
- 24590-WTP-PD-RAPM-PM-0001, Rev 0, *Long-Term Preservation Maintenance Program [LTPM]Description*, August 24, 2017
- CR 16-00524, *Subcontract Equipment – Preservation and Preventive Maintenance*
- CR 16-01004, *PMTF Accuracy Review*
- WTCC Construction Procedure 24590-WTP-GPP-CON-3504, Rev. 18, *Pressure Testing of Piping, Tubing and Components*, July 26, 2017
- Design Guide No. 24590-WTP-GPG-M-017, Rev. 8C, *Design Parameters & Test Pressures for Equipment and Piping*, April 9, 2012
- Specification No. 24590-WTP-3PS-DB01-T0001, Rev. 8, *Engineering Specification for Furnishing and Delivering Ready Mixed Concrete*, March 30, 2007
- Specification No. 24590-WTP-3PS-D000-T0001, Rev. 8, *Engineering Specification for Concrete Work*, September 20, 2012
- Specification No. 24590-WTP-3PS-C000-T0001, Rev. 6, *Engineering Specification for Material Testing Services*, January 11, 2011
- WTCC Construction Procedure 24590-WTP-GPP-CON-7101, Rev. 13, *Construction Quality Control Program*, March 9, 2017
- Specification No. 24590-WTP-3PS-JQ08-T0001, Rev. 3, *Engineering Specification for Construction and Installation of Controls and Instrumentation*, January 28, 2015
- WTCC Construction Procedure 24590-WTP-GPP-CON-3401, Rev. 5, *Controls and Instrumentation Installation*, May 31, 2017
- WTCC Procedure 24590-WTP-GPP-MGT-044, Rev. 10, *Nonconformance Reporting and Control*, January 31, 2018
- Document number 24590-WTP-QAM-QA-06-001, Rev. 18, *Quality Assurance Manual*, January 30, 2018
- TRS-OA-IP-01, *Integrated Oversight Process*, Rev. 11, 6/1/17
- MGT-PM-PL-06, *WTP Performance Evaluation Plan*, Rev. 2, September 2016
- MGT-PM-PL-02, *Safety Management Functions, Responsibilities, and Authorities for the U.S. Department of Energy Office of River Protection*, Rev. 13, 3/8/16
- TRS-ISS-IP-02, *Issue Reporting and Resolution*, Rev. 4, 10/1/2016

- MGT-PM-PI-04, *Quality Assurance Program Description*, Rev. 4, 8/20/14
- MGT-PM-PL-12, *Waste Treatment and Immobilization Plant Project Startup and Staffing Plan*, Rev. 4, 5/1/17
- MGT-PM-PL-17, *Waste Treatment and Immobilization Plant Operational Readiness Certification and Verification Plan*, Rev. 1, 10/27/16
- MGT-PM-CH-01, *Waste Treatment and Immobilization Plant Operational Readiness Line Management Review Board Charter*, Rev. 1, Jan 2018
- MGT-PM-GU-03, *Waste Treatment and Immobilization Plant Engineering Division Oversight*, Rev. 1, 6/1/16
- TRS-OA-IP-02, *Operational Awareness Oversight Database*, Rev. 2, 10/01/2016
- MGT-PM-DI-04, *WCD Construction Oversight*, Rev. 1, 11/28/2012
- Proposed Checklist for ORP Documentation Reviews – EPC Verification, Rev. 0 (Draft)
- Power Point Slides, ORP Training on Lines of Inquiry to Evaluate Contractor Assurance System
- Report 7273-ORP, Management Assessment, *Effectiveness of the Office of River Protection Technical Qualification Program*, 2/2/18
- OA Report 35428, 18103 - BNI CAS OA, 12/12/17
- OA Report 35706, *Walk-down of SSC; C5V Exhaust Fan Discharge Confinement to an Elevated Release*, Rev. 1, 2/1/18
- OA Report 35804, *Walk-down of selected SSC's for Melter Offgas System*, Rev. 3, 2/21/18
- OA Report 35805, *Walk-down of Safety Equipment Backup Power SSC*, Rev. 1, 2/15/18
- OA Report 35846, *Walkdown of the LAW Building Structure SSC*, Rev. 1, 2/21/18
- Surveillance Reports 18143-WTP & 18144-WTP, *Bimonthly Startup Testing Activities Surveillance Summary Report, October Through January Fiscal Year 2018* (draft)
- Surveillance Report S-17-WSC-RPPWTP-004, *Bimonthly Startup Testing Activities Surveillance Summary Report, February and March Fiscal Year 2017*
- Surveillance Report 17008-WTP, *Bimonthly Startup Testing Activities Surveillance Summary Report, April and May Fiscal Year 2017*
- Surveillance Report 17011-WTP, *Bimonthly Startup Testing Activities Surveillance Summary Report, June and July Fiscal Year 2017*
- Surveillance Report 18148-WTP, *Bimonthly Startup Testing Activities Surveillance Summary Report, August and September Fiscal Year 2017*
- WTP Contract No. DE-AC27-01RV14136 Section J, Attachment P
- ORP contract milestone validation documentation (2)
- COD Surveillance and Observation Checklists (3)
- *Waste Treatment and Immobilization Plant Line Management Review Board Annual Report for 2016*, 3/30/17
- Management Assessment M-16-MGR-INTERNAL-001, *Assessment of Staffing, Skill Mix, and Qualifications of ORP Technical Personnel*, 2/22/2017
- Self-Assessment M-17-TRS-INTERNAL-001, *Technical Regulatory Support Issues Management and Requirements Management Assessment*, 3/3/2017
- Management Assessment 17012-ORP, *WTP WSC FY2017 Management Assessment*, 9/14/2017
- Management Assessment M-16-WED-INTERNAL-001, *WTP Engineering Division Fiscal Year 2016 Management Assessment*, 8/24/2016

Interviews

- WTCC Construction Subcontract Manager
- WTCC Subcontract Coordination specialist (2)
- WTCC Subcontract Technical Representatives (2)
- CMMS Database Manager

- South 40 Laydown Yard surveillance personnel (5)
- Yakima Warehouse Material Management Personnel (2)
- BNI Supplier Quality Manager
- WTCC AECOM Work Control Manager
- WTCC CMMS Database Manager
- WTCC Maintenance Planning Supervisor
- WTCC Work Package Supervisor
- WTCC Maintenance Personnel (3)
- WTCC Mechanical Field Engineers
- WTCC Civil Field Engineers
- WTCC Field Engineering Assistant Manager
- WTCC Quality Control Inspectors
- WCD Site Inspectors and Facility Representatives
- Assistant Manager WTP Startup, Commissioning and Integration (WSC)
- WSC Commissioning, Maintenance and Operations (COD) Division Director
- WTP Construction Oversight and Assurance Division Acting Director
- WTP Engineering Division Director
- Quality Assurance Division (QAD) Acting Director
- Safety and Health Division Director
- COD Facility Startup Engineer (Testing)
- COD Facility Startup Engineer (Maintenance, Procedures, & Operations)
- COD Facility Startup Engineer (Readiness Manager)
- QAD subject matter expert
- Performance Assurance Manager
- Project Oversight and Quality Manager

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Observations

- South 40 Laydown Yard Walkdown
- South 40 Laydown Yard, Row 4AN Surveillance
- Yakima Warehouse walkdown
- WTP Site T52 Warehouse engineered structure
- LAW Preservation Maintenance Activity
- PTF Preservation Maintenance Activity
- Observed a concrete placement in exterior and interior walls in the EMF
- Examined the slope of instrument tubing associated with sensing instruments installed in the LAW
- Observed performance of a pneumatic pressure test performed on CM tubing for SCW instruments located in the yard area at the southwest corner of the LAW
- Observed performance of a pneumatic pressure test performed on Q tubing that supplies air for operating valves in the LOP system.
- WTCC Startup Punchlist Meeting
- WTCC Startup Testing Plan of the Day Meeting
- Tour of LAW and Laboratory with WCD Facility Representative
- Construction “Same Page” Meeting

Appendix C Deficiencies

Deficiencies that did not meet the criteria for a finding are listed below, with the expectation from DOE Order 227.1A for site managers to apply their local issues management processes for resolution.

- Contrary to NQA-1, Requirement 5, “Activities affecting quality and services shall be prescribed by and performed in accordance with documented instructions, procedures, and drawings,” WTCC has not defined the process for entering accepted subcontractor equipment CTNs into TEAMWORKS.