

**Office of Enterprise Assessments
Targeted Review of
Work Planning and Control at the
Hanford Tank Farms**



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Acronyms

ALARA	As Low As Reasonably Achievable
AL-WP&C	Activity-Level Work Planning and Control
AMW	ALARA Management Worksheet
CA	Contamination Area
CAM	Continuous Air Monitor
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
EA	Office of Enterprise Assessments
EA-30	Office of Environment, Safety and Health Assessments
ERSS	Extended Reach Sluicer System
ES&H	Environment, Safety, and Health
ESH&Q	Environment, Safety, Health and Quality
FR	Facility Representative
FWS	Field Work Supervisor
FY	Fiscal Year
GHA	General Hazard Analysis
HPT	Health Physics Technician
HVAC	Heating, ventilation, and air conditioning
IH	Industrial Hygiene
JHA	Job Hazard Analysis
LL	Lessons Learned
LOTO	Lock out/Tag out
NCO	Nuclear Chemical Operator
OFI	Opportunity for Improvement
ORP	Office of River Protection
PER	Problem Evaluation Request
POD	Plan of the Day
PPE	Personal Protective Equipment
RA	Radiation Area
RWP	Radiological Work Permit
SHD	Safety and Health Division
SME	Subject Matter Expert
TOD	Tank Farms Operations Division
TVIS	Tank Vapor Information Sheet
WP&C	Work Planning and Control
WRPS	Washington River Protection Solutions
XRF	X-ray Fluorescence

Executive Summary

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted an independent review of activity-level work planning and control at the Hanford Tank Farms. The Tank Farms store and manage the 56 million gallons of liquid or semi-solid radioactive and chemical waste stored in 177 underground tanks at the Hanford Site. The Tank Farms are managed and operated by Washington River Protection Systems (WRPS), under contract to the DOE Office of River Protection (ORP). The ORP Tank Farms Operations Division (TOD) provides the primary oversight of WRPS work planning and control at the Tank Farms.

EA's review of WRPS activity-level work planning and control focused on operations, maintenance, and construction activities, as well as associated WRPS assurance and ORP oversight processes. EA's review of the Hanford Tank Farms was part of a broader EA targeted review of activity-level work planning and control across DOE that partially addresses a DOE commitment to the Defense Nuclear Facilities Safety Board to enhance Federal oversight of activity-level work planning and control.

During the targeted review, EA generally found that WRPS established appropriate processes at the WRPS Tank Farms to plan and control the conduct of operational, maintenance, and construction activities. With some exceptions, WRPS adequately defined the scope, analyzed the hazards and established controls, confirmed readiness, performed the work as specified and provided feedback for improvement. One notable process was the incorporation of specific lessons learned, with appropriate controls, into construction work instructions. Additionally, ORP TOD effectively performed oversight of the contractor with respect to Work Planning and Control. Facility Representatives are trained, qualified, and identified deficiencies in the area of work planning and control. These deficiencies are being entered into the ORP issue management system and communicated to WRPS, although WRPS has sometimes been slow to resolve the issues.

Despite these strengths, EA noted deficiencies in implementation that caused additional rework of work planning activities, delays in work schedules, and poor allocation of craft resources. In a few cases, work area hazards were missed or specific controls were not comprehensive for identified hazards. Finally, WRPS did not always adequately communicate hazards and controls in pre-job briefings as required by procedures, resulting in a few cases where workers did not adequately implement the controls. Increased management attention to implementation of existing work planning and control processes will enhance and improve the safety and efficiency of operations, maintenance, and construction activities at the Tank Farms.

During this EA review, the Savannah River National Laboratory (SRNL) led Tank Vapor Assessment Team (TVAT) released their report which depicted numerous short and long term management, industrial hygiene and engineering challenges in identifying, evaluating and controlling Tank Farm chemical vapors. Due to the complexity of the final TVAT report, the TVAT members, at the request of WRPS, briefed the entire WRPS work force through a number of two- hour sessions which impacted WRPS field work activities at the Tank Farms, and subsequently limited the number of EA field work observations. EA recognizes that the issues surrounding the tank chemical vapors are complex and the resolution will be an ongoing challenge for WRPS and ORP.

Office of Enterprise Assessments Targeted Review of Work Planning and Control at the Hanford Tank Farms

1.0 PURPOSE

The U.S. Department of Energy (DOE) independent Office of Enterprise Assessments (EA), Office of Environment, Safety and Health Assessments (EA-30), conducted an assessment of activity-level work planning and control at the Hanford Tank Farms. The onsite portions of this assessment were conducted from October 20 to 23, 2014 and November 3 to 6, 2014.

This independent assessment is part of a larger-scale targeted assessment of activity-level work planning and control (AL-WP&C) across the DOE complex, including National Nuclear Security Administration sites. EA selected this area for targeted review because of its importance to facility and worker safety and as part of the Deputy Secretary's commitment to enhance Federal oversight of AL-WP&C, which is documented in a response to a Defense Nuclear Facilities Safety Board (DNFSB) letter and DNFSB/Tech-37, *Integrated Safety Management at the Activity Level: Work Planning and Control*.

2.0 SCOPE

EA-30 conducted this independent assessment of the work planning and control (WP&C) program at the Hanford Tank Farms in accordance with EA's assessment plan, *Plan for the Office of Enterprise Assessments Targeted Review of Work Planning and Control at the Hanford Tank Farms*. To assess the performance of the Tank Farms Operating Contractor, Washington River Protection Systems (WRPS), in implementing AL-WP&C at the Hanford Tank Farms, EA reviewed the documented processes at the Hanford Tank Farms. EA reviewed WP&C procedures, hazard analyses and controls, technical procedures, maintenance work packages, construction work packages, and other WP&C documents; interviewed key WRPS personnel; observed meetings; and performed other data-gathering activities. EA focused on observing activity-level work in the areas of operations, maintenance, and construction, including the performance of job hazard analyses (JHAs), activity walkdowns, senior management reviews, work authorization activities, pre-job briefings, execution of work activities, post-job feedback, and contractor assurance system activities. The scope of this assessment also included a focused review of Office of River Protection (ORP) processes for oversight of the contractor's AL-WP&C activities.

3.0 BACKGROUND

The EA program is designed to enhance DOE safety and security programs by providing DOE and contractor managers, Congress, and other stakeholders with an independent assessment of the adequacy of DOE policy and requirements as well as the effectiveness of DOE and contractor line management performance in safety and security and other critical functions as directed by the Secretary of Energy. The EA Independent Assessment Program is described in and governed by DOE Order 227.1B, *Independent Oversight Program*, and a comprehensive set of internal protocols, operating practices, inspectors guides, and process guides.

EA evaluates safety and emergency management policies and programs throughout DOE, with a particular emphasis on evaluating worker and public protection from high consequence hazards at many DOE sites. EA accomplishes its safety and emergency management oversight through two primary mechanisms: (1) a network of staff site leads who are assigned to monitor the activities at DOE sites with

nuclear facilities or activities, and coordinate office assessment activities at those sites; and (2) a program of targeted assessments that evaluate selected functional or topical areas at multiple sites across the DOE complex. Assessment activities are selected, prioritized, and planned based on such factors as risk to workers and the public, facility operational status, and performance history.

ORP was established in 1998 to manage the 56 million gallons of liquid or semi-solid radioactive and chemical waste stored in 177 underground tanks at the Hanford Site. ORP serves as DOE line management for the Tank Farms, which maintains the 177 underground storage tanks, and the Waste Treatment and Immobilization Plant, which is under construction and will be used for retrieval, treatment, and disposal of the waste stored in the underground tanks. The Tank Farms are managed and operated by WRPS under contract to ORP. ORP provides Tank Farm oversight.

4.0 METHODOLOGY

EA's *Plan for the Office of Enterprise Assessments Targeted Review of Work Planning and Control at the Hanford Tank Farms* identified the criteria to be used to evaluate AL-WP&C. In accordance with the plan, this EA review focused on performance and implementation of site AL-WP&C processes. When performance weaknesses were identified, EA evaluated these weaknesses to identify possible causes.

Appendix A lists the EA personnel responsible for this assessment. Appendix B provides a detailed list of the documents reviewed, personnel interviewed, and observations made during this assessment, relevant to the findings and conclusions of this report.

5.0 RESULTS

The results of this EA assessment of AL-WP&C implementation by WRPS are provided by work type, followed by the results of EA's assessment of contractor assurance and ORP oversight.

5.1 Operations

Operations work at WRPS is typically performed by qualified WRPS supervisors and nuclear chemical operators (NCOs). Operations work spans routine shift operations work as well as work activities involved in the operation of a system (e.g., 242-A Evaporator), equipment item (e.g., sluicer) or component (e.g., valve and pumps). All WRPS organizations (i.e., Projects, Base Operations, Retrieval and Transfer Operations) are involved in operations work at the Tank Farms. EA reviewed several operations work activities performed in accordance with work packages and procedures. These operations included daily operator rounds conducted at the 242-A Evaporator and at the AN and C Tank Farms, C-107 Tank "Grab" Sampling, placing the C-102 Tank Sluicer box in a safe shutdown condition, and pre-job briefings for the aforementioned work activities, and preparations for core sampling in the C Tank Farm. EA also conducted interviews, system and facility walkdowns, and document reviews.

Overall, WRPS has established appropriate processes at the WRPS Tank Farms to plan and control the conduct of operational activities. For most observed activities, WRPS adequately defined the scope, analyzed the hazards, and established controls; confirmed readiness; performed work as specified; and provided feedback for improvement. However, EA noted the following deficiencies in implementation:

- WRPS did not always sufficiently tailor work scoping and planning to the emergent work activity before the pre-job briefing. In one case, this deficiency caused additional re-work of work planning activities, delays in work schedules, and poor allocation of craft resources.

- WRPS did not always adequately define hazards, implement controls or provide a documented technical basis.
- Acceptance criteria in operator rounds were sometimes unclear or could not be performed as written.
- WRPS supervisors and /or field work supervisors did not always engage workers during pre-job briefings.

Details for these observations are provided in the following paragraphs.

Objective: The scope of work is described in sufficient detail to allow the work planning process to identify hazards associated with the work and to develop necessary schedules, priorities and work instructions.

The scope of work for most observed operational activities was well defined in technical or operating procedures, work packages, and Plan of the Day (POD) Daily Reports. For example, the Tank Farm operating procedure for Core Sampling Push Mode Operations clearly identified the purpose and scope for this activity as well as step-by-step instructions for installing the drill string, preparing for core sampling, performing the sampling, and recovering the spent sampler from the drill string. Similarly the work order for Performing “Drag” Grab Sampling at Tank 241-C-107 included detailed specific work instructions for conducting the grab sampling operation.

WRPS adequately defined most scopes of observed work. However, in one case, WRPS’s initial work planning and work scoping process of an emergent work activity was inappropriate. During the pre-job briefing for an activity to put the C-102 Sluicer Box in a safe shutdown condition, the field work supervisor (FWS) briefed the work crew on this task, using an approved Level 1 work order (TFC-WO-14-3130 to “Install Sluicer #2 @ Riser #2” for Tank 241-C-102) not specific to this task. Although later steps in this 23-page work order may have accommodated the work scope to “button up the sluicer box,” the scope of the work order was focused on installing a sluicer into riser #2, which was not part of the work activity being briefed. To use this Level 1 work order would have required an extensive revision or mark-up to the Level 1 work order to accommodate the lesser work scope of placing the C-102 Sluicer Box in a safe shutdown condition. Section 4.7 of the Tank Operations Work Control Procedure requires a Work Change Notice for complex changes to a work document, including the appropriate reviews and approval for the changes. However, the Work Change Notice process was not used when modifying the Level 1 work package. After workers and the ORP Facility Representative (FR) raised questions about the appropriateness of this Level 1 work order for the proposed task during and following the pre-job briefing, the FWS recognized the challenges of applying this Level 1 work order to a limited task and paused the work activity. Following the pre-job briefing, the FWS met with Tank Farm Operations Division management and concluded that a new Level 3 work package tailored to “buttoning up the sluicer box” was a more appropriate work control mechanism. WRPS then delayed the work until a new work package could be planned and approved. Inadequate planning and work scoping for this work activity caused unnecessary delays and expenditures of resources. (See **WRPS-OFI-OP-1.**)

Objective: All hazards that could potentially adversely impact workers, the public, the environment, the facility, and its equipment are documented and analyzed for severity/significance.

Most of the operations work observed by EA involved radiological hazards, physical hazards, and/or potential chemical vapor hazards. At a minimum, WRPS evaluates all observed work activities for potential hazards through the performance of a general hazard analysis (GHA). When hazards are outside of those hazards identified and analyzed in the GHA, WRPS follows the JHA process to identify,

evaluate, control, and communicate potential hazards for all WRPS activities including facility operations. The GHA identifies routine work place hazards where controls are skill based and can be implemented by the individual performing the work. In general the WRPS Job Hazard Analysis procedure adequately defines the hazard analysis process for the GHA and JHA processes, as well as the Standing JHA process. The EA team evaluated the 242-A Evaporator Backside Rounds procedure and the Core Sampling System Push Mode Operations procedure as well as the associated GHA and/or JHA. For work performed by procedures, the JHA or GHA is not typically provided with the technical procedure when performing the work activity, as the appropriate subject matter experts (SMEs) identified and documented hazards during the procedure review process. The WRPS Technical Procedure Control and Use procedure adequately documents the procedure review process. For the 242-A Evaporator Backside Rounds procedure, the procedure review process appropriately indicated that the GHA would be adequate to address the hazards of this work activity. Similarly, the JHA and Document Acceptance Review Form prepared for the Core Sampling Push Mode technical procedure appropriately indicated that the correct SMEs reviewed the procedure and that the hazards identified in the JHA were consistent with work scope.

WRPS procedures appropriately identified and documented hazards for other observed operations work activities. The hazards and controls were consistent with the work scope, with the exception of the work activity to place the C-102 Tank Sluicer Box in a safe shutdown condition, as discussed previously. For this work evolution, the initial JHA reflected a much larger work scope. When this work activity was paused and re-planned as a Level 3 work activity in lieu of the previous Level 1 work activity, the GHA replaced the previous JHA in the Level 1 work package. In general, the GHA adequately addressed the potential work hazards identified in the JHA for the reduced work scope.

Objective: Controls are identified and implemented that effectively protect against identified hazards, and approved activity-level work control documents can be performed as written.

Operations work activities rely on a combination of engineered controls, administrative controls, and personal protective equipment (PPE) to control hazards. WRPS uses engineered controls, such as the use of remote equipment and valve controllers, interlocks, and other design features, whenever possible to protect personnel from radiological, electrical, chemical, and other hazards. The WRPS hazard analysis process (e.g., JHA, GHA and/or Standing JHA) is the primary mechanism to identify hazard controls at the task level for operations activities. The most common administrative work control that governs operations is the use of technical procedures and/or a combination of technical procedures and work packages. Aside from weaknesses noted previously, the WRPS technical procedure process provides a comprehensive system for developing, reviewing, approving, using, and modifying procedures. This process also requires that during procedure development or revision, controls identified in the JHA are included in the technical procedure. For the most part, operating procedures governing observed activities were well written and technically accurate, and they contained the appropriate information and level of detail to perform the tasks safely. The procedures included appropriate precautions, limitations, cautions, and notes to effectively integrate the applicable controls from the JHA process.

WRPS identified appropriate controls for most observed operations. However, EA noted the following exceptions:

- WRPS Industrial Hygiene (IH) had not adequately established hearing protection boundaries around the AN Tank Farm Exhauster. As a result, an operator entered a high noise area on the back side of the exhauster, without hearing protection.

- Numerous tags on riser covers in the AN Tank Farm are missing or are not legible. WRPS previously identified this concern and is tracking it as an improvement item.
- A truck in the AN-Farm had an illegible Tank Farms access authorization sticker.

EA also observed two weaknesses associated with the performance of operator rounds at the AN and C Tank Farms. First, a requirement on the daily rounds at the AN Tank Farm is for operators to observe the displays on the field mounted Continuous Air Monitors (CAMs), document the reading on the round sheet, and compare the reading to the acceptance criteria stated on the round sheet of ≤ 3000 (BNCR)(NCPM). Neither the operator performing the rounds nor the shift manager could explain the acronym (BNCR)(NCPM), why the CAM data recorded on the day of the observation was always negative (e.g., -140 counts per minute), and whether the CAM data should be considered suspect.

Daily rounds at the C Tank Farm require the operators to verify that there is no obvious visible damage to, or leaks from, above ground portion of process and support pits and pit coverings. During a seven day period, including the day of the EA observation, operators checked this condition as being met, although the majority of process and support pits and pit coverings were not visible from outside the C Tank Farm fence, where the operators perform this observation. Operators could not readily access C Tank Farm at the time because of respiratory protection constraints, and most of the process and support pits and pit coverings were not visible from outside the fence because of obstructions such as tents and scaffolding over the Tank Farm components. WRPS indicates that the check that is currently performed is intended to observe only “gross problems” and therefore an observation outside the tank farm is adequate. However, the current requirement in the operator round sheet does not infer nor define “only gross problems”, and is misleading and should be revised to reflect the expectations for a more limited observation. (See **WRPS-OFI-OP-2.**)

The WRPS Tank Farms present challenges with respect to ensuring workers are adequately protected from exposure to chemical vapors that are occasionally emitted. In particular, some single shell tanks contain a mixture of over 800 chemicals with varying potential health effects. During recent months, more than 50 workers have reported to the WRPS medical facilities as a result of potential exposure to Tank Farm odors/vapors. As a hazard control, in accordance with existing processes, WRPS has developed a listing of potential tank chemical vapors for each Tank Farm. This listing, known as the Tank Vapor Information Sheet (TVIS), is based on previous sampling and personal monitoring for each Tank Farm. This listing typically identifies a dozen or so hazardous chemical vapors that could be present outside the tanks and could pose chemical exposures to workers. The TVIS typically requires workers to wear a half face respirator with a chemical respirator cartridge when working in the vicinity of vapor sources. A respiratory protection form provides the specifics regarding the type of respirator cartridge (e.g., Mine Safety Appliances GME/HE) that should be worn to protect against chemicals identified on the TVIS forms.

Although the TVIS is generally comprehensive, WRPS has not documented a technical basis to identify the effectiveness of any of the respiratory cartridges listed on the respiratory protection forms. For example, most of the WRPS specified chemical respirator cartridges do not protect workers from nitrous oxides, and possibly other chemicals, which are identified on some of the TVIS forms. WRPS initiated a Problem Evaluation Request (PER) in May 2013 to partially address this issue by requiring “periodic review of TVIS and associated respiratory cartridges.” However, the proposed corrective action for the PER to “conduct periodic source sampling of representative sources in each tank” was unrelated to the respirator cartridge issue. At the time of this EA review, IH had not initiated a PER to address the effectiveness of the prescribed respirator cartridges for chemical vapors identified outside the tanks, which was also an issue that was initially identified during the 2004 DOE Office of Oversight review. During the past few months the Savannah River National Laboratory Tank Vapor Independent Review

Team identified a similar concern and this issue is now being tracked as a corrective action as a result of the SRNL review.

Objective: Work is conducted diligently in accordance with approved work instructions and within established controls.

WRPS verifies readiness to perform operations work on a daily basis using POD schedules, POD meetings, shift manager meetings, shift briefings, and pre-job briefings. WRPS holds a POD meeting each morning to release work activities and coordinate activities for the next day. WRPS Operations conducts shift turnover meetings at the completion of each shift. Supervisors hold pre-job briefings for all involved workers before commencing operational work activities that are performed by procedures and work packages. The pre-job briefings provide workers with relevant facility information, safety topics, and job assignments for the day.

Workers performed most observed operations activities in accordance with procedures and existing controls. Operations personnel have significant experience and a high level of knowledge in their areas of responsibility. Workers performed operations activities using approved procedures and followed most administrative requirements and postings.

EA identified one area of concern regarding the conduct of pre-job briefings in support of operational activities. Although well attended, several pre-job briefings failed to engage workers in reviewing the work tasks, hazards, and controls. Often, these pre-job briefings involved thirty or more workers and support staff, with the FWS presenting the work scope and activities with minimal interaction or engagement from those in attendance. During one pre-job briefing, several workers were more involved with their cell phones than the pre-job briefing. In addition, the FWSs demonstrated few tools that would encourage greater worker involvement (e.g., questioning attitudes, repeat backs, use of video projections, demonstrations, and presentations by others within the group). In particular, during the pre-job briefings there was a lack of discussion of hazards and controls identified in the JHA, although the WRPS *Pre-Job Briefing Checklist* identifies the discussion of job hazards, controls, and PPE as one of six of the minimum items to be discussed during the pre-job briefing. For example, during a pre-job briefing for a Level 1 work package, the FWS asked if anyone felt a need to review the JHA, but since there was no response, the JHA and associated controls were not reviewed. Furthermore, in some cases, there was no discussion during the pre-job briefing of adherence to the work instructions or the identification of critical tasks, each of which is identified in the WRPS Pre-Job Briefings and Post-Job Reviews procedure as among the minimum elements to be covered during a pre-job briefing. (See **WRPS-OFI-OP-3**.)

5.2 Maintenance

WRPS Maintenance workers perform maintenance related assignments throughout the various Tank Farms, support facilities, maintenance shops, and laboratory facilities. Routine maintenance activities include equipment refurbishment/replacement, corrective and preventive maintenance, and support to operational and construction generated work packages. A cadre of procedures governs work planning at the Tank Farms, using a graded approach to plan, authorize, and control the range of work activities from minor to complex. These procedures predetermine that some activities fall within the skill of the craft/worker and therefore require no formal work instruction. However, all work activities must be planned and formally released. The majority of observed maintenance was work with increased complexity requiring more detailed work instructions and work packages. The EA team observed a number of representative maintenance work activities, including equipment replacement and testing, minor maintenance work activities, hot cell load-in port decontamination, a maintenance work planning walkdown activity, and a number of pre-job briefings.

TFC-OPS-MAINT-C-01, *Tank Operations Contractor Work Control*, governs maintenance at WRPS. This procedure, as well as supporting procedures associated with work planning and work instruction development, JHA, pre-job briefing, and post-job reviews, are well written and address most aspects associated with planning and implementing maintenance. For many observed activities, work documents adequately defined the work scope, workers and planners adequately identified and analyzed the hazards and established appropriate controls, FWSs confirmed readiness, and workers performed work as specified within the work documents. However, workers and planners sometimes missed hazards and associated controls and did not always implement controls in accordance with the work package documents. FWSs did not always confirm readiness to perform work and sometimes performed incomplete pre-job briefings. In one case, the work control process did not sufficiently identify, document, and communicate the hazards to workers during the pre-job briefing. In these cases, FWSs did not follow minimum expectations for communicating hazards and controls set forth in TFC-OPS-MAINT-C-02, *Pre-Job Briefing and Post Job Reviews*. Further, the process contains inadequate mechanisms to engage workers during pre-job briefings. Details for these observations are provided in the following paragraphs.

Objective: The scope of work is described in sufficient detail to allow the work planning process to identify hazards associated with the work and to develop necessary schedules, priorities, and work instructions.

Maintenance work packages adequately defined the work scopes for most observed maintenance activities. For example, maintenance work instructions documented the work scopes for the work package for the Capacitor Bank Replacement (LAB-WO-12-0508) at the 222-S Laboratory and the work package for the SY Tank Farm riser removal and zip cord placement (i.e., TFC-WO-14-4525), such that hazards and controls can be identified.

In one case, EA observed a work scope that did not meet the requirements of the WRPS work approval and release process. While observing the POD for November 5, 2014, EA noted that all needed resources were not identified before authorization. The work package (which included a work instruction) identified the work scope for activities performed in the C Tank Farm (TFC-14-5605). These work activities included maintenance and operations staff conducting lockout/tagout of electrical disconnects and mechanical valves in support of the C-111 project to drain a high-pressure water skid and hoses. The work planning process at WRPS uses work scope in the work package and associated work instruction to identify schedules. Therefore, priorities and needed resources (including health physics technician [HPT] coverage) must be identified before work release to ensure appropriate hazard controls. The package (i.e., TFC-14-5605) as approved at the POD failed to identify the need for HPT resources. Radiological controls supervision and HPT first line supervision indicated that they were not informed that the work would be conducted within the C Tank Farm (as the actual skid is located outside the fence). Work inside the C Tank Farm would require HPT coverage in accordance with the Radiological Work Permit (RWP) CO-111 Rev. 024. Following the pre-job briefing, the WRPS Operations Engineer/FWS dispatched workers inside the C Tank Farm without having HPT present at the briefing, discussing radiological hazards or controls (see discussion later), or coordinating with the HPTs. EA questioned the radiological controls organization, at which point the HPT first line supervisor confirmed that the individuals were working within the C Tank Farm (i.e., a contamination area [CA]) without their knowledge and redirected available HPT resources to provide intermittent coverage to these workers as required by the RWP. (See **WRPS-OFI-M-1**.)

Objective: All hazards that could potentially adversely impact workers, the public, the environment, the facility, and its equipment are documented and analyzed for severity/significance.

Most of the maintenance work observed by EA involved expected hazards such radiological hazards, physical hazards, and potential chemical vapor hazards. WRPS evaluates all work activities for potential hazards through the performance of a GHA. When hazards are identified that are not addressed in the GHA, WRPS follows the JHA process to identify, evaluate, control, and communicate potential hazards for all WRPS activities including maintenance activities. EA evaluated several maintenance work packages and their associated GHAs and/or JHAs including LAB-WO-12-0508, *Capacitor Bank Replacement*; LAB-WO-12-1319, *Decon Large Hot Cell Load-in Port*; TFC-WO-14-4525, *SY 102 Riser Removal and Zip-Cord Placement*; TFC-WO-14-5754, *QA Acceptance Testing of Valves by XRF*; and TFC-14-5605, *C111 Drain High Pressure Water Skid and Hoses*. For these work evolutions, the appropriate SMEs identified and documented hazards during the JHA review process. TFC-ESHQ-S, SAF-C-02, *Job Hazard Analysis*, adequately documents this process.

While the majority of the maintenance work observed had sufficient hazard analysis to establish requisite controls, one maintenance work evolution revealed shortfalls in the hazard analysis process and resulted in the following:

During the replacement of the heating, ventilation, and air conditioning (HVAC) equipment on the 222-S Laboratory Maintenance Annex roof (Work Order TFC-WO-14-2419 222-S Counting Room HVAC Upgrade), workers raised questions and their union representative requested a safety pause regarding whether I-beam supports were painted with lead-based paint. Prior to the safety pause, workers had performed grinding work to remove the welds that connected the HVAC units to support beams. WRPS planned and approved this work without the lead-based paint being identified in hazard control documents. Following the safety pause, WRPS determined the paint contained lead. As a result, the Mission Support Alliance sheet metal workers who performed the grinding did not have the appropriate PPE. WRPS held a fact-finding meeting the next day to initiate data gathering and analysis into the event and determine a path forward. EA noted the following deficiencies:

- The JHA walkdown performed on June 10, 2014, failed to identify lead-based paint as a job hazard.
- The JHA checklist does not specifically address lead hazards. If the hazard analysis identifies lead, it has to be added as an “Other” item.
- The Industrial Safety representative who supported the preparation of the JHA checklist (and who was one of the signed approvers) indicated that the small quantity of grinding assumed to be needed would have mitigated the hazard, and this may be why the hazard was not identified. The Industrial Safety representative also confirmed that no negative exposure determination had been documented. This conflicts with the hazard analysis process as required by TFC-ESHQ-S, SAF-C-02, where potential hazards must be identified before identifying mitigating controls.
- Based on a later review of sampling conducted at the 222-S Laboratory in 2013, WRPS determined that the painted surfaces in question tested positive for lead. However, this information was never incorporated into the work planning process or work package.

While the procedures adequately document the work planning and JHA processes, tools to help work planners and environment, safety, and health (ES&H) SMEs identify legacy hazards are not readily available. (See **WRPS-OFI-M-2**.)

Objective: Controls are identified and implemented that effectively protect against identified hazards, and approved activity-level work control documents can be performed as written.

WRPS provides guidance and direction for developing and integrating hazard controls through maintenance procedures, work packages, and JHAs. For most observed maintenance work, hazard controls identified in maintenance work packages were appropriate for the hazard, and controls identified in JHAs were either included in maintenance work instructions at a convenient location (i.e., directly before introducing the hazard) or expected to be discussed by the FWS before the commencement of the assigned work evolution. For example, most reviewed work instructions contained prerequisites, such as “PERFORM a documented Pre-Job Briefing prior to work in the field,” and “DISCUSS Lessons Learned” (which typically included a document containing relevant injuries or events). Caution statements are embedded within the work instruction and could be used for hazard controls. Although WRPS adequately identified, developed, and implemented many hazard controls, EA noted the following exceptions: (See **WRPS-OFI-M-3.**)

- For Work Package TFC-WO-14-5754, *Valve Inspection*, the FWS conducted the pre-job briefing with the worker, without the assigned HPT in attendance. Although the worker was briefed before commencing work, neither the FWS nor HPT briefed the work crew about radiological hazard controls (RWP WTP-0145 Rev. 006), including the control that standoff distances from the X-ray Fluorescence (XRF) device would not be posted and that the HPT would be controlling the stand-off distance as well as other RWP required control items. Only the XRF SME/operator and HPT were aware that the work scope also included testing of the device in accordance with a radiation survey plan (i.e., 2011-WTP-012, Rev. 4) as the additional work scope is only required when a device has either been newly acquired or had recently been returned to service following repair of calibration.

Objective: Work is conducted diligently in accordance with approved work instructions and within established controls.

In general, POD meetings, pre-job briefings, and morning crew briefings were informative, addressed the assigned work tasks, with some exceptions addressed the hazards and controls of the upcoming work activities, and attempted to engage workers. As previously discussed in the Operations section, the conduct of pre-job briefings had some deficiencies. Several pre-job briefings failed to engage the workers in reviewing the work tasks, hazards, and controls. Often these pre-job briefings involved thirty or more workers and support staff, with the FWS presenting the work scope and activities with minimal interaction or engagement from those in attendance. Many maintenance pre-job briefings lacked a discussion of hazards and controls identified in the JHA or RWP. During several pre-job briefing of maintenance work packages, the FWSs or Operations Engineer asked if anyone felt a need to review the JHA. Since there was no response, the JHA was not reviewed, which conflicts with the minimum elements (i.e., hazards and controls) that must be included in pre-job briefings by TFC-OPS-MAINT-C-02, *Pre-job Briefings and Post-Job Reviews*. Furthermore, in some cases, there was no discussion during the pre-job briefing of adherence to the work instructions or the identification of critical tasks, each of which is identified in the WRPS Pre-Job Briefings and Post-Job Reviews procedure as among the minimum elements to be covered during a pre-job briefing. (See **WRPS-OFI-OP/M-5.**)

In most work observations, work was performed in accordance with maintenance work instructions, JHAs, and RWPs. However, EA noted one exception, discussed below:

The EA team observed one instance where workers and their supervisors did not perform work in accordance with items stipulated in the As Low As Reasonably Achievable (ALARA) Management Worksheet (AMW) (i.e., AW-2115 Rev. 002) and/or in accordance with good ALARA work practices. In this case, LAB-WO-12-1319, *Decontamination of Large Hot Cell Load-in Port*, included extensive planning effort, use of engineering controls (e.g., containment tent and ventilating testing), radiological controls including completion of task specific RWP and AMW, and a detailed work instruction. However during the conduct of work, WRPS assembled several support workers in an area designated as a High

Radiation Area (RA), Airborne RA, and High CA. Further, WRPS stationed a number of other support staff in a containment tent designated as a RA, Airborne RA, and CA (albeit primarily because of potential). In both cases, all the support individuals had already donned the full ensemble of PPE required by RWP S-753 Rev. 004, including respiratory protection. Requiring workers to wait unnecessarily in these areas is not in keeping with the ALARA principle. During this time, the painter assigned to perform the work mixed paint in the area outside the containment tent. HPT entry into the Airborne RA/High RA/High CA may have been necessary for radiological survey purposes, but the remainder of the crew was in the respective radiological hazard areas for upwards of 15 minutes while the painter mixed the paint. The FWS did not recognize or act upon this delay nor discuss it during the pre-job briefing. The work order and statements in LAB-WO-12-1319 did not stipulate the work sequence. The work planning did not follow the AMW requirement that states, "Work activities that do not require opening or breaching a contaminated component or system will be performed prior to donning respiratory protection equipment." (See **WRPS-OFI-M-4.**)

5.3 Construction

Subcontractors perform most construction work at WRPS. The requirements for elements of WP&C (e.g., work package planning, job hazards analysis, pre-job briefings, and training) flowdown from WRPS to the subcontractors through the contract mechanisms. WRPS has procedures that adequately address construction activities including TFC-PRJ-CM-C-01, *Construction Management*, and TFC-BSM-CP_CPR-D-02.10, *Construction Contracting*. Per the construction contracting procedure, subcontracts must include all applicable safety requirements.

EA reviewed construction activities performed by American Electric, a subcontractor to WRPS, to remove hoses from the Extended Reach Sluicer System (ERSS) for testing. EA observed operations POD meetings; a construction POD meeting; pre-job briefings; a team planning meeting to review the work package for pump and jumper replacement; and a Joint Review Group meeting. EA also conducted interviews, walkdowns, and document reviews.

Overall, WRPS has established appropriate processes at the Tank Farms to plan and execute construction activities. The statement of work documents adequately describe the scope of work. WRPS staff and subcontractors identify and analyze hazards and establish controls for construction activities using the same WRPS corporate processes (i.e., GHA, JHA checklists, and permits). The work packages and work instructions are effective activity-level work control documents for construction activities. Joint Review Group meetings, POD meetings, and pre-job briefings affirm readiness, and the FWS oversees and coordinates construction activities. The incorporation of specific lessons learned, with appropriate controls, into the construction work instruction is an effective mechanism for using and sharing lessons learned. EA identified a few problems including the lack of inclusion of the JHA checklist in the Master Submittal Log, an inconsistency between the JHA checklist and the work instruction on fall protection, and the use of notes in work instructions that allow excess flexibility in performing steps.

Objective: The scope of work is described in sufficient detail to allow the work planning process to identify hazards associated with the work and to develop necessary schedules, priorities and work instructions.

In accordance with the WRPS Construction Management procedure, the statement of work for construction defines the work scope, processes, and requirements of the subcontractor. EA reviewed the statement of work for construction for the AY-102 Recovery Construction Phase I, AY-102 Sluice Pit Pump Removals Field Work. The summary of work included the scope of work (i.e., a work breakdown structure) and a preliminary hazard analysis. The work breakdown section included a discussion of the construction execution activities for the three sluice pit pumps and equipment removal, as well as

potential future construction activities. The preliminary hazard analysis within the document was comprehensive and included fire protection, safety case management, industrial hygiene, industrial safety, safety management, and standards. The general requirements section of the statement of work included a safety and health section that required the subcontractor to perform work in accordance with the WRPS Safety and Health Program. Another section addressed badging, dosimeters, and training requirements. Other requirements included work packages (work package planning was covered under a separate statement of work and subcontract); training and medical exams; a project execution plan; and qualifications of subcontractor staff including the FWS, the on-site safety representative, and the quality assurance representative. The work scope required all subcontractor personnel performing work within the radiologically controlled boundaries to have current respirator use training and respirator fit tests. A listing of design drawings and engineering change notices was also included. The section on communications and coordination addressed the requirement for pre-construction conferences, pre-job briefings (a guideline for pre-job briefings was attached), and work release/work packages.

The scope of work in conjunction with the preliminary hazard analysis, safety and health section, and design documents provides adequate information for the work planning process, and, met the applicable requirements.

Objective: All hazards that could potentially adversely impact workers, the public, the environment, the facility, and its equipment are documented and analyzed for severity/significance.

The WRPS Job Hazard Analysis procedure requires construction activities undergo the JHA process when hazards are beyond those evaluated within the GHA (e.g., contact with tank waste, beryllium, and asbestos). The subcontractors had prepared a JHA for each of the reviewed tasks using the WRPS JHA checklist. The JHA checklist covers a broad range of hazards, identifies the task(s), and describes the method for controlling the hazard through: 1) the use of precautions/limitations/prerequisites; 2) warning/caution; 3) work/procedure instruction; and/or 4) permit/plan/evaluation. Following the team planning meeting to review the work instructions for the pump and jumper replacement (TFC-WO-3937), the team conducted a review of the draft JHA checklist. The JHA checklist addressed all the job hazards including chemicals (e.g., polyurethane paint), radiological, tank waste, tank farm vapors, beryllium (unexpected), asbestos (unexpected), electrical, and confined spaces (unexpected). The work package to remove the hoses from the ERSS #1 and #2 (TFC-WO-14-5133) included the GHA and a JHA checklist. The American Electric safety representative had prepared the JHA checklist, which included chemicals, radiological, potential contact with waste; and vapor. Typically, the work planning team conducts a walkdown for a JHA. However, in this instance the planning team conducted a table top review instead of a walkdown, which the JHA procedure allows. The work order to remove a pump and refurbish a pit (i.e., TFC-WO-14-3513) was reviewed at a Joint Review Group meeting. This package included a job hazards analysis, an RWP, an AMW, and IH sample plan. The FWS, the subcontractor safety representative, IH and Industrial Safety representatives approved the JHA checklist. In general, the GHA, JHA checklists, and permit processes adequately identify and analyze hazards associated with construction activities.

Objective: Controls are identified and implemented that effectively protect against identified hazards, and approved activity-level work control documents can be performed as written.

Construction work is accomplished through work packages, which include work instructions. At WRPS, hazards associated with construction activities are incorporated into the written work instructions or implemented through permits. EA reviewed three Level 1 work packages, all of which were for activities with high radiological risk. EA observed a team planning meeting for the pump and jumper replacement work package (TFC-WO-3937), where attendees included the FWS, work planner, industrial safety, industrial hygiene, safety representative, DOE FR, crafts, radiological control, engineering, and project

management. The planning team went through the draft work instructions, which included precautions and limitations, cautions, and warnings. There was good team interaction, and the planning team noted a number of additions and changes. EA questioned the absence of controls related to the use of a laser and later noted that the subcontractor revised the draft JHA to address the laser hazard. In general, there was agreement between the draft JHA and the work instruction; however, the work instruction addressed the installation of a fall protection handrail around the pit and included associated precautions related to the pits/risers. The planning team had marked the fall hazard as not applicable in the draft JHA.

Overall, the work instructions are effective activity-level work control documents for construction activities. The work instructions reviewed included the appropriate controls from the JHA checklist, including precautions and limitations, prerequisites, and cautions and warnings. Some of the controls included RWPs, vapor respiratory protection, hold points, AMW, a confined space hazard identification form, an IH sample plan, an ergonomic evaluation, and a special lift plan.

Objective: Work is conducted diligently in accordance with approved work instructions and within established controls.

WRPS and the subcontractor hold a pre-construction kick-off meeting after a subcontract is awarded. The meeting includes a review of the scope of work, schedule, ES&H, chemical management, radiological controls, and contractual issues. WRPS requires high risk work packages to be reviewed by a management Joint Review Group composed of WRPS and subcontractor management, as well as appropriate SMEs and workers, whose purpose is to ensure the readiness of the work package and FWS. EA observed a Joint Review Group review of Work Order TFC-WO-3513, AY-102-02D Remove Pump and Refurb Pit. The meeting included appropriate representation from the appropriate disciplines, including IH, radiological control, engineering, safety and health, crane operators, pipefitters, operations, construction management, and DOE. Voting members included representatives from safety and health, radiological control, environmental, engineering, and ESH&Q. The FWS provided an overview of the construction work activity, and then the review group began reviewing the work instruction. The Joint Review Group chairperson expressed a concern with the excessive use of notes allowing steps to be performed concurrently, or in any order. However, for this task it was important that certain steps be performed in sequence and not in any order as the notes would allow. The Joint Review Group chairperson appropriately failed this package, requiring the work planner and FWS to revise the work instructions. During a discussion with the work planners, the planners acknowledged that the use of notes allowing flexibility in procedure step performance was a standard practice, which they considered to be an improvement in the efficiency of the work process.

Before construction activities can begin, the work must be authorized on the operations POD. Construction activities are typically included on the Retrieval/Projects Daily Release Sheet. The construction work associated with removing hoses from ERSS #1 and #2 (TFC-WO-14-5133) was not originally approved for start on the October 22, 2014, Retrieval/Projects Daily Release Sheet. The FWS noted this issue during the Construction POD meeting, and called the shift manager to obtain work start approval. Once work start has been approved, the FWS conducts a pre-job briefing, which is a prerequisite in the work instruction.

EA observed the pre-job briefing for the construction activity to remove hoses from ERSS#1 and #2. The FWS conducted the briefing and specifically requested attendees to put away their phones and pay attention to the briefing. He provided an overview of the job and a review of the work instructions. The FWS covered the hazards on the JHA checklist, hold points, emergency response (including a discussion of emergency equipment), emphasized stop work authority, and presented a relevant lessons learned. Although the pre-job briefing covered the minimum requirements, there was little interaction with the workers other than one of the attendees mentioning that the eyewash station had been moved. The FWS

asked the standard four questions that are designed to prompt worker involvement; however, they were ineffective in engaging the work force in a dialogue. (See **WRPS-OFI-OP/M-5**.)

EA observed the execution of steps within work package TFC-WO-14-5133, *C-111 Remove Hoses from ERSS #1 and #2 for Testing*, to install the glovebag and remove a sample. The worker wore appropriate PPE and respiratory protection. HPT and IH coverage was continuous. The FWS, who is responsible for overseeing and coordinating the daily work activities and for ensuring that all steps in the work packages are signed off, was at the jobsite. During this activity, the FWS had the work package/work instruction in hand, and was signing off on steps as they were accomplished. The work was stopped at a designated hold point so that the HPT could certify the glovebag. The work was conducted in a careful manner, with an appropriate emphasis on radiological ALARA.

5.4 Contractor Assurance

Objective: The WP&C processes are routinely evaluated by the Organization's Contractor Assurance System and feedback and improvement processes, and lessons learned are adequately captured and incorporated into the planning and performance of ongoing and future work activities.

EA reviewed processes used to facilitate learning from and improving AL-WP&C activities, including the collection and use of feedback after completion of activities and AL-WP&C focused assessments. Overall, Operations, Maintenance, and Construction used several effective methods to collect feedback and facilitate improvements to future activities.

Tank Farm Operations has established and implemented several mechanisms for collecting activity-level feedback and using that input to improve operational work activities. The WRPS procedure for Pre-Job Briefings and Post Job Reviews details the requirements for conducting post-job reviews. Operations work that is performed through the work package process (specifically the Tank Operations Contractor [TOC] Work Control procedure) includes requirements for post job reviews, and work records that accompany each work package also identify concerns and opportunities for improvement (OFIs). Work activities performed by shift operations, shift turnovers, day shift briefings, and the weekly turnover checklist review provide inherent feedback mechanisms. A shift briefing for the 242-A Evaporator communicated highlights from the morning POD meeting as well as issues from the preceding shift. For work activities performed through technical procedures, the post job review requirements in the Pre-Job Briefings and Post Job Review procedure are applicable, and for some Tank Farm operations activities, a post-job management review provides additional feedback and improvement opportunities. For example, the shift manager reviews the data sheets at the completion of the operator rounds and provides feedback and improvement opportunities when needed.

Construction work instructions require, as a prerequisite, that a documented pre-job briefing be conducted before working in the field. The prerequisite also includes specific lessons learned to be addressed during the pre-job briefing. These lessons learned are applicable to the work activity. The work instruction also discusses what actions are taken in the work package to prevent a similar occurrence. The incorporation of specific lessons learned, with appropriate controls, into the activity-level work control document is noteworthy and is an effective mechanism for using and sharing lessons learned. The subcontractors conduct weekly tailgate meetings with the construction forces. The tailgate meeting for October 20, 2014, included a summary of weekly injury/illness statistics, a discussion on security badges, and an update on the chemical vapors solutions team activities and the evaporator campaign.

WRPS has a company-level performance dashboard that monitors and trends data for 10 key areas including: Safety and Health, Conduct of Operations, Problem Identification and Resolution, and Performance Assessment.

WRPS tracks the application of internal and external lessons learned as a performance metric. WRPS developed a goal to achieve more than 45 lessons learned applications per month as a Special Emphasis Area. Examples include use in work planning and control packages, use at meetings, inclusion in required reading, inclusion in training, and incorporation in documents. The majority of the lessons learned applications are use in work planning packages. Based on WRPS data collection, their 3-month average exceeds the goal. EA observed some cases where use of lessons learned in work packages may not have significant relevance to the work to be performed.

WRPS recognizes that timely closure of the backlog of PERs open longer than one year is still an issue even after implementing a Long Term Corrective Action Review Board.

A sample of Management Observation Performance assessments included assessment of performance of specific activities. WRPS properly entered identified deficiencies into the site issues management system. However, some of the supporting documentation within a sample of closed issues provided insufficient information to justify closure of the specific deficiency. (See **WRPS OFI-CA-1**.)

In past assessments, WRPS and ORP identified issues regarding pre-job briefings (e.g., inconsistent conduct, inconsistent interaction with workers, inconsistent attendance, and limited time for FWS to review work package and prepare for pre-job briefings). Some recommended corrective actions have yet to be implemented while others, such as coaching, have been ineffective. During this review, EA also noted similar deficiencies with the pre-job briefs. (See **WRPS-OFI-OP/M-5**.)

5.5 ORP Oversight

Objective: Effective oversight processes have been established and implemented with respect of AL-WP&C.

ORP Oversight of WRPS is primarily through the Tank Farms Operations Division (TOD). TOD performs effective oversight in the evaluation activities of WRPS WP&C activities. TOD has identified significant deficiencies in the performance of work by WRPS. The identified deficiencies have caused WRPS to initiate WP&C PERs, causal analysis, and corrective action plans. The TOD FRs perform all TOD WP&C oversight activities including planned surveillances, reactive surveillances, and backshift observations. The TOD Director has designated a FR as the ORP WP&C SME. Although the requirements for WP&C SME are not formally defined, the SME is an FR with many years of experience and who has identified WP&C deficiencies in the TOD Operational Awareness database.

The TOD FRs obtain technical assistance from the ORP Safety and Health Division (SHD) SMEs. The SME for Radiological Control attends TOD meetings, reviews work packages to ensure they meet radiological safety requirements, and maintains a working relationship with the FRs. The SHD IH SME position assigned to Tank Farms is presently vacant but is in the process of being filled. The contracted employee who currently fills that position is a Certified Industrial Hygienist and Health Physicist, and provides IH coverage for the ORP Tank Farms via the performance of assessments and studies (such as white papers). The SHD also has a federal industrial hygienist assigned to the Waste Treatment and Immobilization Plant, who has limited availability to assist with industrial hygiene issues at the tank farm. As a result of limited federal IH support at the tank farms, the FRs are often required to shoulder the day to day industrial hygiene oversight responsibility at the tank farms. A review of the FR qualification requirements indicates that although the qualification requirements are robust, the FR training and qualifications in the field of industrial hygiene are not as rigorous as those in radiation protection. Considering the continued emphasis on potential exposures of workers to chemical vapors, additional training in industrial hygiene for the Facility Reps may be warranted. (See **ORP-OFI-1**.)

As a part of the Assessment Program Committee quarterly meeting, TOD performs quarterly trending of TOD Issues (i.e., ORPS, findings, OFIs, and Contractor strengths). This data is used for the Program Owner Evaluation of the Health of Tank Farm Project. This program owner evaluation also takes into account contractor identified significant issues, federal staff identified issues, and system operability.

WP&C issues identified by the FR are put into the ORP Issues Management System. The system is managed by the Issues Management System administrator who is trained in causal analysis. The TOD also performs self-assessments of its processes such as a September 2014 self-assessment that evaluated the TOD's compliance with the ORP Issue Management Process.

The ORP FR Program is implemented by ORP procedure MGT-PM-IP-08 R3, *Facility Representative Program*. FR oversight provides ORP line managers with information on the contractors work performance and practices including the implementation of the contractor's integrated safety management system. FRs document their activities in the Operational Awareness database in the form of operational awareness entries, surveillances, and assessments, known respectively as Level 3, 2, and 1 assessments.

The ORP Integrated Assessment Program is implemented through ORP procedure TSR-OA-IP-01, *Integrated Assessment Process*. This procedure establishes the responsibilities for implementing the ORP integrated assessment program. The ORP annual integrated assessment schedule is developed and issued in accordance with ORP procedure TRS-OA-IP-06 R4, *Assessment Program Committee*. EA reviewed the ORP integrated assessment schedule for fiscal year (FY) 2013, 2014, and 2015. During these periods, TOD had appropriately scheduled WP&C and maintenance assessments.

EA toured the 200 east area and the 242-F Evaporator with the FR. The FR was knowledgeable of the 200 east area and explained in detail the waste reduction process performed in the 242-F Evaporator, using the schematics in the 242-F Control Room. The FR also called the Radiation Protection SME before escorting EA team members into the 242-A Evaporator to verify the entry requirements for visitors, indicating an awareness of facility-specific requirements.

EA attended a pre-job briefing with the FR for a valve replacement in 242-A. EA informed the FR that the job supervisor did not discuss the topics of possible spills and actions to take if a person gets wet at the pre-job briefing. The FR relayed the EA comments to the job supervisor. During the job, both the FR and EA observed that the work resulted in a spill of potentially contaminated liquid, a wrench falling, a worker below not having on a hard hat, and the RWP action level being exceeded. The radiological control technician acted appropriately, stopping the job and controlling the spread of contamination. The FR addressed the situation by questioning the job supervisor at appropriate intervals. After the events, the FR held a meeting with the job supervisor to discuss expected recovery actions. The FR appropriately documented a reactive assessment as a result of the observations and issued a Level 3 finding.

EA attended an ALARA review with the Radcon SME. The review was conducted because contamination was found outside a CA in the building 222-S Laboratory. The SME asked questions relating to the extent of condition. The SME later reviewed the Work Package to Perform an Investigative (High Risk) radiation survey.

The ORP lessons learned coordinator is an electrical engineer that performs lessons learned duties as a collateral duty with a primary job of serving as the ORP electrical safety and Lock out/Tag out (LOTO) SME. The SME demonstrated the automated system (i.e., OPEXShare) and provided the SME list used by Mission Support Alliance to distribute lessons learned to DOE personnel. The Lessons Learned (LL) coordinator performed an assessment of the WRPS LL program from April to May 2014. This assessment identified that WRPS employees do not use the information and 20 percent of the time the

information is used for program improvement. The LL coordinator also stated that Federal SMEs no longer provide input about the usefulness of the system.

Assessments

Procedure TRS-OA-IP-01 R8 implements the ORP integrated assessment program. The ORP SHD is responsible for coordinating the ORP assessment program. The three levels of ORP assessments are Level 1 (the highest level that consists of formal assessments), Level 2 (formal assessments of ongoing programs that are narrower in scope than level one assessments), and Level 3 (operational awareness). The ORP TOD FRs regularly perform Level 3 (Operational Awareness) assessments of WRPS WP&C activities.

On November 18, 2013, ORP issued S-13-AMTF-TANKFARM-017-F0, *Emerging Trend in 242-A Work Control and Hazard Analysis Implementation*. TOD rolled up a number of recent issues and events that indicated a negative trend in WP&C into a Level 2 finding.

In the corrective action plan, the causal analysis stated that the issues identified do not indicate a programmatic failure in the work control or procedure/process program. The corrective actions, two of which remain in process beyond their expected due date, are:

1. (AC01-01) Provide a briefing to the EV Area-242A/AW/AP organizations on the results of this analysis and the importance of procedure compliance. Due Date: March 5, 2014
2. (AC01-02) Update and clarify the instructions for the 242-A Evaporator Startup for the FY-2013 Campaign Affidavit. Due Date: March 10, 2014
3. (AC01-03) Update the WPRS integrated assessment schedule to assess the Evaporator work team during the pre-RA maintenance period and the 3 to 4 week maintenance period before hot start-up for procedure compliance, rigor of work instructions/procedure proper hazard identification, and work package review and approval. The assessment will be a specialty assessment using input from senior level Management Observations. Due Date: March 10, 2014
4. (AC01-04) Update the WRPS integrated assessment schedule to assess the evaporator work team for approximately 3 to 6 months following hot start during maintenance activities for procedure compliance, rigor of work instructions/procedures, proper hazard identification, and work package review and control. Due Date: March 31, 2014

The assessments required in corrective actions 3 and 4 have yet to be performed, and ORP has yet to forecast a new date for performance of these assessments. (See **ORP-OFI-2**.)

6.0 CONCLUSIONS

Overall, WRPS has established appropriate processes at the WRPS Tank Farms to plan and control the conduct of operational, maintenance, and construction activities. For most observed activities, WRPS adequately defined the scope, analyzed the hazards and established controls, confirmed readiness, performed the work as specified and provided feedback for improvement. One notable process was the incorporation of specific lessons learned, with appropriate controls, into construction work instructions. Additionally, ORP effectively performed oversight of the contractor with respect to WP&C. FRs are trained and qualified and are identifying deficiencies in the area of WP&C. These deficiencies are being entered into the ORP issue management system and communicated to WRPS.

Although WP&C processes and procedures were generally adequate, EA noted the following deficiencies in implementation:

- WRPS did not always sufficiently tailor work scoping and planning to the emergent work activity before the pre-job briefing. This deficiency caused additional re-work, delays in work schedules, and poor allocation of craft resources.
- WRPS did not always adequately define hazards, implement controls, or provide a documented technical basis.
- Acceptance criteria in operator rounds were sometimes unclear or could not be performed as written.
- Inconsistencies occurred in construction activities between hazard analysis and controls within the JHA and the work instructions.
- WRPS did not always adequately communicate hazards and controls in pre-job briefings as required by procedures, resulting in a few cases where workers did not adequately implement the controls. Further, in several pre-job briefings, FWSs did not effectively engage workers in discussion of applicable hazards and controls.
- WRPS did not always resolve the issues identified during self-assessments or by ORP in a timely manner.

7.0 FINDINGS

None.

8.0 OPPORTUNITIES FOR IMPROVEMENT

As discussed above in the results, this independent review identified 11 OFIs. These potential enhancements are not intended to be prescriptive or mandatory. Rather, they are suggestions offered by the EA team that may assist site management in implementing best practices, or provide potential solutions to minor issues identified during the conduct of the review. In some cases, OFIs address areas where program or process improvements can be achieved through minimal effort. It is anticipated that these OFIs will be evaluated by the responsible line management organizations and either accepted, rejected, or modified as appropriate, in accordance with site-specific program objectives and priorities.

WRPS OFIs

WRPS-OFI-OP-1: Provide additional training to FWSs and work planners on the Work Change Notice process to ensure that changes to work scopes are performed in accordance with this process and that work packages and procedures are appropriate to the work activity and work scope being performed before convening the pre-job briefing for that work activity.

WRPS-OFI-OP-2: Provide additional training to NCOs and shift managers concerning the actions to be taken when performing shift rounds if an item/condition on a round sheet is not understood or cannot be performed as written or revise the operator round sheet to reflect the expected actions to be taken.

Consider including the round sheet examples in this report for discussion at the next WRPS Conduct of Operations Council meeting.

WRPS-OFI-OP/M-3: Provide WRPS FWSs with the training and tools to effectively conduct a pre-job briefing that encourages workers to participate in a discussion of work scope, hazards, and hazard controls.

WRPS-OFI-M-1: Ensure that work planning and work package development processes include the resource loading required to meet work scope, as well as, support SMEs required by permits and/or other WRPS mechanisms, e.g., HPTs required by RWP, fire watch individuals required by Hot Work permits, and IH coverage required by standing orders. Consider establishing a prerequisite in Work Instructions to match POD resource loading, work release, and needs for required support SMEs.

WRPS-OFI-M-2: Provide ES&H SMEs additional tools to assist in identification of legacy hazards including access to historic facility bases databases for prior sampling efforts. Ensure ES&H SMEs understand that hazards need to be identified prior to considering mitigating controls in the JHA process.

WRPS-OFI-M-3: Ensure that FWSs are aware of their responsibilities to verify they have addressed controls related to readiness to perform work including conduct of pre-job briefings and oversight of SMEs (e.g., HPTs and IH).

WRPS-OFI-M-4: Establish a process that ensures FWS, HPTs, and workers review AMW recommendations, including those incorporated into Work Instructions during work preparation, e.g., pre-job briefings and crew assembly (when donning PPE and at control point access). Consider additional training or other reinforcement methods to address maintaining good ALARA work practices.

WRPS-OFI-CA-1: WRPS should evaluate the timeliness and effectiveness of their corrective actions to address WP&C deficiencies and evaluate whether immediate interim actions are necessary to ensure the protection of workers, equipment, and the environment.

ORP OFIs

ORP-OFI-1: Consider additional training for the ORP Facility Reps in the area of industrial hygiene; such as the 32 hour course *Fundamentals of Industrial Hygiene* offered by the American Industrial Hygiene Association (AIHA), or an equivalent course.

ORP-OFI-2: TOD should evaluate the timeliness of WRPS corrective actions to address WP&C deficiencies and evaluate whether immediate interim actions are necessary to ensure the protection of workers, equipment, and the environment.

9.0 ITEMS FOR FOLLOW-UP

None.

Appendix A Supplemental Information

Dates of Review

Onsite Review: October 20-23, 2014 and November 3-6, 2014

Office of Enterprise Assessments

Glenn S. Podonsky, Director, Office of Enterprise Assessments
William A. Eckroade, Deputy Director, Office of Enterprise Assessments
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Pat Williams, Team Leader
James Coaxum
James Lockridge
Terry Olberding
Joe Lischinsky

Appendix B
Key Documents Reviewed, Interviews, and Observations

Documents Reviewed

ORP Procedure TRS-OA-IP-01 R8 Integrated Assessment Process
ORP Procedure TRS-OA-DI-03 R3 Control OF QA Program Description Requirements Matrix
ORP Procedure TRS-ISS-IP-02 R3 Issue Reporting and Resolution
ORP Facility Representative Functional Area Tank Farm Specific Qualification Standard
ORP Procedure MGT-PM-DI-04 R1 WCD Construction Oversight
ORP Procedure TRS-OA-IP-06 R4 Assessment Program Committee
ORP Desk Instruction MGT-PM-DI-01 On-Call Facility Representative Duties
ORP Facility Representative Log Entries
ORP Issue Report Form IR-2013-0462 Emerging Trend in 242-A Work Control and Hazard Analysis Implementation
ORP Operational Awareness Surveillance “WRPS COP for the start-up of the 242-A Evaporator
WRPS FY2014 Integrated Assessment Schedule Rev-8
WRSP-PER-2013-2145 242-A Evaporator Work and Hazard Control Performance Issues
WRPS Procedure TFC-OPS-MAINT-C-02 Pre-Job Briefings and Post-Job Reviews
WRPS Procedure TFC-OPS-MAINT-C-13 Technical Procedure Control and Use
WRPS Procedure TFC-ESHQ-S SAF-C-02 Job Hazard Analysis
WRPS Procedure TFC-OPS-MAINT-STD-02 Work Planning and Work Instruction Development
WRPS Procedure TFC-OPS-MAINT-C-01 Tank Operations Contractor Work Control
WRPS Procedure TFC-OPS-OPER-C-07 Turnover of Shift Responsibility
WRPS Procedure TFC-OPS-OPER-C-08 Shift Routines and Operating Practices
WRPS Procedure TFC-PLN-47 Worker Safety and Health Program
RPP-16922 Environmental Specification Requirements
WRPS Daily Reports
Standing Order OPS-13-011 Guidance for Retrieval Operations
TF-OR-DR-AN AN Daily Rounds
TF-OR-A-02 242-A Evaporator Backside Rounds & Supporting Documents
TO-080-503 Core Sampling System Push Mode Operations & Supporting Documents
TF-OSR-01 242-A Evaporator Environmental Verification Surveillance & Supporting Documents
Work Order TFC-WO-14-3130 241-C-102, Install Sluicer #2 @ Riser #2
Work Order TFC-WO-14-6116 Put C-102 Sluicer Box in Safe Shutdown Condition
Work Order TFC-WO-13-1831 241-C-107 Perform ‘Drag’ Grab Sample & Supporting Documents
WRPS JHA Checklist Instructions
TFC-OPS-MAINT-C-01 Tank Operations Contractor Work Control
TFC-OPS-MAINT-STD-02 Work Planning and Work Instruction Development
TFC-OPS-OPER-C-13 Technical Procedure Control and Use
TFC-ESHQ-SAF-C-02 Job Hazard Analysis
TFC-OPS-MAINT-C-02 Pre-Job Briefing and Post-Job Reviews
TFC-OPS-OPER-C-28 Lessons Learned
LAB-WO-12-0508 Capacitor Bank Replacement Work Package, including Work instruction, Special Lift Plan, JHA and associated vendor documentation
LAB-WO-12-1319 Decontamination Large Load in Port 1E Hot Cell Work Package including Work Instruction, associated JHA, RWP and AMW
TFC-14-4525 SY 102 Riser 4 zip cord placement Work Package, including Work Instructions, JHA and RWP
TFC-14-5754 Valve disassembly and testing (XRF) Work Package, including Work Instruction, JHA and RWP

TFC-ESHQ-Q-INSP-P-03 Acceptance Testing of X-ray Generating Device (XRF)
TFC-14-2419 222S Laboratory HVAC replacement Work Package, including Work Instruction, JHA and associated documentation
TFC-14-2419 222S Laboratory HVAC replacement, event draft report, background documentation including prior testing and correspondence
TFC-14-5605 C0111 Drain high pressure water skid & hoses Work package, including Work Instruction LOTO plan, JHA, RWP and associated documentation
Various standing orders associated with implementation of the use of respirator protection within Tank farms
Post Job Review TFC-WO-14-3911 and 14-3912
54891 Release 01, Part 1, Statement of Work for Construction, AY-102 Recovery Construction Phase I, AY-102 Sluice Pit Pump Removals Field Work, R0, 8/22/2014
TFC-WO-14-3937, 241-AZ01A Pump and Jumper Replacement, R3
TFC-WO-14-5133, C-111 Remove Hoses from ERSS#1 and #2 for Testing, R0
TFC-WO-14-3513, AY-102-02D Remove Pump and Refurb Pit
TFC-PRJ-CM-C-01, Construction Management, Rev B-6, 9/15/2014
TFC-BSM-CP-CPR-D-02.10, Construction Contracting, Rev A-6, 1/27/2011
Tailgate Powerpoint Presentation, 10/20/2014
Pre-construction (kick-off) meeting minutes, meeting number 54891-001-09-14-001-R00, Project T1P97, AY-102 Recovery Construction Phase I – Sluice Pit Equipment Removal Field Work, 09/23/2014

Interviews

Shift Managers
Shift Operators
Nuclear Control Operators
Work Planners
Field Work Supervisors
Manager (Acting), Industrial Hygiene
Program Industrial Hygienists
Chemical Vapor Solutions Team Members
WRPS Procedure Writers
ORP Facility Representatives
WRPS Conduct of Operations Program Manager
WRPS ES&H Deputy Manager
WRPS RadCon Program Manager
WRPS Engineers
Health/Safety Technicians
Health Physics Technicians
Laboratory Facilities Manager
Maintenance Field Work Supervisors
Maintenance Workers
Maintenance Work Planners
Maintenance Work Planning Supervisor
Industrial Hygienist and IH Technicians
Industrial Safety Representatives
Operations Engineers
Radiological Protection Program Supervisors
Radiation Protection First Line Supervisors
Tank Farm Operations Managers
Quality Inspector

WRPS Construction and Commissioning Manager
URS Construction Safety
WRPS Work Planner Group Meeting
DOE Construction Oversight
WRPS Manager, Performance Assurance
WRPS Contractor Assurance POC
WRPS Lessons Learned Coordinator
WRPS Organizational Performance Improvement Manager

Observations

242-A Evaporator Backside Daily Rounds
AN and C Tank Farm Daily Rounds
Core Sampling System Push Mode Operations
C-102 Sluicer Box Safe Shutdown
241-C-107 Perform 'Drag' Grab Sample
241-AZ Pump Jumper Replacement (Planning Meeting)
C-102 Installation of Enhanced Reach Sluicing System (Pre-Job)
Daily Plan of the Day Meetings (G206 & MO511)
Pre-Job Briefings
Pre-Job Brief for LAB-WO-12-0508 Capacitor Bank Replacement
Hoisting and rigging associated with LAB-WO-12-0508 Capacitor Bank Replacement
Pre-Job Brief for LAB-WO-12-1319 Decontamination Large Load in Port 1E Hot Cell
Donning PPE, work prep and entry for LAB-WO-12-1319
Pre-Job Brief for TFC-14-4525 SY 102 Riser 4 zip cord placement
Donning PPE, work prep and entry for TFC-14-4525 SY 102 Riser 4 zip cord placement
Pre-job Brief for TFC-14-5754 Valve disassembly and testing (XRF)
Work prep, disassembly and XRF testing TFC-14-5754
Conduct of XRF equipment set-up TFC-ESHQ-Q-INSP-P-03
Walk-down of areas and discussion of events associated with work stoppage TFC-14-2419
Pre-Job Brief for TFC-14-5605 C0111 LOTO associated with drain high pressure water skid & hoses
Walk down 222S Laboratory facilities and ongoing maintenance activities
TVAT meeting/briefing for IH staff
Plan of the Day (POD) meetings for 10/21, 10/22, 10/23, 11/3, 11/4, 11/5/2014
Construction work for project C111 Remove Hoses from ERSS#1 and #2 for Testing
Operations plan of the day meetings
Construction POD meeting
Pre-job briefings
Team planning meeting to review the work package for pump and jumper replacement
Joint Review Group meeting