

**Office of Enterprise Assessments
Targeted Review of
Work Planning and Control at the
Hanford Central Plateau
Environmental Remediation Projects**



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**Office of Worker Safety and Health Assessments
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Acronyms

ACE	Apparent Cause Evaluation
AJHA	Automated Job Hazard Analysis
ALARA	As-Low-As-Reasonably-Achievable
AL-WP&C	Activity-Level Work Planning and Control
AMW	As-Low-as-Reasonably-Achievable Management Worksheet
ARA	Airborne Radioactivity Area
ASME	Assistant Manager for Safety and Environment
BTR	Buyer's Technical Representative
CAS	Contractor Assurance System
CFR	Code of Federal Regulations
CHA	Craft Hazard Analysis
CHPRC	CH2M HILL Plateau Remediation Company
CR	Condition Report
CRRS	Condition Reporting Resolution System
D&D	Deactivation and Decommissioning
DOE	U.S. Department of Energy
DOP	Division Oversight Plan
EA	Office of Enterprise Assessments
EM	Office of Environmental Management
EPC	Engineering, Projects, and Construction
ESQ	Environmental Safety and Quality
FR	Facility Representative
FWS	Field Work Supervisor
FY	Fiscal Year
GHA	General Hazard Analysis
HRB	Hazard Review Board
IEP	Integrated Evaluation Plan
IMS	Issues Management System
JHA	Job Hazard Analysis
JSA	Job Safety Analysis
MOP	Management Oversight Program
MSR	Maintenance Service Request
NSD	Nuclear Safety Division
NSPEB	Nuclear Safety Performance Evaluation Board
OA	Operational Awareness
OFI	Opportunity for Improvement
OOD	Operations Oversight Division
ORPS	Occurrence Reporting and Processing System
OS&IH	Occupational Safety and Industrial Hygiene
PFP	Plutonium Finishing Plant
POD	Plan of the Day
PPE	Personal Protective Equipment
PRF	Plutonium Reclamation Facility
PTS	Project Technical Services
RL	Richland Operations Office
RL-MOP	RL - Master Oversight Plan
RM	Responsible Manager
RWP	Radiological Work Permit
SGRP	Soil and Ground Water Remediation

SME	Subject Matter Expert
SSOE	System Safety Oversight Engineer
SWOC	Solid Waste Operations Complex
TE	Technical Evaluation
WHA	Worksite Hazards Analysis
WP&C	Work Planning and Control

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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 within CH2M HILL Plateau Remediation Company (CHPRC). CHPRC is the prime contractor for the environmental cleanup of the Central Plateau of the Hanford Site. The Richland Operations Office (RL) provides Federal oversight of CHPRC.

EA's review of CHPRC activity-level work planning and control focused on operations and maintenance at the Plutonium Finishing Plant and construction activities performed by CHPRC and subcontractors at the 105K Annex to support the CHPRC soil and groundwater work scope. EA also reviewed the CHPRC assurance and the RL oversight processes as they relate to work planning and control. This review was part of a broader EA targeted review of activity-level work planning and control across the DOE complex.

Overall, CHPRC has established appropriate processes at the Hanford Site to plan and control operational, maintenance, and construction activities. For most observed activities, CHPRC adequately defined the scope, analyzed the hazards, established controls, confirmed readiness, performed the work as specified and provided feedback for improvement. Pre-job briefings were generally effective in communicating hazards and establishing controls. Most observed work was performed within the established controls.

However, much of the observed work was performed as skill-based. In these cases, CHPRC did not always sufficiently define work scopes to be able to identify hazards, tailor the work activity, and develop and implement the appropriate controls. EA identified examples at the Plutonium Finishing Plant and construction/subcontracted work activities where the skill-based approach to work resulted in hazards that were missed or not sufficiently analyzed. As a result, hazard controls were not always well defined or identified.

Overall, the CHPRC contractor assurance system is effective in scheduling and performing work planning and control oversight. The contractor assurance system can identify and manage issues; however, the system has been ineffective in resolving issues related to ensuring that work identified as skill-based is, in fact, skill-based and that all the subsequent hazards have been analyzed.

RL is effective in performing oversight of the contractor's work planning and control processes. RL has a well-defined qualification and requirements process for facility representatives, subject matter experts, and system safety oversight engineers. These personnel are identifying deficiencies in the area of work planning and control and providing appropriate input, observations, and analyses. These deficiencies are being entered into the RL issue tracking system and communicated to CHPRC.

**Office of Enterprise Assessments Targeted Review of
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1.0 PURPOSE

The U.S. Department of Energy (DOE) Office of Environment, Safety and Health Assessments, within the Office of Enterprise Assessments (EA), conducted a targeted review of the activity-level work planning and control (AL-WP&C) processes and activities within CH2M HILL Plateau Remediation Company (CHPRC). CHPRC is the prime contractor for the environmental cleanup of the Central Plateau at the Hanford Site. The Richland Operations Office (RL) provides Federal oversight of CHPRC. The onsite portions of this EA targeted assessment were conducted from December 1 to 5 and 15 to 19, 2014.

This independent review is part of a larger-scale targeted assessment of AL-WP&C across the DOE complex. 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 letter and Technical Report (DNFSB/Tech-37).

2.0 SCOPE

EA conducted this review of the AL-WP&C program at CHPRC in accordance with *Plan for the Office of Enterprise Assessments Targeted Review of Work Planning and Control*. EA reviewed the documented processes, including work planning and control (WP&C) procedures, hazard analyses and controls, technical procedures, maintenance work packages, construction work packages, and other WP&C documents; interviewed key RL and CHPRC personnel; observed meetings; and conducted other data-and construction, including the performance of job hazard analyses (JHAs), Job Safety Analyses (JSAs), activity walkdowns, senior management reviews, work authorization activities, pre-job or pre-evolution briefings, execution of work activities, post-job feedback, and contractor assurance system (CAS) activities. The scope of this assessment also included a focused review of RL processes for oversight of the contractor's AL-WP&C activities.

3.0 BACKGROUND

The EA independent assessment 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 and 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 227.1, *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 that exist 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. EA selects, prioritizes, and plans assessment activities based on such factors as risk to workers and the public, facility operational status, and performance history.

The Hanford Site occupies 586 square miles in Benton County, Washington. RL oversees cleanup along the Columbia River and in Hanford's Central Plateau including groundwater and waste site cleanup; management of solid waste, spent nuclear fuel, and sludge; facility cleanout, deactivation, and demolition; environmental restoration; plutonium management; and all site support services. CHPRC is the prime contractor for the safe, environmental cleanup of the Central Plateau at the Hanford Site. CHPRC is responsible for waste retrieval and fuels management, groundwater and vadose zone remediation, demolition of facilities and canyons, and closure of the Plutonium Finishing Plant (PFP). Along the Columbia River, CHPRC is also remediating the 100K Area, which includes preparing for the treatment of highly radioactive sludge that is now in the K West Basin, where it will be stored until it can be treated.

4.0 METHODOLOGY

EA's *Plan for the Office of Enterprise Assessments Targeted Review of Work Planning and Control at the Richland Operations Office* identified the criteria to be used to evaluate AL-WP&C. This review focused on performance and implementation of site AL-WP&C processes. EA also evaluated identified weaknesses for potential causes.

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

5.0 RESULTS

The results of this EA review are provided by work type, followed by the results of EA's assessment of contractor assurance and RL oversight.

5.1 Plutonium Finishing Plant Project Operations and Maintenance

The mission of the PFP Project is to provide for safe stabilization, interim storage, repackaging, and shipment of the PFP inventory of plutonium-bearing materials, spent nuclear fuel, and other nuclear material to other locations for reuse, long-term storage, and/or final disposition. This mission requires deactivating and dismantling PFP systems and structures to the degree determined appropriate via the National Environmental Policy Act (NEPA) / Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) / Resource Conservation and Recovery Act (RCRA) processes to eliminate significant hazards to workers, the public, and the environment and to minimize long-term surveillance and maintenance risks and costs. During this review, EA observed WP&C associated with a sampling of ongoing activities at PFP in the areas of operations, maintenance, and deactivation and decommissioning (D&D). Specifically EA observed elevator corrective maintenance, 242-Z Americium Recovery Facility D&D operations, 236-Z Plutonium Reclamation Facility (PRF) Canyon crane repair activities, and waste operations. EA's evaluation of the observed activities at PFP in relation to the five core functions of integrated safety management is discussed below.

Generally, the PFP Project adequately implemented CHPRC work management processes to identify activity-level work scopes and analyze and control hazards. Workers performed work diligently in accordance with written procedures and required controls. Managers, supervisors and operations, craft,

and environment, safety, and health personnel were experienced, knowledgeable of assigned work activities, and interacted with each other in a professional manner. Observed pre-job briefings were thorough, interactive, and tailored to the shift activities. However, in a few areas involving skill-based work and control implementation, EA identified concerns with overly broad work scope, missed hazards, and insufficiently defined hazard controls.

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.

PRC-PRO-WKM-12115, *Work Management*, requires all CHPRC work to be performed in accordance with approved work instructions, procedures, periodic maintenance and surveillance datasheet instructions, or contractual statements of work. PRC-PRO-WKM-12115 describes the work management process for initiating, validating, developing instructions for, approving, scheduling, releasing, performing, changing, and closing out new work documents. Periodic Maintenance and Surveillance Testing activities are developed per PRC-PRO-MN-19304, *Periodic Maintenance Process*. Technical procedures are developed per PRC-PRO-MS-589, *CH2M HILL Plateau Remediation Company Procedures*.

The scope of activity-level work activities performed at PFP is generally well defined in operations and maintenance procedures, work packages, work instructions and Plan of the Day (POD) daily reports. For example, Technical procedure ZO-200-022, *Load, Tie Down and Ship TRU/TRU Mixed Waste and LLW/LLW Mixed Waste Drums and Boxes*, clearly identified the purpose and scope for a mixed low-level waste drum shipment performed during the review, including hazards, controls, and steps required for loading drums on the shippers transport vehicle and for completing the necessary transport documentation and radiation surveys. Similarly, the 234-5Z Globe Elevator Corrective Maintenance and Pit Clean Up Maintenance Work Package contained written work instructions that clearly defined the scope of the job and associated tasks and steps for work completion. Work Package 2Z-13-07371/M WCN*1, Preparation of 242 for Demolition, also adequately defined the work scope and steps necessary for setting up the work area, entering and exiting 242-Z, and dismantling and removing three glove boxes and associated debris.

As discussed in Section 5.2 below, work scopes in a number of observed construction work activities were too broad to ensure identification of all applicable hazards and controls. EA observed a similar example at PFP where the work scope of the PRF Crane Repair repetitive use work package was too broad to permit effective evaluation of all applicable hazards. As a result, the responsible manager (RM) did not effectively ensure proper application of hazard analysis requirements during work package scope changes, resulting in a hoisting and rigging hazard that was not properly identified and analyzed per institutional requirements. This hoisting and rigging hazard is further discussed in the hazard analysis section below. (See **CHPRC-OFI-PFP-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.

PRC-PRO-WKM-079, *Job Hazard Analysis*, provides several mechanisms to ensure that work hazards are identified, analyzed, and documented. These mechanisms include the General Hazard Analysis (GHA) and Craft Hazard Analysis (CHA), which provide a documented hazard analysis and identify the control measures for hazards that are common to the core activities of the workers' assigned job positions. The GHA and CHA form the foundation for all hazard analysis methods described in PRC-PRO-WKM-079, and are among the criteria used by the RM in making the determination that work is skill-based work. Skill-based work is a hazard level category in the CHPRC JHA process for work where employees

can reasonably be expected to recognize and know how to mitigate hazards based on their fundamental knowledge and training.

For work that does not meet the skill-based criteria, PRC-PRO-WKM-079 requires a task/activity specific Automated JHA (AJHA). However, this procedure allows the RM to waive the performance of an AJHA when the only skill-based criterion not satisfied is radiological, although the work is still considered to be “beyond skill-based.” All radiological work requires formal risk-ranking that dictates the level of required hazards analysis. One criterion of skill-based work is that it must be non-radiological or low-hazard radiological work. Low-hazard radiological work may include only completion or assignment of a or job-specific RWP, whereas medium- and high-hazard radiological work requires more comprehensive analysis, including completion of an As-Low-As-Reasonably-Achievable (ALARA) Management Worksheet (AMW), mandatory controls in the work document, job-specific RWP, and higher level of radiological control management review.

The prevalence of radiological hazards causes much of the work at PFP to be classified as beyond skill-based, and for radiological work observed by EA, RMs did require AJHAs be performed. Radiological protection personnel analyze radiological hazards concurrently with AJHA hazard analysis. EA observed two beyond skill-based jobs requiring AMWs. The AMWs were of high quality and used effectively in evaluating radiological hazards and developing appropriate controls in the applicable RWPs and work documents.

As indicated above, repetitive use Work Package 2Z-14-04129, Repair PRF Canyon Crane, was used to troubleshoot and repair a malfunction of the canyon crane. This work package is prepared annually for repetitive use because of failures that frequently occur with various canyon crane components. This work package contains basic information on hazards and controls that are necessary to properly enter and exit the canyon airborne radioactivity area (ARA) to perform basic crane system inspections and troubleshooting. To accomplish specific troubleshooting and repair work scopes, PFP uses the change control process from PRC-PRO-WKM-12115 to create one or more maintenance service requests (MSRs), which are incorporated as addenda to the base repetitive use work package. However, for the troubleshooting and repair activity being performed during EA’s review, the RM and associated reviewers did not follow the institutional work management process to analyze changes to existing hazard analysis based on the specific work scope of the MSR, resulting in a lifting hazard that was not properly identified and analyzed as required by PRC-PRO-WKM-12115 and PRC-PRO-WKM-079. (See **CHPRC-OFI-PFP-2.**)

While the hazards and controls associated with canyon entry for troubleshooting activities were adequately addressed by the original AJHA and work package, the lifting and rigging hazards associated with the replacement of the failed 330 pound crane motor assembly were not anticipated and were not addressed in the original AJHA or during the change control process, as required, before authorizing the change to the work document and then performing the work. Specifically, the RM and other reviewers did not evaluate the new hazard and controls, as required by PRC-PRO-WKM-079, and did not engage the industrial safety subject matter expert (SME) for formal review and approval of the MSR, per the change control requirements of PRC-PRO-WKM-12115. Following these requirements would have invoked the need for a critical lift determination per the Hoisting and Rigging Manual; however, no documentation indicates that a critical lift determination was made. The proposed activity appears to meet the critical lift criteria in the hoisting and rigging manual due to cost and schedule impact that could occur if the load were mishandled and dropped. The lift also meets the hoisting and rigging manual requirements for a special/engineered lift of “non-routine rigging configurations being used or items requiring special care because of size, weight, close tolerance installation, or high susceptibility to damage.” Proper evaluation and disposition of these requirements are not reflected in the work package.

In 2013, RL issued a finding from a PFP Facility Representative Surveillance to CHPRC about using maintenance service requests because such requests are not specifically recognized in the CHPRC work control process and the work scope covered by the MSR is unknown when the repetitive use work package is being developed. CHPRC evaluated the finding and documented their position that the MSR is consistent with the authorized change control process for work packages as described in PRC-PRO-WKM-12115. However, based on this review, CHPRC does not always follow these requirements with sufficient rigor. (See **CHPRC-OFI-PFP-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.

D&D activities at PFP present special challenges in the control of radiological and non-radiological hazards because engineered controls such as glove boxes and ventilation systems can no longer serve as the primary hazard barriers. While negative ventilation and temporary containments are used in lieu of the permanent engineering controls wherever possible, many activities require extensive use of personal protective equipment (PPE), such as encapsulating suits and elaborate respiratory protection, to effectively limit exposure potential. Use of these controls present additional human factors concerns such as ergonomic hazards, limited mobility and visibility, and the potential for heat stress. Because of this, CHPRC has developed advanced dress/undress training as an admin control which is required for each person required to use/support use of this extensive PPE. Workers observed in these operations were able to perform work effectively under these adverse conditions. For example, assigning sufficient support personnel significantly improved the ARA entry process for work in 242-Z and the PRF canyon. This included support staff members who were systematically assigned to assist workers and ensure proper PPE donning and doffing, breathing air bottle changes and monitoring, airlock and containment tent entry and exit, and overall direction and control for work involving multiple hazards and personnel with different assignments.

As noted above, AMWs for work involving ARA entries were comprehensive and properly used as a basis for developing appropriate radiological controls. For example, the use of a technical evaluation formed the basis discussed in AMWs for ensuring real time assessment and control of any significant increases in radiological airborne concentrations in work locations where use of a real time continuous air monitor was impractical. This was accomplished by requiring count rate measurements on portable air filter media every five minutes using handheld instruments and comparing the results with predefined action thresholds. Controls for many non-radiological hazards were also effectively defined and clearly identified in controlling work instructions and work packages. For example, work instructions specifically identified controls needed for sharps and chemical use during globe elevator corrective maintenance and 242-Z D&D, and work package attachments discussed industrial hygiene exposure assessments for each chemical.

EA observed a few examples of lack of specificity and accuracy of certain RWP information and survey records for 242-Z work, indicating some inattention to detail in preparation and approval. This lack of specificity and accuracy included different respiratory protection requirements for the same areas, resulting in potential for confusion or incorrect PPE, and several transcription errors associated with ARA actions levels and limits. In addition, survey records did not provide a record of each measurement that was taken to evaluate the rate of rise when using the CHPRC radiation protection Technical Evaluation (TE) TE-PFP-12-002 in lieu of a continuous air monitor. This TE requires a measurement of the air sample filter media every five minutes using a handheld meter to evaluate the rate of rise against the RWP action levels and suspension limits. Only the highest reading obtained during the evolution was recorded. However, complete accounting of all results may be appropriate, to provide clear evidence all were properly accomplished. EA discussed and reviewed these anomalies with radiological control management. (See **CHPRC-OFI-PFP-3.**)

EA also observed vulnerabilities associated with skill-based work and use of skill-based controls at PFP and construction (described in Section 5.2). Specifically, SME's are not always effectively tailoring hazards and controls to the specific work activity being performed, consistent with the guiding principles of Integrated Safety Management. PRC-PRO-WKM-079 gives RMs broad latitude when determining whether work is skill-based and deciding whether AJHA skill-based controls are included in written work instructions. In some cases, RMs do not conservatively apply these skill based provisions because of the subjectivity inherent in such determinations. The examples below highlight this vulnerability. (See **CHPRC-OFI-1.**)

EA discussed MSR-SR-14-04129-30-00 with the RM because the MSR did not specify how the 330 pound motor assembly would be removed and replaced with a new one. Specifically, the MSR did not specify how the new motor assembly would be transported from its pallet into the canyon, onto the work platform, and installed overhead. The RM indicated that the skill-based controls contained in the CHA for iron worker/rigger were sufficient because the CHA referenced generic lifting hazards and use of chain falls and come-along devices as controls. However, the lifting hazard was never formally evaluated and documented through a revision to the original AJHA or a work entry record, Reliance on the existence of a generic CHA reflects lack of proper tailoring of the hazards and controls to the specific work as required by PRC-PRO-WKM-079. More importantly, the CHA does not presume the adverse work environment of the canyon (e.g., limited mobility, limited visibility, and limited breathing lines, as well as very tight quarters on an elevated work platform). PRC-PRO-WKM-079 requires that SMEs tailor AJHA controls to fit the hazard for the specific situation, and states "*It is important to note that the application of some controls (e.g., lock out/tag out [LOTO], use of Personal Protective Equipment [PPE], erection of scaffolding, etc.) may, in some cases, introduce new hazards or risks and may affect decisions about what controls to apply or how best to apply them. This complex integration is an important aspect of the Team Work Planning and AJHA processes*". Also, special rigging devices were being fabricated and special techniques were being discussed during iterative planning with engineering on how to safely move the motor assembly in this environment. The need for special planning invalidates the premise that the work and controls for this situation are skill-based.

Also, as previously discussed, there is no evidence of a critical lift or engineered lift determination or development of a special lift plan for this activity. The MSR work instructions contained no details regarding engineering's assessment of the proper approach to safely removing the old motor, getting the new motor into and through the containment tent and onto the canyon mezzanine, over the mezzanine railing and onto the work platform, and lifted into position for installation. The use of a skill-based approach to this activity is not sufficient given the iterative planning and complex and hazardous work environment where visibility, mobility, and space constraints not addressed by the GHA and CHA could impact worker abilities and increase the potential for worker error and undesired consequences. (See **CHPRC-OFI-PFP-4.**)

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

Readiness to perform work at PFP is verified on a daily basis using POD schedules, POD meetings, shift manager meetings, shift briefings, and pre-job briefings. PFP work management personnel conduct a POD meeting each afternoon to review the scheduled work activities for the next day and again each morning to discuss any changed conditions. Field work supervisors (FWSs) hold pre-job briefings for all involved workers prior to commencement of operational work activities. The pre-job briefings provide workers with relevant facility information, safety topics, and assignment of jobs for the day. Observed pre-job briefings were well attended, interactive, detailed, and effectively communicated job assignments, support needs, and work priorities.

Workers performed most observed operations in accordance with written procedures and required controls. Operations, craft, and radiological control technicians were experienced, knowledgeable of their assigned work activities, and interacted with each other in a professional manner.

EA observed a few potential weaknesses in two evolutions. During the globe elevator maintenance work, out of service postings were placed on elevator doors, consistent with work instructions. However, during the work steps, workers discovered the elevator had been moved and was not at the original floor level as required. Work was suspended to determine the path forward, including the use of barricades and physical security, in addition to the postings on the elevator doors, to prevent elevator movement prior to lock out/tag out completion. However, the RM did not require a change to the work instructions to reflect the lessons learned and new requirements for physical security and barricades, as would be expected under institutional conduct of operations requirements to follow procedures as written. (See **CHPRC-OFI-PFP-5.**)

For the PRF Crane repair work mentioned earlier, PFP management did not effectively ensure readiness to perform work before authorizing work under MSR-SR-14-04129-30-00. Specifically, the PFP management chain approved and authorized MSR-SR-14-04129-30-00 for work before completing ongoing iterative engineering and planning discussions regarding the methods for safely removing and replacing the motor assembly. According to the work record, the FWS, unreviewed safety question screener, Hazard Review Board (HRB) Chair, Release Authority, and RM approved this MSR. Portions of the MSR were worked that same day, concurrent with ongoing planning discussions between engineering, management, and craft about the proper path forward on installing and removing the drive motor as well as options for getting the new motor into the canyon. Removal and replacement of the motor assembly, while authorized, was not completed. During the day's entry, workers discovered size constraints associated with removing the old assembly from its installed position, which required some additional planning and engineering discussion on the path forward. However, the entire MSR, including generic steps for removal and installation, had already been authorized to work. (See **CHPRC-OFI-PFP-6.**)

5.2 Construction and Subcontracted Work Activities

Construction and other subcontracted work activities are a growing work control segment within the CHPRC work activities at the Hanford site. At present, all construction and subcontracted work is performed by 16 CHPRC subcontractors comprising a workforce of approximately 110 craft supplied through the local building trades union. The Project Technical Services (PTS) organization manages construction activity for CHPRC, as described in PRC-PRO-CN-14990, *Construction Management*, and PRC-PRO-CN-8006, *Construction Work Authorization*. PRC-PRO-SH-40078, *Contractor Safety Processes*, and PRC-PRO-MS-40213, *Subcontractor Oversight*, define the construction and subcontractor oversight and support activities for occupational safety and industrial hygiene (OS&IH) support.

At the work activity level, construction and subcontracted work processes generally use the same CHPRC work control processes as CHPRC maintenance, D&D, and operations activities. For example, the CHPRC work control procedures for work management (PRC-PRO-WKM-12115), pre- and post-job reviews (PRC-PRO-WKM-14047), and the conduct of JHAs (PRC-PRO-WKM-079) apply to construction work activities as well as other CHPRC organizations.

During this assessment, EA reviewed ongoing construction activities at the 100K Annex construction project and construction and other subcontracted work in support of CHPRC soil and ground water projects. A variety of CHPRC subcontractors under the direction and oversight of CHPRC FWSs performed all observed work. At the 100K Annex project, observed construction work included interior finishing, installation of mechanical equipment, and miscellaneous work activities. At the soil and

groundwater construction projects, observed work included the installation of an asphalt apron at the Waste Sampling and Characterization Facility; construction of a weather enclosure at the 200 West Pump and Treat area; and fabrication, welding, and routine activities in the PTS craft maintenance shop. EA observed construction pre-job briefings and field construction work activities and conducted interviews, walkdowns and document reviews. All of the observed work was skill-based, with varying degrees of work instructions and hazard analyses as described in the following paragraphs.

Overall, CHPRC has established appropriate processes and procedures for construction and subcontracted work activities to plan and execute construction activities, and in a number of cases, the work control process was adequately implemented. However, in a few examples, work scopes were too broad or limited to adequately define the hazards and controls, or the hazards and controls were not tailored to the specific work activity in the work package. In cases where work was not well defined or hazards were not identified and/or tailored to the work activity, controls were missed, placing some workers at risk.

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 CHPRC *Construction Work Management Integration* procedure (PRC-STD-CN-40381) provides construction/subcontractor related work planning methods and expectations for PTS project and CHPRC facility management. The procedure dictates that subcontract work planning begins with the project manager, followed by the buyer's technical representative (BTR) who forwards a work package request and statement of work to PTS planning for initial work package development. The RM validates the work request, and the work package planner begins a draft work package and development of work instructions using CHPRC institutional WP&C guidance provided in the CHPRC *Work Planning Guide* (PRC-GD-WKM-12116). In general, EA found this process of work planning to be an effective mechanism for construction/subcontractor WP&C if appropriately implemented.

The work scope in reviewed construction and subcontracted work packages was sometimes discrete and well defined. For example, the work package for fabricating and welding materials in the PTS shop provides the instructions and controls for welding activities. In other work observations, the work scope was not always specified, resulting in hazards that could not be easily identified and analyzed. As a result, in some cases, the appropriate controls were not implemented. For example, EA identified that the work scope for the K100 Annex was not adequately defined in the construction work package, *Perform Misc. Work Activities for Annex Construction*. According to this work package, "the scope of the work package is to provide instructions for miscellaneous activities for construction forces supporting the 105KW Annex." Although the work steps provide a sampling of miscellaneous work activities, it does not specify whether the workers are limited by these activities or can perform other miscellaneous work activities. EA also observed the work planning for the application of fire caulking at the 100K Annex which was to be installed by a vendor using the vendor's procedures and/or protocols. The FWS and work planner stated that the CHPRC approach included an existing work package for ECRTS Annex Interior Finishes without modification to apply the caulking under Step 5.21 of the work instruction to "perform miscellaneous material/component installing including doors and hardware; lockers; fire extinguishers; base cove; storage cabinets, benches/tables and other finish material." The fire caulking application process, including the introduction of a new hazardous chemical, was beyond the pre-defined work scope for a finishing material. (See **CHPRC-OFI-C-1.**)

An example of a broad scope work package that encompasses a variety of construction and subcontracted work activities is the Construction Craft Maintenance/Shop work package that, based on the job description provided with the CHPRC work release for this package, includes tasks such as general housekeeping/janitorial work; monthly preventive maintenance; material segregation, loading, and

handling with or without equipment; electrical and mechanical shop work; building material storage/shelves; and supporting office moves. For each of these tasks, there is no further discussion of the work tasks involved in performing the activity, nor are the skill-based requirements and the limits of the skill-based work defined. For example, the FWS over janitorial services indicated that the housekeeping/janitorial work task involves at least 13 specific activities, which are not identified or described in the work package (or elsewhere), such as sweeping and mopping non-carpeted floors, cleaning bathrooms, cleaning up shop work benches and shop work areas, and using commercial cleaning supplies. Each of these activities could involve an array of hazards (ranging from chemical and biological hazards to ergonomic concerns) that would not be recognized without a defined work scope. (See **CHPRC-OFI-C-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.

The CHPRC JHA procedure establishes the minimum requirements for integrating an activity-based JHA into all field work including construction/subcontracted work activities. In general, CHPRC uses three tools for performing a hazard analysis: the GHA, the CHA, and a web-based AJHA. The hazards and controls in the GHA and CHA documents are intended to suffice when the job has been determined to be skill-based work. CHPRC had determined that the construction/subcontracted work observed by EA was skill-based and relied on the GHA and CHA as the minimum hazard analysis required, even though a number of the construction/subcontractor work packages observed also included output from an AJHA. A Job Safety Analysis (JSA), which is unique to the construction process, was also included but not required since the JSA would typically only cover the subcontractor's activities.

The content and quality of the reviewed GHA, CHAs, and AJHAs were generally robust and included well defined controls. However, EA identified some exceptions (discussed below). The GHA sometimes included a discussion of the controls and typical injuries that could result from the hazard if not adequately controlled. Reviewed CHAs for pipefitters, sheet metal workers, and laborers were also generally well designed and informative.

Although the content of the reviewed hazard analysis documents was adequate, CHPRC did not always adequately tailor the hazard analysis to the observed work activities in accordance PRC-PRO-WKM-079, *Job Hazard Analysis*. For example, the aforementioned housekeeping/janitorial task is identified but not described in the Construction Craft Maintenance/ Shop Work package. This particular work package includes a 21 page AJHA Hazard Report which describes 28 hazards and the associated controls. However, although this work package encompasses a number of widely varied work activities with respect to hazards, it does not specify which hazards pertain to the housekeeping/janitorial work scope (which is not defined as previously discussed). Furthermore, the CHA for laborers (the craft who typically perform housekeeping/janitorial work) does not identify housekeeping/janitorial work as a characteristic duty of a laborer, and therefore is not helpful at defining or tailoring the hazards associated with this work activity. Therefore, it is not evident when reading the laborer's CHA that a laborer has all the craft skills necessary to perform the housekeeping/janitorial function. (See **CHPRC-OFI-C-2.**)

For observed construction/subcontracted work activities, there is inconsistency and confusion regarding the use and application of the work hazard analysis (WHA) process. The WHA process is described in the CHPRC JHA procedure, and the WHA is intended to "assist the FWS/workers in the review of the current work activity/ environment, look for changes, and confirm the initial skill-based decision just prior to the start of the field work/activity." The WHA was sometimes used as intended (e.g., during installation of an asphalt apron at the Waste Sampling and Characterization Facility). However, since the WHA is not a hazard analysis, a number of the observed work activities did not have a WHA performed. Interviews with FWSs indicated that the FWS/workers did not fully understand when a WHA should be

prepared. In some cases, (e.g., Construction Craft/Maintenance Shop Work), the WHA was prepared concurrent with the work document but months before the activity was performed, which does not meet the intent of the JHA procedure. In another example (Performing Miscellaneous Work Activities for the 100K Annex), only one WHA was prepared but not linked to one or more specific work activities. Based on interviews with FWSs, some FWSs regard the WHA as the documented hazard analysis for the work activity, a function the JHA procedure did not allocate to the WHA. (See **CHPRC-OFI-C-3**)

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

CHPRC uses the JHA process, as previously described, to ensure hazard controls are tailored to the work being performed at the activity level during work planning and execution. The CHPRC JHA process requires a team approach for work planning, when analyzing hazards and environmental impacts, implementing controls, and encouraging involvement of workers, technical discipline SMEs, and first line managers at the earliest stages of work definition. CHPRC safety professionals and industrial hygienists were actively involved in developing and implementing hazard controls for most observed construction/subcontractor work activities. For example, during the application of fireproofing in the 100K Annex, CHPRC and subcontractor industrial hygienists had performed exposure assessments and extensive personal sampling of airborne contaminants to support the selection of respiratory protection controls. Similarly all construction/subcontractor work packages reviewed by EA had been reviewed by industrial safety and/or industrial hygiene.

Most construction/subcontractor work is performed as skill-based, and controls for observed construction/subcontractor work was generally adequate. Skill-based work does not require the use of the AJHA process to document controls in the work package, although controls that are unique may be defined in the precautions and limitations section of the work description within the work package. For example, the PTS Shop Welding work package does not include a documented hazard analysis (e.g., AJHA) but relies on controls identified in the hot work permit for the PTS Weld shop, the controls in the “hot work” section of the pipefitters CHA, and the welding hazard controls identified in the precautions and limitations section of the work package. The control set was adequate because the work activity is well defined in the work package, the work scope is narrow, and a certified welder performed the observed welding.

In other work activities, where neither the work scope nor hazards are identified in the work package, AJHA, GHA, or CHA, the controls are not well defined and the controls required to perform the work may exceed the skill set of those assigned to perform the activity. For example, the lack of well-defined hazard controls associated with the construction of a weather enclosure at the 200 West Pump and Treat site resulted in a worker being unnecessarily exposed to repeated short bursts of concrete dust that may have contained silica. In this example, a subcontractor was using a roto-hammer to drill and insert bolts into concrete blocks. During the work activity, the worker periodically sprinkled water from a drinking water bottle onto the drill bit, although this action did not prevent bursts of dusts from entering his breathing zone when the drill bit was withdrawn from the concrete. EA discussed this event with the CHPRC industrial hygienist who indicated that the occasional sprinkling of water from a water bottle was neither an effective nor approved wet method for controlling concrete dust exposures. In this example, although the work package contained detailed work steps and a JSA, the dust hazards and controls for concrete dust when using a roto-hammer were missed by those who prepared, reviewed and approved the JSA. During the pre-job briefing the subcontractor supervisor emphasized the need for wet methods when drilling into concrete, but the acceptable wet methods were not described during the pre-job briefing or in the work package or JSA. (See **CHPRC-OFI-C-4**)

Another example is the housekeeping/janitorial task previously discussed. In this case, the work tasks are not identified in the work package, or elsewhere, and the AJHA hazards in the work package are not tailored to the work activity. It is difficult for the FWS to verify that the worker training requirements have been met before performing work since the work scope, hazards, and training requirements have not been defined. Based on a sampling of training records of four laborers who are assigned to this housekeeping/janitorial task, several training courses in Appendix D of the CHPRC procedure on *Contractor Safety Processes* were required to perform this work, but the workers had not been completed all of the required training. (See **CHPRC-OFI-C-4.**)

In another example, EA observed a subcontractor finishing a drywall installation in the 100K Annex. The worker performed the work using a set of protective work gloves and a dust mask, which the worker indicated he had personally purchased from a local hardware store. Although the protective work gloves may have been an adequate control for the application of drywall mud, the glove material differed from that of the AJHA standard (i.e., leather gloves) and had not been evaluated by the CHPRC Safety Organization. The dust mask, which the worker indicated he used periodically during sanding operations and on a voluntary basis, was not a National Institute of Occupational Safety and Health (NIOSH) approved filtering face piece as required by 10 CFR 851.A6 and the CHPRC Respiratory Protection Program, nor had the use of this dust mask been evaluated and approved for use by CHPRC. (See **CHPRC-OFI-C-5.**)

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

Performing work includes preparing for the work through pre-job briefings and walk downs; confirming readiness to perform the work; and performing the work in a safe, environmentally protective, and efficient manner. EA observed several construction/subcontractor pre-job briefings, and in each case, the pre-job briefings were informative and workers were engaged and participating in the pre-job briefings. The individuals providing the briefings (typically a prime subcontractor FWS or superintendent) followed the CHPRC Pre-Job Briefing Checklist and were knowledgeable of the work activities and associated hazards and controls.

Observed work was performed in accordance with approved and authorized work packages, although it was not always evident that work was performed within established controls, particularly for some skill-based work.

5.3 Contractor Assurance

Objective: The Contractor Assurance System produces periodic scheduled and non-scheduled evaluations (e.g., self-assessments, independent assessments, management walkthroughs, etc.) of WP&C activities which identify issues, concerns and opportunities for improvement in the WP&C program.

CHPRC has established a robust self-assessment program for WP&C activities that comprises independent assessments (PRC-PRO-QA-9662), management observation program (PRC-PRO-QA-40099), work site assessments (PRC-PRO-QA 40090), and surveillances (PRC-PRO-QA-9769) in CHPRC projects, facilities, and programs. The CHPRC Assessment process is implemented through procedure PRC-MP-QA-40092, *CHPRC Assessment Program Plan*.

The requirements and processes for these assessments include the development and maintenance of a CHPRC Integrated Evaluation Plan (IEP) for managing all assessment activities, with the exception of non-scheduled assessments performed under the Management Observation Program (MOP) implemented by PRC-PRO-QA-40099. The IEP provides controls for selecting, compiling, coordinating, scheduling,

and monitoring to completion WP&C activities. Between 2013 and 2015, CHPRC performed more than 36 WP&C assessments.

One method used to evaluate the effectiveness of WP&C activities performed by CHPRC is the performance of comprehensive assessments by the CHPRC Nuclear Safety Performance Evaluation Board (NSPEB). These reports include core area comments on nuclear safety, safety, conduct of operations/integrated safety management, self-assessment/performance improvement, management and functional area evaluations of nuclear safety, management, operations, radiological controls, work control, quality assurance, engineering, training and qualification, and environmental and waste management.

NSPEB assessments identified deficiencies with pre-job briefings and the procedure for pre-job briefings in the Sludge Treatment Project, PFP Closure Project, D&D and the Soil Remediation Project, the Soil and Groundwater Remediation Project, Safety Health Security and Quality program, Engineering, Projects, and Construction (EPC) program, Business Services program, and the Liquid Waste and Fuel Systems (LWFS) and Waste Fuel Management Project (WFMP). CHPRC managed these issues through the issue management system. EA noted that pre-job briefings observed were thorough and interactive in section 5.1 of this report.

NSPEB assessments have also been effective in identifying deficiencies in work packages such as work packages not including proper hazard controls for example beyond skill based controls (when needed) not being incorporated into work packages, hazard analyses too broad, and controls specified in the AJHA not incorporated into the work instructions. These deficiencies were identified in the WFMP, the D&D and Soil Remediation Project, the Sludge Treatment Project, and the PFP Closure Project. This is consistent with the OFIs noted in this report, i.e. CHPRC-OFI-1, CHPRC-OFI-PFP-4, CHPRC-OFI-C-1, CHPRC-OFI-C-2, and CHPRC-OFI-C-4.

EA observed an Operations Specialist perform an assessment using PRC-PRO-QA-40099, *Management Observation Program*. MOPs are unscheduled assessments to establish and maintain a management presence in the field. Management Observations are designed to assess the knowledge of workers, identify unsafe conditions, and promote communication between management and workers. EA observed an Operations Specialist perform a MOP of the pre-job briefing for placing a mixed waste container (231ZDR-11) into an overpack/shipping container for storage and future transport for processing. Work Package 2X-12-03385, *Overpack and Relocate Waste Container 231ZDR-11*, and Critical Lift Plan, *Load waste Container 231ZDR-11 Onto IP-1 Overpack*, were briefed at the pre-job briefing by the Field Work Supervisor. The Field Work Supervisor / Person In Charge (PIC) also discussed contamination control (RWP), PPE, PPE self-checks, surveying out of the ARA, suspended load precautions, stopping points (when to stop; how to stop), stop work authority, and traffic control. The FWS then discussed what could go wrong such as rainwater on bottom of container, personnel under load, injured personnel, radiological control shutdown, alarm annunciation, and wind direction changes. A DOE representative asked the crane operator about seat belt usage. Workers were engaged and asked questions. In order to ensure worker attention, the presenter asked the workers questions. Overall, this pre-job briefing was effective. However, work was postponed because of weather. Consequently, the Operations Specialist could not observe the job as part of the MOP. The CHPRC Operations Specialist adequately documented the observations of the pre-job briefing in Management Observation report (MOP#: DWF&RS-2015-MOP-15384).

Objective: The contractor analyses, tracks, trends internally and externally identified issues and concerns; evaluates this information against established performance objectives and expectations (i.e., measures and metrics); develops and implements corrective actions; and conducts effectiveness reviews to ensure continued improvements in the WP&C program.

Procedure PRC-PRO-QA-24741, *Performance Analysis Process*, provides the processes and expectations for conducting performance analysis of the CHPRC project. This project analysis consists of developing, maintaining, and analyzing performance indicators and the trending of Condition Reporting Resolution System (CRRS) reports, RL operational assessments, lessons learned, and occurrence reporting and processing system (ORPS) information to identify areas of potential weakness and recommend actions for performance improvement. The CHPRC trending process is designed to identify areas of potential weakness before they have a negative impact on projects, facilities, or functional groups.

CHPRC evaluates WP&C effectiveness in CHPRC CAS summary reports under the heading of CHPRC Work Management. Issues are identified from three sources: suspended work packages, CRRS items with specific cause of trend codes, and RL Operational Assessment Reports of specific categories. The issues are tracked using the following categories: work planning was less than adequate; work performance was less than adequate, and hazard control and development was less than adequate. The goal is less than 12% with colors assigned to other percentages: blue 0-12%, green 13-25%, yellow 26-50%, red greater than 50%. If the monthly quantiles are less than 67% of the 12 month rolling average, no color is assigned.

EA reviewed the data for November 2013 to October 2014 and noted that data for December 2013, January 2015, and May 2014 met the desired goal of less than 12%. However, monthly quartiles for August 2014 and September 2014 were yellow.

CAS summary reports were reviewed by EA for April, June, August, October, November, and December 2012. All of these reports noted performance concerns with work control. CAS summary reports were reviewed for all months in 2013. With the exception of May, all months reviewed showed performance concerns with work control or WP&C. CAS summary reports were reviewed for March, April, May, June, July, August, and October 2014. With the exception of October, all of the months reviewed identified performance concerns with work planning. These reports are consistent with CHPRC assessment data and are adequate in assessing the effectiveness of WP&C.

Issues are managed by CHPRC using procedure PRC-PRO-QA-052, *Issues Management*. This procedure establishes the requirements and responsibilities for identifying, evaluating, and resolving events, the conditions of opportunities for improvement (OFIs), and the process for documenting preventative and corrective actions. A condition report (CR) is initiated for issues that may require evaluation trending, cause determination, or the identification and tracking of actions. The CR is then entered into the web-based Condition Reporting Resolution System. CRs are divided into significance levels; the highest being significant, with the subsequent levels in decreasing significance being adverse, track until fixed, and OFIs. Resolution of a significant CR requires a root cause evaluation, while an adverse CR requires a root cause evaluation or an apparent cause evaluation. Both significant and adverse CRs require the development and completion of remedial and preventative actions, and in some cases interim actions that establish measures that would allow work to continue.

CHPRC initiated Condition Report CR-2014-2016 on 10/13/14 in response to Concern A-14-OOD-002-C01: *Inadequate hazard analysis and control selection of activity level work* from the Richland Operations Assessment of CHPRC Activity Level Work Planning and Control Report A-14-OOD-PRC-002. This CR was screened as Adverse and an Apparent Cause Evaluation (ACE) Report was completed on 12/3/14.

The associated ACE report included an extent-of-condition review of an additional 387 CRs identified in the CHPRC CRRS system with trend codes corresponding to *Work Planning; Control of Field Work; Work Performance; Hazard Control Development or Implementation; Hazard Identification Analysis; and ISMS - Perform Work Within Controls*. The evaluation was conducted using the Why Analysis tool and

resulted in the apparent cause being Responsible Managers lack of understanding of skill based criteria. The contributing causes identified were “Less than adequate work planning” and “Less than adequate work package review”.

Actions identified in the ACE report to resolve WP&C deficiencies in WP&C are: Revise PRC-PRO-WKM-079, *Job Hazard Analysis; Appendix B*, to clarify skill based determination criteria by 8-4-15; Develop and provide briefing materials to Project Work Control Managers regarding changes made to PRC-PRO-WKM-079 for Responsible Managers, Planners and Field Work Supervisors by 9-11-15; Develop and provide briefing materials to Project Work Control Managers regarding effective planning sessions expectations for Project Responsible Managers, Field Work Supervisors, Planners and SMEs.; Develop and provide briefing materials for to Project Work Control Managers regarding work package review requirements and expectations for Project Responsible Managers, Field Work Supervisors, and SMEs by 2-5-15; Schedule a Work Site Assessment to review activity level hazard analysis and control in the IEP by 12-3-2014.

EA notes that the corrective action to revise PRC-PRO-WKM-079 is consistent with field observations and an OFI made during this assessment. CHPRC should assure that corrective actions developed in response to CR-2014-2016 are adequate and effectively implemented to address issues identified in assessments activities performed by NSPEB, Office of Environmental Management (EM), RL, and EA pertaining to the integration of hazard controls into work packages and the vulnerabilities associated with the skill-based work. (See **CHPRC-OFI-CA-1**.)

Overall, the CHPRC CAS is effective in scheduling and performance of WP&C oversight. The system has the ability to identify and manage issues; however, CHPRC line management has been ineffective in resolving issues related to ensuring that work identified as skill-based, is in fact, skill-based and that all the associated hazards have been analyzed. EA plans to follow up on the CHPRC progress in improving activity level work planning and control, with particular focus on skill-based work.

5.4 Richland Operations Office Oversight

Objective: DOE field element line management has established and implemented effective oversight processes that evaluate the adequacy and effectiveness of contractor.

RL oversight of CHPRC WP&C is primarily through the Assistant Manager for Safety and Environment (AMSE) Operations Oversight Division (OOD). DOE-RL-RIMS-CIPE-PD-RL, *Oversight of Contractor*, describes RL's oversight of site contractor programs and management systems including verification that work is performed in a safe, secure, and quality manner that protects the public, the worker, and the environment and complies with contractual requirements. DOE-RL-RIMS-CIPE-PD-RL, *Oversight of Contractor* satisfies the Program Office oversight requirement, as stipulated in DOE Policy 226.1B, *Department of Energy Oversight Policy*.

DOE-RL-RIMS-CIPE-OPER, *Oversight Performance*, describes RL's crosscutting process for conducting oversight of contractors, which includes performing operational awareness (OA) activities, surveillances, and assessments; disposition of contractor issues (e.g., Concern, Finding, Observation, Good Practice); review and approval (rejection) of contractor corrective actions plans; closure of RL identified contractor issues (e.g., reviewing and accepting contractor completed corrective actions, effectiveness reviews); Lessons Learned, and the Stop Work process.

The AMSE has three divisions: the OOD, the Environmental Safety and Quality (ESQ) Division, and the Nuclear Safety Division (NSD). The divisions consist of facility representatives (FR) within OOD, SMEs within ESQ, and the Safety System Oversight Engineers (SSOEs) within NSD.

The FRs, SMEs, and SSOEs are highly qualified personnel who each have formal qualifications they are required to complete within 1 year of being assigned to the positions. The FRs are required to complete qualification cards for General Technical Base, Facility Representatives Functional Area, RL Site-Specific, and the assigned Project/Facility-Specific Qualifications. The FRs are also required to satisfactorily complete a written exam and written and oral boards, in accordance with facility representative instruction (FRI) FRI 014, *Facility Representative Program*. The SMEs are required to complete their specific Qualification Card and satisfactorily complete various system walkthroughs and oral checkouts with a qualifying official, in accordance with the *RL Technical Qualification Program Plan*, dated March 30, 2010, and DOE-STD-1174-2013, *Radiation Protection Functional Area Qualification Standard*. The SSOEs are required to complete their specific Qualification Card and satisfactorily complete various system walkthroughs and oral checkouts with a qualifying official, in accordance with DOE-RL-RIMS-OrgSpecific-S&H-SSO-003-0001, Rev 1 *Safety System Oversight Engineer*. Presently, there are 15 qualified FRs, 7 qualified SMEs, and 4 qualified SSOEs. FR and SSOE staffing is adequate, and supports the mission. SME staffing supports the mission, but has one opening, which ESQ is actively pursuing to fill.

The FRs are based on site, which gives them day-to-day access to contractor and subcontractor activities. OOD-LOI-WP&C/DS, *Lines of Inquiry for Work Planning & Control*, describes the FRs role to review documentation, attend meetings, interview personnel, and observe work activities as appropriate to determine the effectiveness of the work control process specific to Integrated Safety Management System Core Function.

The FRs perform one OA per day and at least one core surveillance/assessment/quarter. The SMEs, and SSOEs each perform one OA per week and two formal surveillances per year. For fiscal year (FY) 2014, the FRs, SMEs and SSOEs have generated 2954 OAs specific to CHPRC, as identified in the OA Database. For FY 2014, the FRs completed 12 surveillances and 2 assessments; the SSOEs completed 2 surveillances and 1 assessment; and the SMEs completed 6 surveillances.

FRs develop their site specific (e.g., solid waste operations complex (SWOC) and soil and ground water remediation (SGRP)) RL - Master Oversight Plan (RL-MOP) yearly and update it quarterly in accordance with FRI 005, *Facility Representative Program - Master Oversight Plan*. The RL-MOP is a comprehensive plan developed to conduct contractor oversight such as routine oversight (shift turnover), core surveillance, assessments, and specific OA activities. Schedules within each RL-MOP are also part of the IEP, which provides a systematic plan and schedule for oversight of the contractor of each RL project. The RL-MOPs for FY 2015 were approved by the OOD Director in August and September 2014.

The SMEs and SSOEs develop their own Division Oversight Plan (DOP) yearly and update it quarterly in accordance with AMSE 001, *Assistant Manager for Safety and Engineering - Division Oversight Plan*. The DOP is a comprehensive plan for systematically planning, coordinating, and conducting oversight of contractors. The DOP addresses areas of oversight including subcontractor design, criticality safety, nuclear safety, packaging and transportation safety, fire protection, and maintenance. Schedules within each DOP identify the planned oversight activities to be performed, providing the SMEs and SSOEs with the flexibility to accomplish each activity. These schedules are also part of the IEP. The DOP for FY 2015 was approved by the ESQ/NSD Directors in October 2014.

The RL IEP documents activities that RL plans to complete in each FY. The RL IEP also includes the activities the FRs, SMEs, and SSOEs plan to perform. These planned activities are updated (as necessary) quarterly as the FRs, SMEs, and SSOEs update their respective RL-MOPs or DOPs.

Issue reports are presently initiated and processed through the Richland Issues Tracking System. RL is in the process of updating this system to the issues management system (IMS) as a result of earlier

management commitment and recent external reviews based on the EM Audit Report EM-PA-13-02, April 2014, and the Office of the Inspector General's *Report of the Management of the Plutonium Finishing Plant Project*, September 2014. The IMS effort is being tracked as an RL 2015 key performance goal. RL is scheduled to implement the update by April or May 2015. This update is designed to:

- Strengthen processes and productivity tools to ensure issues or problems are identified, documented, and efficiently resolved to prevent hindering mission performance and repeating mistakes that adversely impact safety, quality, cost, and schedule performance.
- Strengthen processes used to identify and capture performance gaps relative to work performance and ensure weaknesses are appropriately analyzed and efficiently solved.
- Foster an open culture that seeks to actively address conditions adverse to quality, concerns, issues, and OFIs.
- Ensure performance improvement opportunities, relevant lessons learned, self-assessment recommendations, and emerging performance trends are appropriately evaluated as improvement opportunities.
- Improve transparency and timely feedback of identified issues.
- Incorporate issues management into a formal prioritized activity within senior managerial duties using TRS-ISS-IP-02-R3, Issue Reporting and Resolution.

EA toured the 200 West Pump and Treat facility with the FR and CHPRC operations manager. During this walk down, three personnel were performing work in the Chemical Storage room. The three personnel performing the task were wearing the proper PPE. Two observers (a safe distance away) were without PPE. However, as work progressed, the FR pointed out to the operations manager that the observers moved closer to the work area to provide assistance, without using PPE. At the conclusion of the tour, the FR and EA discussed their observations with the FWS. The FWS agreed that the work area lacked an adequate barrier to prevent personnel from entering, and possible injury. The FR appropriately identified this observation as a significance level 2 finding.

EA observed the FR evaluating field work at the Soil and Ground Water Remediation Project Drilling Operations, near 242A Evaporator. A subcontractor, Stillwater Inc., supplied the equipment and majority of the labor. The drilling operation involved the "cable tool" drilling method, which has just come off of "stop work" because of three separate documented incidents. The area was appropriately roped off with signage listing point of contact and PPE requirements. The FR contacted the BTR, who showed up a short time later. The BTR provided a highlight of work being performed and a safety briefing before entering. The FR asked the BTR for the WP&C documents. The BTR expressed that the WP&C documents were not on site, and the FR noted as such in a weekly OA. Later in the day, the BTR reported to the FR that the onsite Geologist had the WP&C documents. However, the BTR and the FR never asked the onsite Geologist whether she had the WP&C documents.

As a result of the recent drilling failures which are annotated in ORPS report (EM-RL--CPRC-GPP-2014-0005), the follow on critique recommended that a corrective action (check list) be developed that would be performed on a weekly basis to the steel cable, mandrel and button of drilling rig. During the drilling observation, the driller was at a point in the operation where he could perform this (proposed checklist) inspection.

On January 12, 2012, RL, issued A-12-OOD-PRC-001, *Assessment of CHPRC CONOPS and AL-WP&C at STP 100K, and PFP*, and on March 27, 2014, RL issued A-14-OOD-PRC-001, *Assessment of CHPRC CONOPS, Procedure Content and Use at PFP, SWOC and ETF*; and on October 3, 2014, RL issued A-14-OOD-PRC-002, *Activity Level Work Planning and Control*. These assessments indicate that RL is providing appropriate oversight of the contractors and following their internal processes; DOE-RL-RIMS-CIPE-PD-RL, *Oversight of Contractor*; and DOE-RL-RIMS-CIPE-OPER, *Oversight Performance*. The findings, observations, and good practices are consistent with previous assessments (e.g., EM's *Assessment Report for the Hanford Site, Richland Operations Office (RL)*, May 10, 2013). Of note, RL had recently identified concerns with skill-based work, which prompted CHPRC to develop corrective actions.

6.0 CONCLUSIONS

CHPRC has established appropriate processes at the Hanford Site to plan and control the conduct of operational, maintenance, and construction activities. For a number of observed activities, CHPRC adequately defined the scope, analyzed the hazards and established controls, confirmed readiness, performed the work as specified, and provided feedback for improvement. However, much of the work observed by EA was performed as skill-based, and in these cases, CHPRC did not always adequately define work scopes such that hazards could be identified, tailored to the work activity, and the appropriate controls developed and implemented. The EA team identified examples at PFP and construction/subcontracted work activities where the skill-based approach to work resulted in hazards that were missed or not sufficiently analyzed. As a result, hazard controls were not well defined and missed in some cases. Pre-job briefings were generally effective in communicating hazards and controls, and most work was performed within established controls.

Overall, the CHPRC CAS is effective in scheduling and performing WP&C oversight. The CAS can identify and manage issues; however, CHPRC line management has been ineffective in resolving issues related to ensuring that work identified as skill-based is, in fact skill-based and that all the subsequent hazards have been analyzed.

RL has a well-defined qualification and requirements process for the FRs, SMEs and SSOEs. RL is effective in performing oversight of the contractor's WP&C processes. The FRs are providing appropriate input, observations, and analyses. The FRs, along with input from SMEs and SSOEs, are identifying deficiencies in the area of WP&C. These deficiencies are being entered into the RL issue tracking system and communicated to CHPRC.

EA findings are consistent with the concerns, findings and observations RL assessments identify. RL has specifically identified the lack of hazard identification, hazard analysis, and hazard control to adequately ensure worker safety and health.

7.0 FINDINGS

None.

8.0 OPPORTUNITIES FOR IMPROVEMENT

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 assessment. 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.

CHPRC

CHPRC-OFI-1: Continue existing efforts to revise PRC-PRO-WKM-079 to limit the inherent subjectivity associated with skill-based work determinations. In addition, for work that requires an AJHA, consider revisiting the current listing of AJHA skill-based controls that are not required to be included in the work instructions and provide additional guidance to indicate that these controls should be reflected in work instructions under some conditions, such as when work area hazards and PPE use may impact the workers ability to ensure proper implementation.

CHPRC-OFI-PFP-1: Consider limiting the scope of PRF Crane Maintenance Repetitive Use work packages to canyon entry for troubleshooting purposes only, with repair activities to be governed by separate work packages, when the scope of work is known and all possible hazards and controls can be properly evaluated.

CHPRC-OFI-PFP-2: Assess root causes for not following PRC-PRO-WKM-12115 and PRC-PRO-WKM-079 requirements for appropriate SME involvement and revisions to AJHAs when new hazards are introduced, and evaluate the need to provide additional training to RMs on the engagement of appropriate SMEs when work instructions are revised.

CHPRC-OFI-PFP-3: Increase focus on more thorough independent peer checking of accuracy of RWP information, including proper AMW flow down, prior to RWP approval. In addition, ensure records of all surveys taken to demonstrate compliance with 10 CFR 835 requirements are documented on radiological survey reports.

CHPRC-OFI-PFP-4: When additional planning and engineering is needed to ensure proper execution and safe performance of work, such as in the case of the PRF crane motor replacement, ensure adequate level of detail is provided in the work instructions reflecting the results of the planning and engineering.

CHPRC-OFI-PFP-5: Consistent with conduct of operations principles, ensure work instructions are properly updated using the PRC-PRO-WKM-12115 change control process when additional controls are determined to be necessary for proper completion of the work scope.

CHPRC-OFI-PFP-6: Evaluate the need to provide additional training to RMs, HRB, FWS, RA, work planners, and SMEs on proper use of the change control process, limitations on use of skill based controls in complex work environments, and proper work release protocols

CHPRC-OFI-C-1: Ensure that work scopes within construction/subcontractor work activities have sufficient description to identify hazards and controls.

CHPRC-OFI-C-2: Before performing work, ensure that the appropriate hazard analyses (i.e., AJHA, CHA, GHA) have been performed and tailored to the work being performed.

CHPRC-OFI-C-3: Verify through self-assessments that the WHA process is being implemented as described in the CHPRC JHA procedure. Provide training to FWSs, planners, and RMs on the use of the WHA.

CHPRC-OFI-C-4: In construction/subcontractor work packages (including CHAs and GHAs), ensure that the work scope is sufficiently defined and hazards identified such that the appropriate hazard controls (including training) can be readily identified and confirmed prior to work being performed.

CHPRC-OFI-C-5: Perform an assessment on the use of personal PPE at the site and increase training on prohibitions of use of personal PPE (particularly respiratory protection). Ensure that PPE complies with CHPRC, DOE, and U.S. Occupational Safety and Health Administration requirements.

CHPRC-OFI-CA-1: CHPRC should assure that corrective actions developed in response to CR-2014-2016 are adequate and effectively implemented to address issues identified in assessments activities performed by NESPEB, EM, RL, and EA pertaining to the integration of hazard controls into work packages and the vulnerabilities associated with the skill-based work.

Appendix A Supplemental Information

Dates of Review

Onsite Review: December 1-5 and 15-19, 2014

Office of Enterprise Assessments

Glenn S. Podonsky, Director, Office of Enterprise Assessments
William A. Eckroade, Deputy Director, Office of Enterprise Assessments
Thomas R. Staker, Director, Office of Environment, Safety and Health Assessments
William E. Miller, Director, Office of Nuclear Safety and Environmental Assessments
Patricia Williams, Director, Office of Worker Safety and Health Assessments

Quality Review Board

William A. Eckroade
Thomas R. Staker
Karen L. Boardman
T. Clay Messer
Michael A. Kilpatrick

Office of Enterprise Assessments Site Lead

William E. Miller

Team Composition

Patricia Williams, Team Lead
Kevin E. Horace
James B. Coaxum, Jr.
James R. Lockridge
Mario A. Vigliani

Appendix B
Key Documents Reviewed, Interviews, and Observations

Documents Reviewed:

DOE-0336, Hanford Site Lockout/Tagout Program
DOE-0360, Hanford Site Confined Space Procedure (HSCSP),
DOE-RL-92-36, Hanford Site Hoisting and Rigging Manual
DOE-0352 Hanford Site Respiratory Protection
DOE-0343 Hanford Site Stop Work Procedure
DOE-0346 Hanford Site Fall Protection Program
PRC-STD-CN-40381 Construction Work Management Integration
PRC-PRO-SH-40078 Contractor Safety Processes
PRC-STD-CN-40381 Construction Work Management Integration
PRC-PRO-MS-589, CH2M HILL Plateau Remediation Company Procedures
PRC-PRO-QA-5432, Hold Point Application in Technical Work Documents
PRC-PRO-RP-40021, Radiological Work Permits
PRC-PRO-RP-40109, Radiological Work Planning
PRC-PRO-WKM-12115 Work Management
PRC-PRO-WKM-14047 Pre-Job Briefings and Post-Job Reviews
PRC-GD-WKM-12116 Work Planning Guide
PRC-PRO-WKM-079 Job Hazard Analysis
PRC-GD-WKM-17132 Automated Job Hazards Analysis Process Guide
PRC-PRO-WKM-40004, Hazard Review Board
PRC-PRO-FP-40421 Hot Work
PRC-MP-SH-32219 10 CFR 851 CHPRC Worker Safety and Health Program Description
PRC-MP-MS-003 Integrated Safety Management System/Environmental Management System Description (ISMSD)
PRC-STD-SH-40518 Personal Protection
PRC-STD-SH-40314 Portable and Fixed Ladder Standard
PRC-PRO-SH-52718 Elevating Work Platforms
PRC-PRO-SH-40463 Ergonomics
PRC-PRO-SH-40445 Tags, Signs & Barriers
PRC-PRO-SH-095 Scaffolding
Technical procedure ZO-200-022, Load, Tie Down and Ship TRU/TRU Mixed Waste and LLW/LLW Mixed Waste Drums and Boxes
Technical procedure ZO-170-059, Mixed Low Level Waste Handling and Packaging
Work Package 2Z-13-08910 234-5Z Globe Elevator Corrective Maintenance and Pit Clean Up Maintenance Work Package
Work package 2Z-13-07371/M WCN*1, Preparation of 242 for Demolition
AJHA 2Z-6261 Rev 0
Radiation protection Technical Evaluation TE-PFP-12-002-5
RSR Z=1404630
RWP Z-870 Rev. 013
AMW Z-AMW-0927
Work Package 2Z-14-04129 Repair PRF Canyon Crane
AJHA 2Z-6180, Rev 1
RWP Z-818 Rev 054
AMW Z-AMW-0928
Maintenance Service Request # SR-14-04129-01-00
Maintenance Service Request # SR-14-04129-02-00

Maintenance Service Request # SR-14-04129-03-00
 Work Document 1K-14-03978 Perform Misc. Work Activities for Annex Construction
 Work Document 1K-14-04588 ECRTS Annex Mechanical Installations
 Work Document CS-14-05745 Construction Craft Maintenance/Shop Work
 Work Document CS-14-03503 Fabricate/Weld Material in PTS Shop
 Work Document 1K-14-04119 ECRTS Annex Interior Finishes
 Work Document CS-14-05127 Construct Weather Enclosure at 289T for Container Tarping
 Work Document CS-14-07122 Installation of Asphalt Apron
 SGW-41472 Soil and Groundwater Remediation Project Site Specific Health and Safety (HASP)
 CHPRC Training Records (various)
 CHPRC Employee Job Task Analysis (EJTA) records
 Craft Specific Job Hazard Analyses (various trades)
 KW Annex Albi-Clad Project Personnel Exposure Summary; April-September 2014
 CHPRC General Industrial Safety Hazard Analysis (GHA)
 PRC-PRO-QA-9662, Independent Assessments
 PRC-PRO-QA-40099, Management Observation Program
 PRC-PRO-QA 40090, Work Site Assessments
 PRC-PRO-QA-9769, Surveillance Process
 PRC-MP-QA-40092, CHPRC Assessment Program Plan
 PRC-PRO-QA-24741, Performance Analysis Process
 AMSE 001 - Assistant Manager for Safety and Engineering - Division Oversight Plan
 DOE-RL-RIMS-CIPE-OPER - Oversight Performance
 DOE-RL-RIMS-CIPE-OPLAN - Oversight Planning
 DOE-RL-RIMS-CIPE-PD-RL - Oversight of Contractors
 DOE-RL-RIMS-Org Specific-OOD-FRI-Lines of Inquiry for WP&C
 DOE-RL-RIMS-Org Specific-S&H-SSO-003-0001 Rev 1 - Safety System Oversight Engineer
 DWF&RS-2014-MA-13132 - Maintenance Management Assessment of the Waste & Fuels Management Project
 EM-42 Assessment Report for the Hanford Site, Richland Operations Office, dated February/March 2013
 A-12-OOD-PRC-001 - Assessment of CHPRC CONOPS and AL-WP&C at STP 100K, and PFP
 A-14-OOD-PRC-001 - Assessment of CHPRC CONOPS, Procedure Content and Use at PFP, SWOC and ETF
 A-14-OOD-PRC-001 - Procedure Content and Use
 A-14-00D-PRC-002 - Activity Level Work Planning and Control
 DOE-RL-FRI 005 - Master Oversight Plan (MOP)
 DOE-RL - FY-12 Assessment of CHPRC CONOPS and AL-WP&C at STP 100K, and PFP (A-12-OOD-PRC-001)
 DOE-RL - FY14 Completed Integrated Evaluation Plan report for RIMS
 DOE-RL - FY-14 Assessment of CHPRC CONOPS, Procedure Content and Use at PFP, SWOC and ETF (A-14-OOD-PRC-001)
 DOE-RL-FY-14 Assessment of CHPRC Activity Level Work Planning and Control (A-14-OOD-PRC-002)
 DOE-RL - FY15 Completed Integrated Evaluation Plan report for RIMS
 DOE-RL - Nuclear Safety Division - Division Oversight Plan (DOP) FY2015
 DOE-RL - Operational Awareness Report, dated 10/11/2013 - 12/4/2014
 DOE-RL - Program Weekly Report for Week of 12/1/2014
 FRI 005 - Facility Representative Program - Master Oversight Plan
 FRI 014 - Facility Representative Program
 OOD-LOI-WP&C/DS Lines of Inquiry for Work Planning & Control
 SAC Issue Log Daily Report for 12/1/2014
 SAC Issues Awaiting CRs - 12/1/2014

CHPRC Work Site Assessment Report - PTS-2014-WSA-13062, 9/9/2014 - 9/25/2014
ASME Safety Report dated September 2014
Nuclear Safety and Performance Evaluation Board (NSPEB) Evaluation of the Sludge Treatment and Surveillance Project (ST&SP), dated April 2014
DOE TQP F09.02.01 - Functional Area Qualification Standard, Radiation Protection, Qualification Card
DOE-STD-1174-2013 - Radiation Protection Functional Area Qualification Standard
RL Technical Qualification Program Plan, dated March 30, 2010
OA57032 - Soil and Ground Water Remediation Project (S&GRP) Drilling Operations near 242A Evaporator
OA57034 - 200 West Pump and Treat (200W P&T) Work Activities
EM-RL--CPRC-GPP-2014-0005 - ORPS report - Drill Rig Cable Separated from Tool String during Well Casing Installation

Interviews:

CHPRC Work Management Director and Staff
CHPRC Radiological Control Director
PFP Shift Managers
PFP Responsible Managers
PFP Work Planning Manager
PFP Work Management Staff
PFP Field Work Supervisors
PFP Cold and Dark Director
PFP Radiological Control Manager
PFP Radiological Control Supervisor
PFP Radiological Engineer
PFP Radiological Control Technicians
PFP DOE Facility Representatives
CHPRC Workers
CHPRC Subcontractor Building Trades Workers
CHPRC and Subcontractor Industrial Hygienists
CHPRC and Subcontractor Safety Professionals
CHPRC and Subcontractor Construction Managers and Construction Superintendents
CHPRC Construction Specialist
CHPRC Project Technical Services; Project Director & Project Delivery Director
CHPRC Responsible Managers
CHPRC Work Planners
CHPRC Work Control Managers
CHPRC Field Work Supervisors
CHPRC Industrial Hygiene Manager
CHPRC Contractor Assurance & Regulatory Reporting manager
CHPRC Integrated Evaluation Plan Manager
HAMTEC Safety Representative
CHPRC Issues Management Coordinator
CHPRC Operations Specialist
RL Facility Representatives
RL Environmental Safety and Quality Division Lead
RL Facility Representative Lead
RL Engineering Team Lead
RL Industrial Rad Team Lead
RL Quality Assurance Team Lead

RL Procurement Division - Plateau Remediation and Mission Support Team

Observations:

PFP Daily Plan of the Day Meetings

242-Z ARA entry and D&D Operations and Pre-job briefing

Globe Elevator Corrective Maintenance and Pre-job Briefing

PRF Crane Repair ARA Canyon Entries and Pre-job Briefing

LLW/LLW Mixed Waste Drum Handling and Shipment and Pre-Job Briefing

100K Annex Mechanical Installations

Construction Shop Maintenance & Shop Work

Fabrication and Welding in the PTS Shop

Constructing a Weather Enclosure at the 289T Pump and Treat Facility

Installation of an Asphalt Apron at the WSCF

100K Annex Interior Finishing

Pre-Job Briefings at the 100K Annex and Soil & Groundwater Construction Support

Soil and Ground Water Remediation Project (S&GRP) Drilling Operations, near 242A Evaporator

MOP for Pre-Job Briefing for placing a mixed waste container in an overpack/shipping container

200 West Pump and Treat (200W P&T) facility