



Independent Assessment of Conduct of Operations at the Hanford Site 324 Building Disposition Project

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Acronyms

ALARA	As Low as Reasonably Achievable
CA	Contamination Area
CPCCo	Central Plateau Cleanup Company
CRAD	Criteria and Review Approach Document
DOE	U.S. Department of Energy
EA	Office of Enterprise Assessments
FR	Facility Representative
iCAS	Integrated Contractor Assurance System
LOTO	Lockout/Tagout
MOP	Management Observation Program
NCO	Nuclear Chemical Operator
OFI	Opportunity for Improvement
OOD	Operations Oversight Division
ORPS	Occurrence Reporting and Processing System
POD	Plan of the Day
PPE	Personal Protective Equipment
RL	DOE Richland Operations Office
RWP	Radiological Work Permit
SHD	Safety and Health Division
SOE	Stationary Operating Engineer
SOM	Shift Operations Manager
SPLT	Single Point Lockout/Tagout
SSCs	Structures, Systems, and Components

INDEPENDENT ASSESSMENT OF CONDUCT OF OPERATIONS AT THE HANFORD SITE 324 BUILDING DISPOSITION PROJECT

Executive Summary

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted an independent assessment of the effectiveness of conduct of operations implemented by the Central Plateau Cleanup Company (CPCCo) at the Hanford Site 324 Building Disposition Project from August through October 2022. This assessment evaluated the effectiveness of CPCCo in managing and maintaining a conduct-of-operations program, including performance-based observations of 324 Building operations and radiological control practices. This assessment also evaluated the effectiveness of DOE Richland Operations Office and Office of River Protection (together “DOE Hanford”) oversight of the CPCCo conduct-of-operations program and radiological control practices.

EA identified the following strengths:

- CPCCo field personnel exhibited strong adherence to conduct-of-operations principles in almost all cases; pre-job briefs were thorough, and personnel were actively engaged.
- Corrective actions put in place in response to a series of earlier personnel contamination events resulted in strong radiological control practices during field work and during donning and doffing of personal protective equipment.
- DOE Hanford Facility Representatives assigned to the 324 Building project were extremely knowledgeable about the project, were routinely in the field performing oversight of work activities and were engaged with CPCCo management and workforce.

EA also identified several areas of concern, including in the areas summarized below:

- Written requirements and instructions, including radiological work permits, did not always align with the work being performed, were not always controlled as required, and were not always written such that steps could be performed in order and as written.
- Operator rounds were not recorded as instrument readings were taken; operators instead routinely recorded instrument readings from memory up to an hour after the readings were taken.
- Equipment status was not always accurately tracked. EA noted several out-of-calibration instruments, a variety of marking methods for deactivated equipment, and informal marking of equipment.

In summary, CPCCo has established an adequate conduct-of-operations program, appropriately covering all requirements of DOE Order 422.1, *Conduct of Operations*. During EA observations, 324 Building personnel demonstrated strong adherence to conduct-of-operations principles in almost all instances, including during most radiological control activities. DOE Hanford oversight of 324 Building operations was observed to be effective. However, there are several notable weaknesses in CPCCO’s conduct-of-operations program implementation at the 324 Building project. Until the concerns identified in this report are addressed or effective mitigations are put in place, 324 Building operations will be at an elevated level of risk.

INDEPENDENT ASSESSMENT OF CONDUCT OF OPERATIONS AT THE HANFORD SITE 324 BUILDING DISPOSITION PROJECT

1.0 INTRODUCTION

The U.S. Department of Energy (DOE) Office of Nuclear Safety and Environmental Assessments, within the independent Office of Enterprise Assessments (EA), conducted an assessment of the effectiveness of conduct of operations at the Hanford Site 324 Building Disposition Project. EA conducted the onsite portion of this assessment September 12-15 and October 3-6, 2022.

Central Plateau Cleanup Company (CPCCo) manages the Hanford Site’s river corridor cleanup mission under the direction and oversight of the DOE Richland Operations Office (RL) and the Office of River Protection (together “DOE Hanford”). The 324 Building, located in Hanford Site’s 300 Area, supported research on highly radioactive materials and operated from 1966 to 1996. Deactivation and decommissioning of the facility began in 1999. Demolition operations were postponed in 2010 after workers discovered significant contamination under a portion of the building (B Cell), likely left from a previous spill of highly radioactive waste within the building.

DOE Hanford and CPCCo are designing, testing, and procuring remotely operated equipment and making necessary building modifications to remove the highly contaminated soil to allow eventual demolition of the facility. Workers are also reinforcing the building’s foundation by installing micropiles around B Cell to ensure that the facility remains stable during excavation of the contaminated soil. Additionally, the building’s ventilation and other systems must be maintained to support the use of remotely operated equipment to remove the soil. Currently, the highest hazard work is maintenance in the hot cell airlock to prepare for remote handling of excavated material, and drilling and grouting of micropiles for structural stabilization in room 18 of the building. In addition to other radiological and industrial hygiene postings, each of these two areas is posted as a high contamination area and airborne radioactivity area, requiring workers to wear significant personal protective equipment (PPE) that includes forced-air breathing protection and multiple layers of anti-contamination clothing.

This assessment evaluated the effectiveness of CPCCo in managing and maintaining a conduct-of-operations program, including performance-based observations of 324 Building operations and radiological control practices. This assessment also evaluated the effectiveness of DOE Hanford’s oversight of the CPCCo conduct-of-operations program and radiological control practices. The scope of the assessment is described in the *Plan for the Independent Assessment of Conduct of Operations at the Hanford 324 Building Disposition Project, August 2022*.

2.0 METHODOLOGY

The DOE independent oversight program is described in and governed by DOE Order 227.1A, *Independent Oversight Program*, which is implemented through a comprehensive set of internal protocols, operating practices, assessment guides, and process guides. This report uses the terms “best practices, deficiencies, findings, and opportunities for improvement (OFIs)” as defined in the order.

As identified in the assessment plan, this assessment considered requirements related to conduct of operations described in DOE Order 422.1, *Conduct of Operations*, and CPCCo implementing procedures. Criteria to guide this assessment were based on those listed in EA Criteria and Review Approach Document (CRAD) 31-39, Rev. 0, *Review of Conduct of Operations*. CRAD objectives CO.3, CO.5,

CO.7, and CO.14 were not reviewed due to a lack of available performance-based observations. EA also used elements of EA CRAD 30-07, Rev. 0, *Federal Line Management Oversight Processes*, to collect and analyze data on DOE Hanford oversight activities related to conduct of operations at the 324 Building.

EA examined key documents, such as system descriptions, work packages, procedures, manuals, analyses, policies, and training and qualification records. EA also interviewed key personnel responsible for developing and executing the associated programs; observed operations and construction activities, which included numerous examples of entry into and egress from high contamination areas and airborne radioactivity areas; and walked down significant portions of 324 Building facilities, focusing on personnel performance and adherence to conduct-of-operations requirements, particularly as those requirements pertain to radiological control activities. The members of the assessment team, the Quality Review Board, and management responsible for this assessment are listed in appendix A.

There were no previous findings for follow-up addressed during this assessment.

3.0 RESULTS

3.1 Organization and Administration

This portion of the assessment evaluated the policies, programs, and procedures that define CPCCo's operations organization and administration.

CPCCo has established an adequate framework of procedures and documents that implement a conduct-of-operations program in accordance with DOE Order 422.1, att. 2, requirement 2.a. The documented, DOE-approved program consists of an adequate procedure (CPCC-PRO-OP-696, *Conduct of Operations*) that defines expectations for conduct-of-operations performance, as well as a thorough conduct-of-operations implementation matrix (CPCC-00542, *CPCC Conduct of Operations Applicability Matrix*) specifying a set of detailed implementing procedures for all 18 elements required by DOE Order 422.1. The program adequately defines roles, responsibilities, authority, and accountability for operations personnel, as observed during shift and job briefings and interviews.

CPCCo has appropriately established shift staffing for all operator, engineering, and support positions through TPLN-PRO-MS-51785, *Staffing Plan*. Minimum shift staffing requirements are appropriately defined for 324 Building operations through 324-PRO-OP-53640, *Minimum Staffing*. Minimum staffing appropriately designates personnel for relief positions. The on-shift shift operations manager (SOM) confirmed that minimum staffing requirements were satisfied and documented in the facility logs each day that EA was on site. During facility rounds with stationary operating engineers (SOEs) and nuclear chemical operators (NCOs), all personnel demonstrated that they clearly understood their roles and responsibilities and reporting requirements (e.g., proper notification of system status changes) and that they were appropriately knowledgeable of 324 Building systems. The reviewed training and qualification records for each participant confirmed full qualification status, including the SOMs, who were appropriately qualified in accordance with CPCC-PRO-TQ-40164, *Personnel Training and Qualification*. An additional SOM is in training and stood watch under instruction of a qualified SOM during the assessment.

CPCCo conducts adequate monitoring and self-assessments of conduct of operations. Independent assessments of conduct of operations are appropriately required by CPCC-MP-QA-40092, *CPCCo Assessment Program Plan*. Management observation of conduct of operations is adequately governed by CPCC-PRO-QA-40099, *Management Observation Program (MOP)*. EA's review of six MOP reports and six assessments (performed during the previous six months) demonstrated adequate rigor and depth to

properly assess the functional area. Adverse conditions were documented and captured in the CPCCo issues management system as required. The six MOPs were conducted by four different managers and demonstrated appropriate management engagement. A conduct-of-operations improvement plan being developed to address improvements identified in timely order 2022-324-02, *Compensatory Measure due to Lack of Discipline [sic] Operations*, establishes an expectation of two MOPs per month for each manager.

CPCCo has appropriately assigned a full-time conduct-of-operations mentor to the 324 Building project. The mentor reviews and observes operations and provides real-time feedback on conduct of operations to workers and their supervisors, creating an environment of continuous improvement.

Organization and Administration Conclusions

CPCCo has established and implemented an adequate conduct-of-operations program. The interviewed personnel had a thorough understanding of their roles and responsibilities. All positions were fully staffed during observations, including relief positions. CPCCo is adequately performing self-assessments of conduct of operations.

3.2 Shift Routines and Operating Practices

This portion of the assessment evaluated CPCCo's established shift routines and operating practices.

CPCCo has established and implemented effective shift routines specified in CPCC-PRO-OP-40120, *Shift Routines and Operating Practices*, to adequately address DOE Order 422.1, att. 2, requirement 2.b. CPCC-PRO-OP-40120 appropriately establishes requirements for operators to remain alert, be informed of conditions, and operate equipment properly. This procedure adequately defines the responsibility for developing round sheets (data sheets that identify important equipment and acceptable equipment instrumentation readings), conducting rounds, and reviewing completed round sheets. These requirements are properly flowed into two procedures (324-PRO-OP-53648, *324 Facility Stationary Operating Engineer Surveillance*, and 324-PRO-OP-53677, *324 Building Nuclear Chemical Operator Surveillance*), which include appropriate instructions for inspections, equipment checks, and round sheets. Both surveillance procedures provide adequate instructions and data recording forms for all facility equipment rounds and surveillances to ensure system functionality. All three of these procedures appropriately specify response to out-of-tolerance equipment indicators and provide information for performance trending. Interviewed SOEs, NCOs, and SOMs demonstrated their understanding of the requirements for shift routines and cognizance of the current facility conditions.

During observed operator rounds for the 324 Building, SOEs and an NCO demonstrated strict compliance with round sheet instructions. However, SOEs and the observed NCO did not identify the following material condition and housekeeping issues (see **OFI-CPCCo-1**):

- A six-foot step ladder and a mop were impeding egress through room 309.
- Another ladder was in the egress path in room 306.
- Several wood pallets were staged next to a waste storage container in the north waste storage yard.
- Out-of-service equipment was not properly identified.
- Calibrated gauges (not in use) had expired calibration stickers.

Most observed operator rounds were properly conducted, but contrary to CPCC-PRO-MS-589, *CPCCo Procedures*, which states that round sheets are to be completed in the field, “back-side”¹ rounds information is not recorded as instrument readings are performed. (See **Deficiency D-CPCCo-1.**) Delayed recording of field observations on round sheets could result in erroneous data. EA observed an operator donning anti-contamination clothing to enter a radiological contamination area (CA) to perform back-side rounds. The operator did not bring the rounds sheet into the CA. Upon completing the rounds and doffing the anti-contamination clothing, the operator recorded 18 items checked during the rounds approximately one hour after the initiation of the rounds; this timing was not in accordance with CPCC-PRO-MS-589.

Shift Routines and Operating Practices Conclusions

CPCCo has established and implemented generally effective shift routines and operating practices through operating procedures. Facility equipment rounds and surveillances are appropriately required by procedure. Most observed operator rounds were properly conducted. However, EA identified weaknesses associated with several material condition and housekeeping issues that were missed during observed operator rounds, and back-side rounds that are recorded from memory, contrary to procedures.

3.3 Communications

This portion of the assessment evaluated the effectiveness of CPCCo’s operations-related communication practices.

CPCCo has established and implemented effective processes that ensure accurate, unambiguous communications among operations personnel through CPCC-PRO-OP-22675, *Communications*, consistent with DOE Order 422.1, att. 2, requirement 2.c. This procedure adequately details communication systems available for normal and emergency operations and appropriately describes the use of the radio system to make notifications, including the use of the phonetic alphabet, abbreviations, acronyms, and repeat-backs. Round sheet surveillance procedures properly require that the SOM be notified of changing conditions observed during rounds.

SOEs and NCOs demonstrated strict adherence to the procedure requirements. Use of the radio was demonstrated on several occasions during the performance of operations. Operators and craft personnel effectively used repeat-backs during airlock entry, room 18 operations, and general radiological operations. EA also observed effective communication among workers during a lockout/tagout (LOTO) evolution in accordance with procedures.

Communications Conclusions

CPCCo has established and implemented effective communications processes that are detailed in operations and programmatic procedures and are adequately implemented. Communications were conducted as required during observed operations.

3.4 Investigation of Abnormal Events, Conditions, and Trends

This portion of the assessment evaluated the formal program established and implemented by CPCCo for investigating and reporting abnormal events, conditions, and trends.

¹ CPCCo uses the term “back side” to refer to the radiologically contaminated areas at the 324 Building, a ccess to which requires signing onto a radiological work permit and industrial hygiene work permit and dressing out in anti-contamination PPE.

CPCCo has established and implemented adequate operations practices for investigating and reporting abnormal events, conditions, and trends to determine their impact and prevent recurrence. CPCC-PRO-EM-058, *Event Initial Investigation and Critique Meeting Process*, adequately addresses DOE Order 422.1, att. 2, requirement 2.f, for investigating and reporting events and conducting critiques. Additionally, CPCC-PRO-EM-060, *Reporting Occurrences and Processing Operations Information*, adequately incorporates the requirements of DOE Order 232.2A, *Occurrence Reporting and Processing of Operations Information*.

EA reviewed 18 events reported between September 2021 and September 2022 against the DOE Occurrence Reporting and Processing System (ORPS) criteria in DOE Order 232.2; the events were reported in ORPS in a timely manner and were appropriately categorized. Additionally, the associated final reports for these events contained adequate causal analysis and corrective actions to address the identified issues.

The interviewed Contractor and Quality Assurance Manager and technical authority for CPCC-PRO-EM-060 understood the occurrence reporting and notification program and explained a screening team process improvement that was in the process of being implemented. The intent of this process improvement, as described in the draft screening meeting charter, is to add a level of oversight for evaluating issues submitted to the CPCCo issues management system (the integrated Contractor Assurance System, or iCAS) to confirm assignment of the responsible manager or organization best suited to manage the issue, the significance level of the issue, and appropriate process flags and trend codes.

CPCCo is effective in developing and communicating lessons learned. For example, the failure of the 324 Building wet pipe sprinkler system due to freezing, described in CPCC-AR-2022-0311, *Fire Suppression System Line Breach in 324 Facility*, resulted in a lessons-learned report documenting necessary actions to prevent cold-weather failure of a fire suppression system and the need for follow-up verification by Engineering. CPCCo published this lessons-learned report as 2022-CE-001, *Engineering Failure to Determine System Limitation for Heating Necessary to Prevent Freezing of the Fire Suppression System*. However, the extent-of-condition review resulting from the adverse condition evaluation did not identify the manual deluge fire suppression system as another 324 Building system that is vulnerable to freezing. CPCCo operations has since added this system to the cold weather protection program.

Investigation of Abnormal Events, Conditions, and Trends Conclusions

CPCCo has established and implemented adequate operations practices for investigating and reporting abnormal events, conditions, and trends. Reviewed events were reported to ORPS in a timely manner and were appropriately categorized. CPCCo is effective in developing and communicating lessons learned.

3.5 Control of Equipment and System Status

This portion of the assessment evaluated the CPCCo practices for equipment control and system status through management of deficient equipment and control of equipment modifications and repairs.

CPCC-PRO-OP-40122, *Control of Equipment and System Status*, adequately addresses DOE Order 422.1, att. 2, requirement 2.h, to establish and implement operations practices for equipment lineups and subsequent changes to ensure that facilities operate with known, proper configuration as designed. This procedure also appropriately invokes the work control requirements of CPCC-PRO-WKM-12115, *Work Management*, to plan and authorize any repair or maintenance work, including work on safety significant structures, systems, and components (SSCs). EA observed maintenance being performed under work

instruction 3I-22-03183, *B-Cell Door Deactivate Latch Pin Indicating Light Circuit*, which appropriately included proper ventilation alignment, confirmation of air flow patterns, continuous personnel monitoring of differential pressure, and post-test confirmation of the restored differential pressure alarm. However, EA identified the following weaknesses:

- Contrary to DOE Order 422.1, att. 2, requirement 2.h(5) and CPCC-PRO-OP-40122, sec. 3.5, CPCCo did not adequately manage equipment deficiencies on three observed equipment items. (See **Deficiency D-CPCCo-2.**) Deficient facility equipment can result in unsafe facility conditions.
 - CPCCo has no test record for the relief valve for the backup plant air compressor located on the third floor, as required by American Society of Mechanical Engineers code standards and manufacturer requirements. Plant air is used for damper actuation in the confinement ventilation system, which is a safety significant SSC.
 - The uninterruptible power supply supporting the pressure differential alarm recorder, which is classified as important to safety, has not been maintained in accordance with manufacturer requirements.
 - The REC hot cell manual deluge fire suppression system, which is classified as important to safety, has not been maintained in accordance with applicable National Fire Protection Association requirements. This system protects the contents of various hot cells.
- Contrary to CPCC-PRO-OP-40122, sec. 3.5, CPCCo does not maintain the required equipment deficiency list to document and track deficient equipment. (See **Deficiency D-CPCCo-3.**) Not documenting and tracking deficient equipment can compromise safety SSCs.

Additionally, EA identified that a differential pressure monitor power supply lacked controls to prevent accidental loss of power. Electrical power to this monitor is provided by an extension cord plugged into an electrical outlet on the far side of room 310, with no controls to prevent unplugging. Removal of power to this monitor results in an alarm indicating loss of ability to monitor the confinement ventilation pressure differential. After notification of the condition by EA, CPCCo initiated actions to guard against inadvertent removal of power.

Control of Equipment and System Status Conclusions

CPCCo has established sufficient procedural requirements for operations practices for deficient equipment to ensure that facilities operate with known, proper configuration. However, operations practices were not always adequately implemented, and several equipment-related issues were observed regarding control of equipment.

3.6 Lockouts and Tagouts and Independent Verification

This portion of the assessment evaluated CPCCo's practices for installing and removing LOTOs, performing independent verifications, and using caution tags to control hazardous energy sources.

CPCCo has established and implemented effective practices for installing and removing LOTOs to protect personnel from hazardous energy sources. CPCC-STD-OP-54266, *Hazardous Energy Control*, adequately addresses DOE-0336, *Hanford Site Lockout/Tagout Procedure*, and DOE Order 422.1, att. 2, requirement 2.i.

EA observed CPCCo operations personnel adequately controlling hazardous energy sources by installing and removing LOTOs in accordance with CPCC-STD-OP-54266. The installation and removal of two

single point lockout/tagouts (SPLTs) were performed in a deliberate manner with proper attention to detail. CPCCo properly designated SOMs using a completed Controlling Organization Designation Letter contained in CPCC-STD-OP-54266. The SOMs appropriately conducted pre-job briefs, discussed the proposed work, and reviewed the drawings of the affected equipment before writing the impact statements for the SPLTs. For both LOTOs, caution tags were appropriately applied, legible, and not relied upon for personnel protection.

One of the two observed SPLTs involved four support groups performing individual LOTOs (maintenance personnel, electricians, radiological control personnel, and the SOM, who is also the Controlling Organization Administrator). The maintenance personnel and electricians appropriately performed independent checks to verify that the hazards were isolated before starting work, in accordance with CPCC-STD-OP-54266. The safe energy state determination was appropriately tailored for the LOTO installed in each case. The interviewed electricians clearly understood the importance of correctly de-energizing equipment before work. The radiological control personnel also properly applied their LOTO associated with the airlock door. Finally, the SOM applied the LOTO controlling the entire evolution. The restoration positions for the components were appropriately determined by referencing the standard operating procedure system lineup. Before authorizing LOTO removal, the SOM appropriately verified that the work was complete and that the workers had properly signed the LOTOs.

Lockouts and Tagouts and Independent Verification Conclusions

CPCCo has established and implemented effective LOTO practices that meet the requirements for controlling hazardous sources to protect personnel. Observed LOTO activities were performed in accordance with established procedures, and facility personnel demonstrated the proper attention to detail.

3.7 Logkeeping

This portion of the assessment evaluated CPCCo's logkeeping processes and procedures, which are meant to ensure thorough, accurate, and timely recording of events and equipment information for performance analysis and trend detection.

CPCC-PRO-OP-24382, *Logkeeping*, adequately addresses DOE Order 422.1, att. 2, requirement 2.k, and appropriately specifies which positions, by title, are required to maintain narrative logs. Facility round sheets also appropriately provide for recording narrative entries in addition to facility data, except for the weakness identified in **Deficiency D-CPCCo-1**.

The reviewed logs and round sheets were adequate, with legible entries and properly recorded late entries and correction of entries. Narrative logs from December 29, 2021, through July 23, 2022, met the requirements of CPCC-PRO-OP-24382. Each of the logs appropriately contained a daily summary of key equipment status, changes in key equipment status, documentation of abnormal events and conditions, and other important data specified in governing procedures. For example, the emergency fire system impairment and compensatory measures, including a weekly fire surveillance that was implemented after the failure of the 324 Building fire suppression system, were appropriately documented in the SOM's log.

Logkeeping Conclusions

CPCCo logkeeping practices generally result in adequately recorded events and equipment information. CPCCo personnel adequately performed logkeeping in accordance with governing procedures.

3.8 Turnover and Assumption of Responsibilities

This portion of the assessment evaluated the CPCCo operational shift and operator relief turnover processes to verify the thorough, accurate transfer of information and responsibilities at shift or operator relief.

CPCCo has established and implemented adequate shift and operator relief turnover processes to ensure continued safe operations. CPCC-PRO-OP-28033, *Turnover and Assumption of Responsibilities*, provides adequate direction for conducting shift turnovers, including shift relief, in accordance with DOE Order 422.1, att. 2, requirement 2.1. CPCC-00542 also appropriately requires supervisory positions to review applicable documentation at the beginning of each workday and inform operators and workers of facility status for facilities like the 324 Building that do not operate 24 hours per day, 7 days per week.

EA observed the SOM appropriately reviewing applicable facility documentation at the beginning of each day and effectively informing operators and workers of the facility status. At the start of each daily work shift, the SOM held a formal facility management meeting followed by a plan of the day (POD) meeting, which effectively communicated to staff the current day's facility and equipment status, changes from the previous day, and currently planned work activities for the day. Appropriate facility staff attended in person or virtually. These meetings were guided by published daily reports prepared by operations management and supervision that contained detailed information on facility conditions, status, and daily requirements. A daily resource log was also used during the POD meeting to identify and authorize all discrete work activities to be performed during the shift. On Monday of each week, the operations manager conducts an all-hands briefing to review project status, the prior week's accomplishments, and target goals for the current week, providing workers with useful context for work performance.

Further, excellent pre-job briefs were held before each work evolution to inform workers and staff of facility conditions, work scope, hazards, and controls, and to ensure adequate readiness to perform work. All observed pre-job briefs conducted by work supervisors were notably effective and well attended, and they demonstrated worker engagement through regular use of reverse briefing techniques.

Turnover and Assumption of Responsibilities Conclusions

CPCCo has established and implemented adequate shift and operator relief turnover processes to ensure continued safe operations.

3.9 Required Reading

This portion of the assessment evaluated the CPCCo required reading program to verify that operators are updated on equipment, document changes, lessons learned, and other important information.

CPCC-PRO-OP-21712, *Required Reading*, adequately addresses required reading in accordance with DOE Order 422.1, att. 2, requirement 2.n. CPCC-PRO-OP-21712 appropriately requires CPCCo to identify the material to be distributed via required reading, the individuals who are required to read distributed material, and documentation of proper distribution and timely completion. The reviewed required reading log identified five appropriate required reading items that were in effect during the assessment: three related to timely order issuance, one on a new water usage procedure issuance, and one on proper actions in response to a fire.

While these five required readings were appropriately transmitted to staff, completion reports from the required reading database show that not all assignees completed these assignments, contrary to DOE Order 422.1, att. 2, requirement 2.n(3) and CPCC-PRO-OP-21712, secs. 3.4 and 3.5. (See **Deficiency D-**

CPCCo-4.) After EA pointed out this deficiency, CPCCo did not adequately address the required reading delinquencies identified in database reports. Workers who do not complete required reading assignments may be unfamiliar with facility requirements, possibly resulting in safety vulnerabilities. Additionally, EA identified inconsistencies in CPCCo's required reading completion report data. The required reading database reports completion percentages for transmitted assignments; most completion percentages reviewed by EA were approximately 70%. However, using the raw data in the same required reading reports, EA calculated higher completion rates of 80-90%. The required reading coordinator also maintains a separate database that shows completion rates of 80-90%.

Required Reading Conclusions

CPCCo has established required reading program requirements that, if properly implemented, would ensure that assigned operators and workers are properly updated on facility requirements, changes, lessons learned, or other needed information. However, implementation is not adequate, since the records show that not all required reading assignments are completed. Also, EA identified some inconsistencies in CPCCo's reports on required reading completion.

3.10 Timely Instructions/Orders

This portion of the assessment evaluated CPCCo practices for timely written direction and guidance from management to operators.

CPCCo has established and implemented adequate processes for timely written direction and guidance from management to operators. CPCC-PRO-OP-22991, *Timely Orders*, addresses DOE Order 422.1, att. 2, requirement 2.o, including appropriate circumstances for the use of timely instructions and orders, designated levels of review and approval, configuration control, distribution to appropriate personnel, and documentation of their receipt and understanding.

Two reviewed timely orders (2022-324-01, *Compensatory Measure due to Inoperable 324 Fire Suppression System*, and 2022-324-02) effectively demonstrated adherence to CPCC-PRO-OP-22991. Both orders were appropriately documented, reviewed, approved, maintained, listed on the published daily reports, covered during the daily POD meeting, and included as required reading for personnel. Compensatory measures implemented by timely order 2022-324-01, resulting from the building fire system impairment, appropriately included weekly building fire loading walkdowns, which were observed to be effective.

Timely Instructions/Orders Conclusions

CPCCo has established and implemented adequate processes for timely written direction and guidance from management to operators.

3.11 Technical Procedures

This portion of the assessment evaluated CPCCo's processes and practices for developing, implementing, and maintaining accurate, understandable written technical procedures.

CPCCo has adequately established processes for developing and maintaining accurate, understandable written technical procedures for safe facility and equipment operation. CPCC-PRO-MS-589 appropriately addresses DOE Order 422.1, att. 2, requirement 2.p, including procedure content, such as format and use of terms (e.g., prerequisites, warnings, cautions, notes, hold points), detail sufficient for accomplishing the operation, technically accurate procedures capable of performance as written, and

procedure conformance with the facility design and manufacturer documentation. Further detail is adequately provided in CPCC-STD-MS-40241, *CPCCo Procedures Standard*. CPCC-PRO-RP-40109, *Radiological Work Planning*, and CPCC-PRO-RP-54262, *Sentinel Radiological Work Permits*, provide appropriate instructions for performing radiological hazard analysis and developing needed controls.

Some procedures included in work packages are controlled as work instructions, which are governed by CPCC-PRO-WKM-12115, *Work Management*. Although the two types of documents are slightly different, CPCC-PRO-WKM-12115 states that work instructions will meet the requirements of CPCC-STD-MS-40241. Work instructions use verification points instead of hold points; however, the procedures standards (CPCC-PRO-MS-589 and CPCC-STD-MS-40241) do not distinguish between verification points and hold points. Because work instructions and procedures are both used in the same way, both types of procedures were evaluated as part of this assessment.

Technical procedure implementation for radiological control procedures was generally adequate, as evidenced by eight reviewed procedures and instructions. EA observed that workers performing 10 different work activities used the correct version of the applicable technical procedure or work package instructions. Implementation of radiological control procedures was also effective and resulted in rigorous and effective controls during high hazard radiological work, as observed during several maintenance work evolutions that required airlock entry. Specifically, work was properly screened as high hazard, resulting in development of detailed as-low-as-reasonably-achievable (ALARA) management worksheets containing specific radiological hazard information and defining the necessary controls that were included in job-specific radiological work permits (RWPs) governing the work. The high dose rate work in a high radiation area was effectively controlled and maintained ALARA by support staff who applied live monitoring of cumulative doses and dose rates via remote telemetry and real time monitoring of worker's electronic pocket dosimeter readings, and then communicated radiological dose and dose reduction instructions to workers to keep them from reaching the pocket dosimeter alarm setpoints specified in RWPs. Finally, the ALARA management worksheet and RWP requirement to use donning and doffing assistants and checklists (implemented to prevent recurrence of prior personnel contamination events at the 324 Building) were observed to be valuable in minimizing the potential for spread of contamination and personnel contamination events.

Even though CPCCo's technical procedure program is generally adequate, EA identified the following weaknesses regarding procedure adequacy, procedure adherence, and document control (see **Deficiency D-CPCCo-5**):

- Contrary to DOE Order 422.1, att. 2, requirement 2.p(3), which requires procedures to be technically accurate, four reviewed procedures contained inaccurate instructions that could lead to incorrect actions during operations. Specifically:
 - During observation of operations under 3I-22-03183, EA noted that step 5.3.11 instructs workers both to exit the airlock and to close the airlock door. This step is contrary to CPCC-STD-MS-40241, section 3.12, which requires each procedure step to contain only a single action. Additionally, the subsequent step (5.3.12), which instructs workers to remove an associated lockout, must be completed before the door can be closed. Therefore, the steps cannot be performed in order.
 - 3O-20-01276, *Drilling Micropile Holes*, step 5.4.17.A, contains two actions to remove the drill stem and to verify depth. This step is contrary to CPCC-STD-MS-40241, section 3.12, which requires each procedure step to contain only a single action. Additionally, the job supervisor explained during the pre-job brief that this step was intended to be a hold point; however, no hold point was specified in the procedure to ensure that a qualified inspector verifies the depth.

- Weekly waste storage area inspections are conducted in accordance with 300A-PRO-OP-54222, *300 Area Waste Container Operations*, and 324-PRO-OP-53677 and documented on A-6007-476, *300 Area Waste Storage Area Inspection Checklist*. These instructions provide conflicting direction. Step 4.18.5 of 300A-PRO-OP-54222 instructs the operator to return the completed checklist to the Environmental Compliance Organization, whereas step 4.3.1 of 324-PRO-OP-53677 instructs the operator to submit the completed checklist to the SOM.
- An appendix in 324-PRO-OP-54055, *Airlock/C-Cell Access*, for responding to a loss of power is not referenced in the precautions and limitation of the procedure, so workers may not know that a pertinent appendix is present. CPCC-STD-MS-40241 does not mention the use of appendices.
- Contrary to DOE Order 422.1, att. 2, requirement 2.p(3), regarding performance of procedures as written, lack of procedure adherence was observed. Not following procedures could result in unauthorized actions.
 - During observation of work activities using 3S-22-00850/G, *324 Craft Routine Activities*, it was noted that section 5.1 specifically allows for selected performance of applicable steps (e.g., perform general housekeeping, place barricades, dispose of waste, assemble tools). In contrast, section 5.2, which addresses other routine activities, does not contain a similar allowance. CPCC-PRO-MS-589 requires that procedures be followed in sequence, yet this work was performed only to steps 11, 23, and 25. EA observed this discrepancy in all repetitive work instructions.
 - EA observed that an SOE performing rounds in a radiological CA did not record instrument data (gauges) upon reading, as required. (See discussion of operator rounds in section 3.2 of this report.)
 - EA observed workers troubleshooting a valve (external to the 324 Building) using procedure 324-22-5168/P, *324 Water Freeze Protection*, to perform water isolation work. However, the procedure steps were not performed in sequence, as required by CPCC-PRO-MS-589, because the workers were directed to perform only one step of the procedure.
 - Contrary to CPCC-PRO-RP-54262, sec. 3.1, step 2, RWP-WL-16-0001, *Skill Based Work for Persons Having Completed 324 Specific Training*, was incorrectly assigned to calibration work (CPCC-PRO-MN-53853, *Calibrating F&J Digital Portable Air Samplers*). The radiological hazards and prescribed radiological controls of RWP-WL-16-0001 (PPE and void limits) were different from what was required for this calibration work. After EA pointed out this discrepancy to CPCCo, operations management did not identify that additional similar work was scheduled to be performed the following day on the same inadequate RWP, and the work was initially authorized to proceed at the start-of-shift meeting. After EA again informed CPCCo of the discrepancy, the work was removed from the schedule, and the RWP was revised. However, the RWP revision was only a minor change to update some void limits; the RWP remained inadequate, lacking any information on surveys to be performed or PPE to be used by the radiological control technician during the calibration task. This RWP is the most frequently assigned RWP at the 324 Building and is used for many varied work activities. However, an extent of condition review to determine if the RWP inadequacy extends to other work was not performed. (See **OFI-CPCCo-2**.)
 - In some cases, workers' lapel air samplers were not positioned within 12 inches of the workers' breathing zone and properly secured in place as required by CPCC-RP-0037, *Lapel Air Samplers*, step 4.2.7. EA made this observation on multiple occasions: once during a donning evolution, and several times during observed work in a radiological high contamination area. Each time it was noted during work, EA informed the radiological control technician supervisor watching the

work via video, who immediately directed workers via radio to correct the positioning. (See **OFI-CPCCo-3.**)

- The external buffer zone for the waste container loadout was not implemented during loading of a roll-on/roll-off waste container in accordance with procedure 300A-PRO-OP-54222, *300 Area Waste Container Operation*, and supporting distance requirements as specified in 300A-PRO-OP-54222, app. A.

Additionally, contrary to DOE Order 422.1, att. 2, requirement 2.p, regarding procedure implementation and change control, EA observed the following lack of control of procedures and postings. (See **Deficiency D-CPCCo-6.**) This condition could lead to the performance of incorrect activities.

- Work instructions automatically print out with an annotation that it is the “RECORD COPY.” On multiple occasions, copies were made for EA that all indicated that they were the record copy.
- Some PPE doffing checklists lacked a document number to show that the checklist is properly controlled. In one location, several different checklists were posted in the area, making it difficult to determine which checklist should be used.
- Several legacy radiation control postings/signs in the facility were not defined or authorized by current radiological control program documents. In one case, a posting on the floor inside a door read “No PPE Past This Point” and “Survey Required.” This door is no longer used to enter or exit the area, and it is unclear from the posting in which direction it would be applied.

Contrary to DOE Order 422.1, att. 2, requirement 2.p(1), regarding expectations for use of procedures, site procedures for control of calibrated equipment were not followed. EA identified six calibrated gauges that had stickers indicating that the calibration had expired in 2019; the gauges were not in use at the time. CPCC-PRO-MN-490, *Calibration Management Program*, step 3.2, requires a master listing of calibrated equipment, but CPCCo could not provide such a list and does not implement this requirement at the 324 Building, as confirmed by interviews with five personnel knowledgeable of the calibration program. Additionally, although step 3.2 of CPCC-PRO-MN-490 requires the establishment of a calibration recall system, the five interviewed personnel confirmed that no such system exists for the 324 Building. (See **Deficiency D-CPCCo-7.**) These conditions could result in the use of equipment with expired calibration.

Technical Procedures Conclusions

CPCCo has established generally adequate processes for developing, implementing, and maintaining accurate, understandable written technical procedures. However, CPCCo has not taken adequate measures to ensure that procedures and work instructions used at the 324 Building are accurate, followed as written, and controlled. Further, EA observed weaknesses associated with the control of procedures and postings, as well as calibrated equipment.

3.12 Operator Aids

This portion of the assessment evaluated CPCCo’s practices for managing and using operator aids.

CPCCo has established and implemented an adequate process to provide accurate, current, and approved operator aids. CPCC-PRO-OP-40125, *Operator Aids*, adequately addresses DOE Order 422.1, att. 2, requirement 2.q with instructions for developing and implementing accurate, current, and approved operator aids that are technically accurate, receive management approval, serve as necessary and useful conveniences that do not alter or conflict with approved procedures or controlled documents, do not

obscure equipment, are administratively controlled, and undergo periodic review for adequacy, continued utility, and correctness.

The reviewed 324 Building operator aid log showed that six currently approved operator aids were in use, all of which had been approved by operations management, were provided for operator convenience, and were not required for the observed equipment operations. The log file also included appropriate records of completed quarterly review checklists. EA observed that operator aid 324-PRO-OP-53649, *Pressure Indicating Transmitter (PIT) and Pressure Indicating Recorder (PIR) Correlation*, was appropriately located close to the point of use, did not obscure any facility equipment, and was identical to the one recorded in the Operator Aid Log Index binder. Further, the SOE accompanying EA understood the purpose and basis of the operator aid.

Operator Aids Conclusions

CPCCo has established and implemented an adequate process for providing accurate, current, and approved operator aids.

3.13 Component Labeling

This portion of the assessment evaluated CPCCo's process and procedures for facility tags and equipment and piping labeling.

CPCC-PRO-OP-23749, *Miscellaneous Facility Tags*, and CPCC-PRO-OP-40126, *Equipment and Piping Labeling*, adequately address DOE Order 422.1, att. 2, requirement 2.r. A SOM designated as the Tag Administrator appropriately oversees the component labeling program and effectively engages with operations personnel to ensure that procedural requirements are met. CPCCo effectively implements a graded approach to labeling components scheduled for deactivation and closure by replacing labels only as necessary to ensure safe operation and essential surveillance and maintenance. The interviewed SOM was aware of his responsibility for the integrity of component labels and tags, including oversight of completed facility tag surveillances. The interviewed operations personnel understand their responsibility to identify and report to the SOM missing or damaged labels. Observed operations personnel performing daily facility rounds carefully checked component labeling to accurately identify process equipment. Many observed equipment labels were properly applied, legible, durable, and contained the required information.

Although many observed equipment labels and tags were adequate, EA identified numerous examples of deficient equipment labeling/tagging that was contrary to CPCC-PRO-OP-40126. (See **Deficiency D-CPCCo-8**.) Inadequate labeling or incomplete facility tags can result in an indeterminate status of equipment and unsafe facility conditions.

- Eleven radioactive waste storage cabinets in room 139C (a posted CA) that are used for interim storage of low-level radioactive waste were not properly labeled. For example, three cabinets were hand-marked with a marker pen "Room 18 waste only;" the hand-marking is not an approved official label. Further, two cabinets were marked with a marker pen "waste only" and displayed a legacy label "caution radioactive material, potential for internal contamination, contact radiological control." One of these cabinets contained bags of labeled radioactive waste, while the other was empty.

During B Cell Airlock work, EA observed a worker placing a bag of radioactive waste from the airlock into the cabinet marked as "Room 18 waste only." When questioned by EA, the worker stated that he did not notice the cabinet marking and placed the waste in an adjacent unmarked empty cabinet.

- Numerous “deactivated equipment” labels had been applied by a prior contractor, and both SOMs confirmed through interviews that the deactivated status had not been verified.
- Several equipment items exhibited incomplete and illegible out-of-service tags.
- A large number of pieces of equipment that had been permanently removed from service were not properly identified. In one case, a transformer with the wires cut and exposed did not have any indication that it was out-of-service. CPCCo subsequently properly labelled the transformer and other out-of-service equipment that was specifically identified by EA.
- Approximately ten electrical breakers labeled as “spare” were found in the “on” position. In one case, a breaker labelled “Exit Lights Safety Shower” was in the “off” position. EA subsequently observed CPCCo installing breaker panel labels.

Component Labeling Conclusions

Despite some noted weaknesses, CPCCo has established and generally implemented a component labeling program to accurately identify the observed operating process equipment. However, weaknesses in labeling of other equipment can result in an indeterminate status of equipment and unsafe facility conditions

3.14 Federal Oversight

This portion of the assessment evaluated the adequacy of DOE Hanford’s oversight of CPCCo’s conduct of operations and radiological control program implementation, including program oversight and oversight of field activities.

Operational, programmatic, and other safety oversight functions are performed by groups in both DOE Hanford offices. Operational oversight for the 324 Building project, including oversight of CPCCo’s conduct-of-operations program and day-to-day implementation of radiological control requirements, is provided by Facility Representatives (FRs) in RL’s Operations Oversight Division (OOD). Programmatic oversight of CPCCo’s radiological control program is provided by health physics subject matter experts in RL’s Safety and Health Division (SHD).

DOE Hanford FRs and subject matter experts perform a variety of oversight activities related to conduct of operations and radiological controls at the 324 Building, ranging from formally documented surveillances to informal field observations, using a graded approach to ensure that the level of oversight is commensurate with the significance of the activity. Based on EA observations and interviews with oversight personnel from both OOD and SHD, strong teamwork and communication within and between oversight groups contribute to effective oversight.

DOE Hanford’s oversight planning and documentation is governed by DOE-PRO-PAI-50085, *Integrated Oversight*. Through interviews and a review of a sample of oversight planning documents, EA verified that DOE Hanford periodically reviews elements of CPCCo’s conduct of operations and radiological control programs. OOD and SHD have different oversight planning processes for identifying oversight requirements and scheduling assessment activities; however, once planned, all oversight activities are entered into DOE Hanford’s integrated oversight system (IOS) as operational awareness activities, surveillances, or assessments in accordance with DOE-PRO-PAI-50085. Once performed, the results of these reviews are documented as required in iCAS and transmitted to CPCCo for action as appropriate.

DOE Hanford’s FR program is governed by DOE-PPD-PAI-51864, *Facility Representative Program*, which appropriately references DOE-STD-1063, *Facility Representatives*. DOE-PPD-PAI-51864 defines

the roles and responsibilities for FRs and their line management, provides for periodic evaluation of the FR program, assigns an FR program sponsor, and establishes FRs' authority to represent DOE line management to the contractor regarding operational safety issues.

The two FRs assigned to the 324 Building project maintain operational awareness of their assigned facility and frequently communicate results of their oversight activities to DOE Hanford leadership. EA observed the FRs' routine daily attendance at shift turnover meetings and pre-job briefs for high-hazard activities, observations of those activities, and interactions with contractor management, first-line supervision, and workforce. The FRs exhibit questioning attitudes and are engaged with contractor leadership and workforce. EA observed communications from the FRs to their supervision to keep line management informed of project status and any issues. EA reviewed a sample of completed oversight activities in iCAS, which were documented in accordance with DOE-PRO-PAI-50085.

EA reviewed DOE Hanford's technical qualification program and job-specific qualification standard for 324 Building FRs and verified the qualification records for one of the two FRs assigned to the 324 Building project. All requirements of the program and job-specific standard were documented as having been met.

EA reviewed the two most recent RL FR staffing analyses developed by OOD leadership, dated July 2021 and July 2022, each in accordance with the then-current version of DOE-STD-1063.² Over those two years, combined FR staffing for all RL projects remained relatively constant, meeting 68.75% of the required staffing level in 2021 and 70.6% in 2022. The 2022 staffing analysis identified the need for four FRs to support the 324 Building project, two for 324 Building operations and two for the soil remediation project. At the time of the assessment, two FRs were assigned to the project. As remediation of the highly contaminated soil below B Cell begins, additional resources will likely be necessary to provide adequate operational oversight.

Federal Oversight Conclusions

Day-to-day DOE Hanford oversight of CPCCo's conduct of operations and radiological control program implementation at the 324 Building is adequate to maintain operational awareness of activities and issues, and to provide performance feedback to the contractor and to DOE line management. Strong teamwork and communication among groups responsible for oversight throughout DOE Hanford is evident, contributing to effective oversight. More consistent planning of individual oversight activities in support of oversight goals could allow additional data collection and easier management review, enhancing opportunities for continuous improvement. Continued attention to FR staffing is warranted, particularly as the 324 Building project progresses toward higher-hazard remediation activities.

4.0 BEST PRACTICES

No best practices were identified during this assessment.

5.0 FINDINGS

No findings were identified during this assessment.

² EA performed a high-level verification that DOE Hanford used the process outlined in DOE-STD-1063-2021, appendix C in developing its FR staffing analysis; EA did not verify that all guidance contained in the standard was followed.

6.0 DEFICIENCIES

Deficiencies are inadequacies in the implementation of an applicable requirement or standard. Deficiencies that did not meet the criteria for findings are listed below, with the expectation from DOE Order 227.1A for site managers to apply their local issues management processes for resolution.

Central Plateau Cleanup Company

Deficiency D-CPCCo-1: CPCCo does not ensure that back-side rounds information is recorded as instrument readings are performed, as required by procedure. (DOE Order 422.1, att. 2, requirements 2.b(4) and 2.k(2), and CPCC-PRO-MS-589, app. D)

Deficiency D-CPCCo-2: CPCCo did not adequately manage equipment deficiencies on three observed equipment items. (DOE Order 422.1, att. 2, requirement 2.h(5) and CPCC-PRO-OP-40122, sec. 3.5)

Deficiency D-CPCCo-3: CPCCo does not maintain the required equipment deficiency list to document and track deficient equipment. (CPCC-PRO-OP-40122, sec. 3.5)

Deficiency D-CPCCo-4: CPCCo does not ensure that all required reading assignments are completed. (DOE Order 422.1, att. 2, requirement 2.n(3); CPCC-PRO-OP-21712, secs. 3.4 and 3.5)

Deficiency D-CPCCo-5: CPCCo did not ensure that all procedures can be performed as written, and workers did not adequately perform six procedures as written. (DOE Order 422.1, att. 2, requirement 2.p(3))

Deficiency D-CPCCo-6: CPCCo document revisions were not properly controlled as required. (DOE Order 422.1, att. 2, requirement 2.p)

Deficiency D-CPCCo-7: CPCCo did not adequately implement all requirements of an equipment calibration program. (DOE Order 422.1, att. 2, requirement 2.p(3) and CPCC-PRO-MN-490, step 3.2)

Deficiency D-CPCCo-8: CPCCo has not ensured that all facility tags and equipment labeling meet requirements. (CPCC-PRO-OP-40126)

7.0 OPPORTUNITIES FOR IMPROVEMENT

EA identified three OFIs to assist cognizant managers in improving programs and operations. While OFIs may identify potential solutions to findings and deficiencies identified in assessment reports, they may also address other conditions observed during the assessment process. These OFIs are offered only as recommendations for line management consideration; they do not require formal resolution by management through a corrective action process and are not intended to be prescriptive or mandatory. Rather, they are suggestions that may assist site management in implementing best practices or provide potential solutions to issues identified during the assessment.

Central Plateau Cleanup Company

OFI-CPCCo-1: Consider increasing the rigor of operator rounds to include equipment and conditions not specifically identified on the round sheet.

OFI-CPCCo-2: Consider performing an extent-of-condition review to ensure that all existing work control documents assigned to RWP-WL-16-0001 (e.g., technical procedures, work instructions) are properly covered by this RWP, including adequate tailoring of the RWP to the specific work scopes, information on specific radiological hazards, expected radiological conditions, and the specific radiological controls needed.

OFI-CPCCo-3: Consider updating the donning instructions to include direction on proper lapel air sampler placement and the use of a sturdier tape that will better secure the sampler in the proper position.

Appendix A Supplemental Information

Dates of Assessment

Onsite Assessment: September 12-15 and October 3-6, 2022

Office of Enterprise Assessments (EA) Management

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