Independent Assessment of Fire Protection Program Inspection, Testing, and Maintenance at the Hanford Site Solid Waste Operations Complex

July 2025

U.S. DEPARTMENT of ENERGY | Office of Enterprise Assessments

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Acronyms

CAP	Corrective Action Plan
CHPRC	CH2M HILL Plateau Remediation Company
CPCCo	Central Plateau Cleanup Company
CR	Condition Report
CRAD	Criteria and Review Approach Document
CWC	Central Waste Complex
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
EA	Office of Enterprise Assessments
FSS	Fire Suppression System
HFO	Hanford Field Office
ITM	Inspection, Testing, and Maintenance
NFPA	National Fire Protection Association
OFI	Opportunity for Improvement
SS	Safety Significant
SSCs	Structures, Systems, and Components
SWOC	Solid Waste Operations Complex
TSR	Technical Safety Requirement

INDEPENDENT ASSESSMENT OF FIRE PROTECTION PROGRAM INSPECTION, TESTING, AND MAINTENANCE AT THE HANFORD SITE SOLID WASTE OPERATIONS COMPLEX

Executive Summary

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted an independent assessment of fire protection program inspection, testing, and maintenance (ITM) at the Hanford Site Solid Waste Operations Complex (SWOC), which is managed and operated by Central Plateau Cleanup Company (CPCCo) for the DOE Hanford Field Office. This assessment evaluated the effectiveness of CPCCo programs in managing and maintaining fire protection program ITM performance, including the adequacy of causal analyses and corrective actions taken in response to adverse conditions associated with safety significant (SS) fire suppression systems (FSSs) identified by CPCCo in 2021 and 2022 at the SWOC Central Waste Complex (CWC). The assessment also reviewed the status and effectiveness of CPCCo actions taken in response to a finding documented by EA in 2019 regarding the adequacy of the SWOC documented safety analysis (DSA). The assessment was conducted in May 2025.

EA identified the following strengths:

- CPCCo continues to replace SS FSSs at the CWC to address the degraded FSS piping systems and eliminate the frequent pipe leaks identified during scheduled ITM, increasing system reliability and maintainability.
- CPCCo's fire safety officer has improved collaboration between CPCCo facility management and the mission essential services contractor to ensure that ITM is properly and timely performed; coordination between CPCCo and the fire system maintenance preventive maintenance coordinators has also improved.

EA also identified several areas of concern, as summarized below:

- Observed technical safety requirement (TSR)-required ITM and surveillances were performed using reference use procedures instead of continuous use, in one case performing a valve lineup from memory without referencing the valve position data sheet.
- CPCCo used a non-listed pipe patch rather than a tested and approved component as a long-term compensatory measure for a pinhole leak on SS FSS piping to reduce cycling of the system air compressor.
- Several issues identified by EA in a 2024 fire systems maintenance assessment were documented in the CPCCo issues management system but were closed without sufficient corrective action being taken or appropriate justification for no action.
- CPCCo has not corrected a 2019 EA finding documenting the SWOC DSA's inadequate evaluation of minimum performance criteria for the CWC SS FSSs. As a result, the TSR surveillance requirements remain inadequate to ensure SS FSS operability.

In summary, CPCCo has made substantial progress toward correcting the causes of the degraded condition of some FSS piping, including significant improvement in ITM coordination and performance. However, procedures do not always require an appropriate level of rigor for surveillances that ensure SS FSS operability, and several previously identified issues have not been corrected, including a safety basis inadequacy that was identified over six years ago. Until the concerns identified in this report are addressed or effective mitigations are put in place, risk will remain that SS FSSs may not perform as intended to mitigate the spread of a fire.

INDEPENDENT ASSESSMENT OF FIRE PROTECTION PROGRAM INSPECTION, TESTING, AND MAINTENANCE AT THE HANFORD SITE SOLID WASTE OPERATIONS COMPLEX

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 fire protection program inspection, testing, and maintenance (ITM) at the Hanford Site Solid Waste Operations Complex (SWOC). SWOC is managed and operated by Central Plateau Cleanup Company (CPCCo) for the DOE Hanford Field Office (HFO). This assessment was conducted in May 2025.

In June 2021, CPCCo identified a lack of internal inspections of the SWOC Central Waste Complex (CWC) safety significant (SS) fire suppression systems (FSSs) and received authorization from HFO's predecessor organization[1] to self-perform this inspection work. CPCCo subsequently discovered that two branch lines of an SS FSS in one building at the CWC were completely occluded. Since the discovery of the occluded branch lines, CPCCo has undertaken extensive corrective actions to restore the FSSs to code requirements and to ensure sustained compliance.

In accordance with the *Plan for the Independent Assessment of Fire Protection Program Inspection, Testing, and Maintenance at the Hanford Site Solid Waste Operations Complex, May 2025*, this assessment evaluated the effectiveness of CPCCo programs in managing and maintaining fire protection program ITM performance, including the adequacy of causal evaluations and corrective actions taken in response to the deficiencies identified by CPCCo in 2021 and 2022. EA previously assessed the Hanford site-wide fire system maintenance program, as documented in the *Independent Assessment of Fire System Maintenance at the Hanford Site – July 2024*.

2.0 METHODOLOGY

The DOE independent oversight program is described in and governed by DOE Order 227.1A, *Independent Oversight Program*, which EA implements 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 fire protection program ITM performance and corrective actions taken for previously identified adverse conditions. EA used selected objectives and criteria from within sections 4.1 (criterion 2 only), 4.3 (criterion 5 only), and 4.4 of EA CRAD 31-12, Revision 2, *Fire Protection Program*, and objectives CAS.3 and CAS.4 from EA CRAD 30-01, Revision 1, *Contractor Assurance System*.

EA examined key documents, such as system descriptions, work packages, procedures, manuals, analyses, and policies. EA also interviewed key personnel responsible for developing and executing the associated programs; observed ITM activities; and walked down significant portions of selected SWOC facilities, focusing on fire protection systems. The members of the assessment team, the Quality Review Board, and the management responsible for this assessment are listed in appendix A.

[1] HFO was formed on October 1, 2024, when the DOE Office of River Protection and DOE Richland Operations Office were formally combined into a single field office.

EA conducted a previous assessment of fire protection program implementation at the SWOC CWC and T Plant in September and October 2018, as documented in EA report *Fire Protection Program Implementation Assessment at the Hanford Site Central Waste Complex and T Plant, May 2019*, and a Hanford-wide assessment of fire system maintenance in April and May 2024, as documented in EA report *Independent Assessment of Fire System Maintenance at the Hanford Site, July 2024*. This assessment reviewed the completion and effectiveness of corrective actions from a finding described in the 2019 EA assessment report, which was also reviewed during the 2024 EA assessment. Results of the corrective action review are included in section 3.3 of this report.

3.0 RESULTS

3.1 Fire Protection Inspection, Testing, and Maintenance

This portion of the assessment evaluated CPCCo's performance, management, and oversight of ITM of fire protection systems and equipment.

CPCCo has established and implemented an adequate fire protection program defined in CPCC-STD-FP-40404, *Fire Protection Program*, in accordance with DOE Order 420.1C, *Facility Safety*, attachment 2, chapter II, section 3.d; DOE-STD-1066-2016, *Fire Protection*; and applicable National Fire Protection Association (NFPA) codes and standards. CPCC-PRO-FP-40425, *Fire Protection System Inspection, Testing, and Maintenance*, adequately defines the ITM requirements for SWOC facility fire protection structures, systems, and components (SSCs) and requires procedures to be developed, implemented, maintained, and performed by appropriately trained and qualified ITM personnel.

CPCCo has established and implemented an adequate ITM program for fire protection SSCs at the SWOC facilities. CPCCo is addressing the ongoing ITM issues for SWOC and has implemented a schedule for replacing existing dry pipe FSSs. Upgrades, including replacement of the existing SS FSSs, will address the degraded FSS piping systems and eliminate the frequent pipe leaks identified during scheduled ITM, increasing system reliability and maintainability. System replacements are prioritized by analyzed risk, with three FSSs (Buildings 2402-WG, 2402-WH, and 2402-WJ) scheduled to be replaced by the end of fiscal year 2025, and three more being replaced each subsequent year as funding is available.

Procedures for three observed operations[2] provided generally adequate instructions. All observed operations used the current procedures. However, weaknesses in procedure adequacy and adherence were observed. Contrary to DOE Order 422.1, *Conduct of Operations*, attachment 2, section 2.p.(1), the procedures used to conduct the observed safety management program/NFPA-required ITM on an SS system and the technical safety requirement (TSR) surveillance were not followed step-by-step. (See **Deficiency D-CPCCo-1**.) Not properly following procedures could lead to the improper performance of NFPA-required ITM on an SS system and TSR surveillances, which are used to ensure compliance with the facility safety basis. During the observed operations, the procedures were not utilized as required by CPCC-PRO-MS-589, *Central Plateau Cleanup Company Procedures*, resulting in the following examples of inadequate procedure adherence:

[2] FSM-PRO-ITM-61682, *Inspection and Testing Dry Riser Fire Sprinkler System*, was used for two 36-month full flow tests (safety management program/NFPA-required ITM) on an SS system, and SWRD-PRO-OP-51714, *Monthly CWC RCRA Fire System Inspection Checklist*, was used for a monthly post indicator valve inspection technical safety requirement surveillance.

- During the performance of FSM-PRO-ITM-61682, several steps were marked as complete before completion, and other steps were completed without appropriate indication. Additionally, the clapper valve inspection appendix included steps to clean the valve, which were not performed.
- During the completion of SWSD-PRO-OP-51714, which implements a TSR-required surveillance to verify operability of CWC FSSs, the valve lineup, which included between one and three verifications on each of 41 different valves, was performed from memory without referencing the valve inspection data sheet to ensure that all valves were checked. The data sheet was filled out following the completion of all performed inspections.

In addition to providing guidance on procedure use and adherence, CPCC-PRO-MS-589 provides direction for designating procedures as continuous or reference use in accordance with DOE Order 422.1, attachment 2, section 2.p.(9):

- Continuous use designation is required for activities that "are high risk, or complex, or infrequently performed, or a performance error could cause significant adverse impact on the environment, the facility, equipment, or the performer." These procedures are required to be "physically located in the work area and in use."
- Reference use designation is acceptable for activities that are "performed frequently, or can be performed without referring to the procedure, or where the education, experience, training, and/or skill of the performer is largely sufficient to perform the activities." These procedures are required to be "available in the work area."

For procedures implementing TSR SRs, few requirements are provided to distinguish when continuous use designation is required or when reference use designation is sufficient. Examples provided of when procedures should be categorized as continuous use include if the procedure "includes…manipulation of equipment related to TSR compliance," or "contains TSR surveillance data." Examples provided for when reference use categorization is appropriate include if the procedure "contains TSR surveillance data with the expectation that datasheets are to be directly utilized in the field." (See **OFI-CPCCo-1**.)

CPCCo has implemented a generally adequate impairment control program for SWOC fire protection SSCs, as defined in CPCC-PRO-FP-40426, *Fire Protection System Discrepancies*. However, a weakness was identified in CP-ENG-0317, *Operability Evaluation of the 2402WB Pinhole in the Fire Sprinkler System*, which addressed a degraded FSS pipe condition involving a 3/32" pinhole leak in Building 2402-WB. The engineering recommendation in the operability evaluation was to install a non-listed pipe patch, less reliable than a tested and approved component, on the FSS piping as an acceptable long-term compensatory measure to reduce cycling of the system air compressor. (See **OFI-CPCCo-2**.) NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, section 15.1.1.2, states that appropriate measures shall be taken during a fire system impairment to ensure that increased risks are minimized and the duration of the fire system impairment is limited.

Fire Protection Inspection, Testing, and Maintenance Conclusions

CPCCo ensures performance of generally adequate ITM on fire protection SSCs in accordance with applicable DOE orders and NFPA codes and standards. However, weaknesses associated with the use of incorrectly categorized procedures and a non-listed pipe patch as a long-term compensatory measure for degraded FSS piping were identified.

3.2 Corrective Actions in Response to ITM Deficiencies

This portion of the assessment evaluated CPCCo's corrective actions and use of its issues management system to address previously identified ITM deficiencies.

CPCCo has established an adequate issues management process through CPCC-PRO-QA-052, *Issues Management*. All issues identified by CPCCo in 2021 and 2022 and the corresponding investigations were appropriately entered into the integrated Contractor Assurance System (iCAS) as required. All identified issues were adequately assigned a significance level and corrective actions, and an appropriate root cause evaluation was conducted as required.

ITM performance and management has greatly improved since the April – May 2024 EA assessment. Coordination has improved between the CPCCo and fire system maintenance preventive maintenance (PM) coordinators, resulting in improved collaboration between CPCCo facility management and the mission essential services contractor to ensure that ITM is properly and timely performed. CPCCo has also added a fire safety officer who appropriately assists in the proper conduct of PM activities. Interviewed CPCCo personnel stated that all fire system maintenance activities have been added to the electronic job control system, which has appropriately enhanced performance tracking. Metrics for PM completion now provide improved visibility for the timely completion of fire system ITM activities. CPCCo also appropriately added a section to CPCC-00162, *CWC-01A System Health Report for FPS FY25*, that provides tracking and trending for ITM completion and for identified issues.

Issues identified during the April – May 2024 EA assessment were appropriately entered into iCAS. However, contrary to CPCC-PRO-QA-052, section 3.4, *Corrective Action Completion*, and DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*, attachment 1, section 2.b.(3)(b), requirements to properly track issue correction to closure, CPCCo closed several of these issues without taking sufficient corrective action or providing appropriate justification for no action. (See **Deficiency D-CPCCo-2**.) Closing issues without taking appropriate corrective action could lead to increased risk and/or repeat occurrences of the condition. Upon review of the condition reports (CRs), several issues were categorized as "Level C" CRs ("find and fix") and were closed without action.[3] These issues included the following conditions:

- The documented safety analysis (DSA) did not adequately define minimum FSS performance criteria; the issue was closed with reference to an evaluation of a potential inadequacy in the safety analysis for a separate issue (see also discussion in section 3.3).
- The fire hazards analysis (FHA) had not been kept current, which was not timely addressed; an action to "ensure SWOC facilities are adequately covered in a current FHA revision" remained open.
- Water delivery time did not meet the design requirement; the issue was closed without addressing the underlying matter.

Corrective Actions in Response to ITM Deficiencies Conclusions

CPCCo has established and implemented a generally adequate issues management process to track issues to closure. The coordination and completion of fire system ITM activities have greatly improved since

[3] CPCC-PRO-QA-052 states that "Level C CRs generally involve the remediation of one or more issues." Closure of a Level C CR with no additional action is permitted in some cases with justification: "If Immediate Actions taken fully address the identified issue, the Responsible Manager may choose to take no action with justification noted in the CR." Reviewed CRs did not all document corrective actions taken or appropriate justification for no additional actions needed.

the April – May 2024 EA assessment. However, CPCCo closed several of the issues identified by EA in 2024 without adequately addressing the deficiencies.

3.3 Follow-up on Previous EA Finding

This portion of the assessment examined the status and corrective actions for one finding documented in EA report *Fire Protection Program Implementation Assessment at the Hanford Site Central Waste Complex and T Plant, May 2019*. At the time of that assessment CH2M HILL Plateau Remediation Company (CHPRC), the predecessor to CPCCo, managed and operated the CWC and T Plant.

Finding F-CHPRC-1 of the 2019 EA report stated that CHPRC had not specified and evaluated the minimum performance criteria for the SWOC FSSs in the SWOC DSA. This resulted in a set of TSRs for the FSSs that did not fully define the operability requirements and ensure that operable FSSs are available.

Status: In response to this finding, CHPRC initially concluded that an analysis supported downgrading the FSSs from SS to general service and did not require a TSR to ensure operability. The CHPRC corrective action plan (CAP) identified that the finding would be closed following approval of an update to the SWOC DSA. HFO's predecessor organization rejected this conclusion and determined that the CWC FSSs were credited and remained SS SSCs.

In March 2021, CPCCo retracted the CHPRC CAP and provided a new CAP for closure of the finding, which requires development of minimum performance requirements for the FSSs to be incorporated into the SWOC DSA and TSRs. Actions to fully address this finding are not anticipated to be completed until CPCCo develops and submits a full revision of the safety basis and it is approved by HFO. In the interim, the current operability requirements in place are that the static pressure exceeds 70 pounds per square inch and that the facility water supply isolation valves are open, with the valves either locked open or having an intact visual tamper device. These requirements alone are inadequate to ensure that FSSs are capable of performing their specified functions and that all necessary support systems are capable of performing their related support functions.

EA previously reviewed the status and corrective actions for this finding during its April – May 2024 assessment, as described in EA report *Independent Assessment of Fire System Maintenance at the Hanford Site, July 2024*. No significant progress has been made on corrective actions since that review. This finding remains open.

Follow-up on Previous EA Finding Conclusions

Actions by CPCCo to address the EA finding related to FSS operability requirements have not yet been completed, and this finding remains open.

4.0 BEST PRACTICES

No best practices were identified during this assessment.

5.0 FINDINGS

No findings were identified during this assessment.

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 did not ensure procedures were followed as required during an observed TSR surveillance and observed safety management program/NFPA-required ITM on an SS system. (DOE Order 422.1, att. 2, sec. 2.p.(1))

Deficiency D-CPCCo-2: CPCCo closed several issues without taking sufficient corrective action or providing appropriate justification for no action. (DOE Order 226.1B, att. 1, sec. 2.b.(3)(b), and CPCC-PRO-QA-052, sec. 3.4)

7.0 OPPORTUNITIES FOR IMPROVEMENT

EA identified the OFIs shown below 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 revising CPCC-PRO-MS-589 to better distinguish between continuous and reference use procedures, including providing more prescriptive requirements for when designation of each is appropriate, and reviewing whether reference use designation is appropriate for TSR SR-implementing procedures.

OFI-CPCCo-2: Consider replacing degraded FSS piping to reduce the duration of fire system impairments and reliance on non-listed pipe patches.

Appendix A
Supplemental Information

Dates of Assessment

May 5 to 21, 2025

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