



# **Fire Protection Program Implementation Assessment at the Hanford Site Central Waste Complex and T Plant**

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## Acronyms

BNA	Baseline Needs Assessment
CAS	Contractor Assurance System
CFR	Code of Federal Regulations
CHPRC	CH2M HILL Plateau Remediation Company
CRAD	Criteria and Review Approach Document
CRRS	Condition Reporting and Resolution System
CWC	Central Waste Complex
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
EA	Office of Enterprise Assessments
FHA	Fire Hazard Analysis
FPE	Fire Protection Engineer
FPP	Fire Protection Program
FSS	Fire Suppression System
FY	Fiscal Year
ITM	Inspection, Testing, and Maintenance
LCO	Limiting Condition for Operation
MDSA	Master Documented Safety Analysis
MSA	Mission Support Alliance, LLC
NFPA	National Fire Protection Association
RL	Richland Operations Office
SS	Safety Significant
SSC	Structure, System, and Component
SSO	Safety System Oversight
SWOC	Solid Waste Operations Complex
TSR	Technical Safety Requirement
USQ	Unreviewed Safety Question

## **Fire Protection Program Implementation Assessment at the Hanford Site Central Waste Complex and T Plant**

### **EXECUTIVE SUMMARY**

The U.S. Department of Energy (DOE) Office of Nuclear Safety and Environmental Assessments, within the independent Office of Enterprise Assessments (EA), conducted an assessment of fire protection program implementation at the Hanford Site Central Waste Complex (CWC) and T Plant, which are operated by CH2M HILL Plateau Remediation Company (CHPRC). EA also assessed the fire protection program implementation by Mission Support Alliance, LLC (MSA), which manages the Hanford Fire Department, emergency services, and infrastructure systems (e.g., water treatment and distribution systems). MSA also performs inspections, tests, and maintenance on the fire protection systems in the CWC and the T Plant.

The CHPRC and MSA fire protection programs, as implemented at the CWC and the T Plant, are appropriately established and maintained. Both CHPRC and MSA have comprehensive, documented fire protection programs that include the elements and requirements for design, operations, emergency response, fire analysis and assessments, and wildland fire, and use the applicable building codes and National Fire Protection Association codes and standards. The Hanford Fire Department is sufficiently staffed and equipped to respond to emergency events as evaluated in the baseline needs assessment. The Hanford Site wildland fire management plan meets requirements. The CHPRC and MSA fire protection programs have adequate work processes and procedures for conducting inspections, testing, maintenance, and acceptance of fire protection systems. The fire protection systems designed for the CWC and the T Plant are adequate and well maintained. The CHPRC, MSA, and DOE personnel associated with fire protection have a good understanding of how the fire protection systems and associated support systems function to protect the facility. EA identified two Best Practices. RL and Hanford contractors have established the Hanford Site Fire Protection Forum, which assists RL in maintaining uniform and integrated FPPs across Hanford. Additionally, MSA established a self-contained breathing apparatus continuing education program, which sponsors MSA technicians to attend the manufacturer's continuing education program every two years.

Despite these strengths, the assessment team identified two significant weaknesses. First, MSA has not established a formal training program for the technicians performing the inspections, testing, and maintenance of the fire protection systems. Second, CHPRC has not met the requirements for developing adequate functional requirements and performance criteria for the Solid Waste Operations Complex fire suppression systems, which has resulted in an inadequate limiting condition for operation and associated surveillance requirement. Other weaknesses include: CHPRC fire protection engineers are not adequately performing reviews of outstanding fire protection issues or evaluating fire protection systems' inspection, testing, and maintenance programs; the east and west dry pipe sprinkler risers in one of the CWC buildings do not have hydraulic design information signs, and inspections are not conducted to verify the presence of these signs; portable fire extinguishers installed outdoors at the CWC and the T Plant were not protected from environmental elements; the response to a main drain test that did not meet the acceptance criteria was inadequate; and ducting penetrating a two-hour fire-rated wall had no fire damper.

The DOE Richland Operations Office (RL) has an adequately documented and established fire protection oversight program. With the exception of the significant weakness areas identified in this assessment, RL is adequately overseeing the overall CHPRC and MSA fire protection programs, as well as program implementation in the CWC and the T Plant.

## **Fire Protection Program Implementation Assessment at the Hanford Site Central Waste Complex and T Plant**

### **1.0 PURPOSE**

The U.S. Department of Energy (DOE) Office of Nuclear Safety and Environmental Assessments, within the independent Office of Enterprise Assessments (EA), conducted an assessment of fire protection program (FPP) implementation at the Hanford Site (Hanford) Central Waste Complex (CWC) and T Plant, which are operated by CH2M HILL Plateau Remediation Company (CHPRC). EA also assessed the FPP implementation by Mission Support Alliance, LLC (MSA), which manages the Hanford Fire Department (HFD), emergency services, and infrastructure systems (e.g., water treatment and distribution systems). In addition, MSA performs inspections, tests, and maintenance on the fire protection systems in the CWC and the T Plant. This assessment was part of a series of targeted assessments of fire protection at nuclear facilities across the DOE complex.

The purpose of this assessment was to evaluate the implementation of FPP requirements and the adequacy of controls designed to reduce the risk from fires. This assessment was designed to evaluate specific core fire protection elements and to provide information to all stakeholders for benchmarking the programs' effectiveness. EA conducted the onsite portions of this assessment on September 17-21 and October 8-11, 2018.

### **2.0 SCOPE**

EA assessed the implementation and effectiveness of key elements of the CHPRC and MSA FPPs and the facility-specific FPP requirements at the CWC and T Plant facilities in accordance with the *Plan for the Office of Enterprise Assessments Assessment of the Fire Protection Program Implementation at Hanford Site's Central Waste Complex and T Plant, Revision 1, September – October 2018*. Those key elements included program documentation; fire hazard analyses (FHAs); combustible controls; building fire protection assessments; fire system impairment processes; baseline needs assessment (BNA); fire department response; pre-incident plans; wildland fire management; fire protection systems; the integration of the FPPs with the facility safety basis process; inspection of supporting infrastructure; inspection, testing, and maintenance (ITM) of fire protection systems; contractor self-assessments of the FPPs; and configuration management. EA also assessed the DOE Richland Operations Office (RL) oversight activities related to fire protection.

### **3.0 BACKGROUND**

Hanford is an Office of Environmental Management site; RL is the responsible EM field office for the CWC and the T Plant, which are hazard category 2 nonreactor nuclear facilities. The CWC and the T Plant are part of the Solid Waste Operations Complex (SWOC), which also includes the Hanford Low-Level Burial Grounds and the Waste Receiving and Processing Facility. The CWC's main structures include the 2402 series, 2403 series, and 2404 series metal buildings, which are used to store low-level waste, low-level mixed waste, transuranic waste, and transuranic mixed waste. Each CWC building has a safety significant (SS) dry pipe sprinkler system. The T Plant complex consists of the 221-T building (the "canyon" building), the attached 271-T building, the 221-T Railway Tunnel, the 2706-T building and additions (2706-TA and 2706-TB), several storage buildings, and outside storage areas. The 221-T building, constructed of reinforced concrete, was built in 1943 and was the original reactor fuel reprocessing facility. The 2706-T and 2706-TA buildings have SS fire suppression systems (FSSs). The

T Plant's current mission is repackaging and storing both low-level and transuranic wastes, including mixed wastes. The T Plant canyon is also being used to store sludge transport and storage containers containing sludge collected from two Hanford reactor spent fuel storage basins.

#### 4.0 METHODOLOGY

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

To guide this assessment, EA used sections of Criteria and Review Approach Document (CRAD) EA CRAD 31-12, *Fire Protection Program Criteria and Review Approach Document*, Rev. 1, January 25, 2018:

- 4.1 Fire Protection Program
- 4.2 Fire Prevention and Protection SSCs and Design Requirements
- 4.3 Operations, Surveillance, Testing and Maintenance
- 4.4 Contractor Self-Assessment Program
- 4.5 Configuration Management.

EA also used elements of CRAD 45-21, Rev. 1, *Feedback and Continuous Improvement Inspection Criteria and Approach – DOE Field Element*, December 4, 2012, to collect and analyze data on RL oversight activities related to fire protection.

EA examined key documents, such as system descriptions, work packages, procedures, manuals, analyses, policies, and training and qualification records. EA also conducted interviews of key personnel responsible for developing, executing, and monitoring the associated systems and programs, including maintenance projects and tracking corrective actions to closure. EA walked down significant portions of the CWC and the T Plant to evaluate the effectiveness of the FPPs as implemented.

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

#### 5.0 RESULTS

This section discusses the team's assessment of the CHPRC and MSA FPPs as implemented at the CWC and the T Plant.

## **5.1 Fire Protection Program**

The assessment team reviewed the respective policies, programs, and procedures to determine whether CHPRC and MSA management have established appropriate requirements for comprehensive FPPs in DOE facilities and emergency response organizations to ensure effective implementation and control of all fire protection activities (10 CFR Part 830; 10 CFR Part 851; DOE Order 420.1C, Change 1, Attachment 2, Chapter II, *Fire Protection*).

### **5.1.1 Fire Protection Program Policy**

*Criterion:*

*The site contractor has an established policy statement that affirms the contractor's commitment to provide a comprehensive fire protection and emergency response program in accordance with applicable DOE directives and other related requirements. (DOE Order 420.1C, Change 1, Facility Safety, Attachment 2, Chapter II)*

The CHPRC FPP policy is formally established in PRC-POL-FP-40402, *Fire Protection Program Policy*, and appropriately includes a commitment to establish and implement an FPP in accordance with DOE Order 420.1C, Change 1, *Facility Safety*. Basic objectives and key aspects of the FPP are specified in the policy. CHPRC's policy statement also commits to providing a fully trained and equipped emergency response organization to ensure a timely and effective response to site emergencies. This service is provided by the HFD under a separate contract with MSA and is implemented through a memorandum of agreement between CHPRC and MSA. The MSA FPP policy is contained in MSC-POL-FP-36200, *Fire Protection Program Policy*. The MSA policy appropriately states the need for a comprehensive FPP and identifies the primary objectives for the program. The CHPRC and MSA policies adequately establish authorities and responsibilities for implementing and integrating the two programs.

The CHPRC and MSA FPP policies are adequate.

### **5.1.2 Codes and Standards**

*Criterion:*

*The applicable building code and National Fire Protection Association (NFPA) codes and standards are identified in the fire protection and emergency response programs. (DOE Order 420.1C, Change 1, Attachment 2, Chapter II; applicable codes and standards from the site-specific contract)*

PRC-POL-FP-40402 states that the CHPRC FPP shall ensure compliance with applicable DOE directives and requirements; other applicable Federal, state, and local requirements; applicable building codes; and NFPA codes and standards.

The CHPRC standard PRC-STD-FP-40404, *Fire Protection Program*, appropriately incorporates the requirements of Section 2, *Fire Protection*, of Appendix A, *Worker Safety and Health Functional Areas*, to 10 CFR Part 851, *Worker Safety and Health Program*; DOE Order 420.1C, Change 1; and the Contractor Requirements Document (Supplemental) Form, *CRD O 420.1C, Chg. 1, Facility Safety [SCRD]*, for fire protection. The SCRDR requires the use of the International Building Code, applicable DOE requirements, and technical standards for design and construction; clarifies the applicability of the International Fire Code in accordance with specific agreements with the State of Washington; and specifies the requirements for compliance with applicable NFPA codes and standards. Throughout the CHPRC FPP documents, references are made to the use of NFPA codes and standards, subject to the conditions related to the code of record, including the requirement that operational aspects of fire

protection, such as ITM, shall comply with the current version of the applicable NFPA codes and standards.

MSA's plan, MSC-MP-58194, *Hanford Fire Department Program Plan*, adequately commits to provide an FPP based on nationally recognized codes and standards, such as NFPA, and applicable codes published by the International Code Council, as well as DOE orders, standards, and directives. This program plan includes a table of the NFPA codes and standards that are applicable to the HFD, along with a list of specific equivalencies and exemptions to the codes that are approved by the RL Authority Having Jurisdiction. This list of equivalencies and exemptions includes the requirement to perform the ITM of fire protection systems using the current NFPA codes.

MSA document MSC-RD-FP-9118, *Fire Protection Design/Operations Criteria*, adequately identifies the fire protection design and operational criteria, including DOE directives and NFPA codes and standards, which are required for all new designs, upgrades, and modifications prepared within the MSA contract work scope.

In accordance with DOE Order 420.1C, Change 1, Attachment 2, Chapter II, CHPRC and MSA FPP documents adequately identify the appropriate fire codes and standards.

### **5.1.3 Fire Protection Program Programmatic Elements**

#### *Criteria:*

*A documented FPP exists as required by applicable safety criteria and includes the elements and requirements for design and operations, emergency response, fire analysis and assessments, wildland fire, and site-specific fire protection criteria. (10 CFR Part 830; 10 CFR Part 851; DOE Order 420.1C, Change 1, Attachment 2, Chapter II)*

*The contractor fire protection programs have been submitted to the DOE site office for review and approval. (DOE Order 420.1C, Change 1, Attachment 2, Chapter II)*

The CHPRC FPP adequately documents the elements and requirements as established in DOE Order 420.1C, Change 1, Attachment 2, Chapter II. Due to a contract modification that incorporates DOE Order 420.1C, Change 1, CHPRC recently revised and implemented PRC-STD-FP-40404, which resulted in significant changes to the FPP. At the time of this assessment, PRC-STD-FP-40404 was being reviewed by RL. EA has identified RL's approval of PRC-STD-FP-40404 as a follow-up item in Section 8.0 of this report.

The MSA FPP that was approved by RL in 2015 adequately documents the elements and requirements as established in DOE Order 420.1C, Change 1, Attachment 2, Chapter II. Additionally, RL has exercised its option to assign certain Authority Having Jurisdiction responsibilities to the Hanford fire marshal, which are defined in 12-SED-0080, *Contract NO. DE-AC06-09RL14728 – Recommended Revisions to the Charter for the Hanford Fire Marshal and Charter for the Hanford Fire Protection Forum*.

Unique to Hanford, the site has established the Hanford Fire Protection Forum as a medium for routine open discussions between the Hanford prime contractors (including CHPRC and MSA) on fire protection topics and issues. It assists RL in maintaining uniform and integrated FPPs across Hanford. The Hanford Fire Protection Forum is comprised of contractor fire protection engineers (FPEs), managers, designers, fire protection staff, the Hanford fire marshal, fire department staff, fire system maintenance managers and engineers, and the RL FPE. EA identified the Hanford Fire Protection Forum role and function as a **Best Practice**.



#### **5.1.4 Fire Hazard Analyses (FHAs), Combustible Controls, and Facility Fire Protection Assessments**

*Criteria:*

*An FHA has been prepared for the facility and reviewed every 3 years by an FPE and revised as appropriate. (DOE Order 420.1C, Change 1, Attachment 2, Chapter II)*

*The FHA has been adequately revised to accommodate changes to the facility, processes (operations), occupancy, safety basis, or BNA; or when new fire safety risks are introduced. (DOE Order 420.1C, Change 1, Attachment 2, Chapter II)*

*Fire and related safety hazards on site (or within the facility) have been identified and evaluated in conjunction with the current and comprehensive FHA and building FPP assessments. (DOE Order 420.1C, Change 1, Attachment 2, Chapter II)*

*A complete spectrum of fire prevention combustible controls and procedures has been developed and implemented as required by applicable fire safety criteria. (DOE Order 420.1C, Change 1, Attachment 2, Chapter II)*

*Facility fire protection assessments are conducted annually for facilities valued over \$100 million dollars, facilities considered a high hazard, or those with vital programs; or at least every three years for low and ordinary hazard facilities; or at a frequency with appropriate justification approved by the DOE head of field element. (DOE Order 420.1C, Change 1, Attachment 2, Chapter II)*

#### **Fire Hazard Analyses**

As required by DOE Order 420.1C, Change 1, Attachment 2, Chapter II, Section 3.f(1) and Section 7.1 of the CHPRC FPP, an FHA is required for all nuclear facilities and major modifications thereto, facilities that represent unique fire safety risks, new facilities or modifications to existing facilities with a combined building and content replacement value of \$25 million or more, or when directed by the responsible DOE authority. Section 2.1 of PRC-PRO-FP-40420, *Fire Protection Analyses/Evaluations*, appropriately establishes the responsibilities of the assessor conducting the FHA and documents the instructions for developing the hazards analysis. The assessment team reviewed HNF-21239, *Solid Waste Operations Complex Fire Hazards Analysis*, and HNF-59192, *T Plant Fire Hazards Analysis*. Each analysis adequately addresses facility fire hazards and fire-related safety concerns, with results of the FHAs integrated into HNF-14741, *Solid Waste Operations Complex Master Documented Safety Analysis [MDSA]*. The SWOC and T Plant FHAs are reviewed at least every three years, are performed under the direction of a qualified FPE, and assess the hazards of and potential damage from fire to verify that fire safety objectives are being met. The FHAs reviewed for the SWOC and T Plant facilities are established in accordance with DOE Order 420.1C, Change 1, Attachment 2, Chapter II, Section 3.f; PRC-PRO-FP-40420, Section 2.1; and DOE-STD-1066-2012, *Fire Protection*, Section 7.1 and Appendix B.

#### **Combustible Controls**

The assessment team reviewed procedure PRC-STD-FP-54133, *Control of Combustible Materials*, which adequately identifies controls to manage combustibles in the CWC and the T Plant. The document provides a general description of combustible material spacing, separation, and location requirements; identifies required surveillances to demonstrate that combustible quantities are below threshold quantities; and institutes provisions for controlling ignition sources. The assessment team also reviewed procedure TPLN-PRO-OP-51750, *Combustible Material Control Surveillance*, which is used by Operations to perform monthly and quarterly combustible material control surveillances required by HNF-15280, *Solid*

*Waste Operations Complex Technical Safety Requirements* [TSRs]. TPLN-PRO-OP-51750 adequately defines the surveillances that address clear separation distances from fuel packages, establishes pallet storage criteria, and provides instructions for completing the “Combustible Material Control Surveillance” checklists. The assessment team reviewed the T Plant Operations-completed surveillance checklists conducted April 2018 through July 2018 and the T Plant outside area surveillance checklists performed May 2018 through July 2018. All surveillances were completed in accordance with HNF-15280 and TPLN-PRO-OP-51750. Walkthroughs of the CWC and T Plant facilities confirmed that CHPRC adequately manages combustible controls in accordance with PRC-STD-FP-54133 and DOE Order 420.1C, Change 1, Attachment 2, Chapter II, Section 3.d.

Although combustibles are adequately managed in the reviewed facilities, the 5-megawatt (MW) combustible loading acceptance criteria for stored and transient combustible fuel packages are not defined in quantitative values for workers and combustible material control assessors. Additionally, interviews with CHPRC FPEs revealed an inconsistent understanding of the quantity of combustibles needed to constitute a 5-MW fire. The CHPRC fire protection engineering organization concurred that the combustible loading acceptance criteria lack consistently defined quantitative values.

### **Facility Fire Protection Assessments**

Requirements for performing facility fire protection assessments are adequately established in Section 7.2 of the CHPRC FPP, which specifies that hazard category 2 and 3 nuclear facilities be assessed every three years. The EA assessment team reviewed facility fire protection assessments for the CWC 2402WK and 2403WD waste storage buildings, and PTS-2015-WSA-8965, *Triennial Fire Protection Assessment – T Plant Complex Buildings*. The CWC 2402WK and 2403WD waste storage facilities were assessed in March 2017 and within the required three-year frequency. PTS-2015-WSA-8965 was last performed June 25, 2015. Contrary to the requirements of Section 7.2 of the CHPRC FPP and DOE Order 420.1C, Change 1, Attachment 2, Chapter II, Section 3.f (2), the T Plant facility fire protection assessment was not performed within the required three-year frequency. (Note: Because the T Plant facility fire protection assessment was completed after the onsite portion of the EA assessment, but before issuance of this report, this was not identified as a deficiency.) CHPRC indicated that the failure to meet the required frequency for the T Plant facility fire protection assessment was an oversight due to the FPE updating the T Plant FHA in April 2018.

Section 2.2 of PRC-PRO-FP-40420 establishes the responsibilities of the assessor evaluating the facility FPP and documents the instructions for conducting a fire protection assessment that includes six elements: occupancy permits, status of open fire protection items, fire protection system ITM, fire prevention and life safety inspections, equivalencies and exemptions, and FHA administrative controls. To verify the implementation of PRC-PRO-FP-40420, the assessment team evaluated assessments of two of the six elements: open fire protection items and the fire protection system ITM review.

PRC-PRO-FP-40420 requires the assessor to review the Condition Reporting and Resolution System (CRRS) to evaluate the status of open fire protection issues. The EA assessment team reviewed three facility fire protection assessments, none of which discussed the assessors’ evaluations or the status of open fire protection issues in the CRRS. The EA assessment team also reviewed the CHPRC CWC spreadsheet “Discrepancy Log,” which identifies 9 sprinkler system deficiencies in the 2403WD building that have been outstanding from 61 to 1,632 days. These deficiencies, if not addressed, could result in the systems not operating as designed. Examples include: failure of the air accelerator, numerous valves leaking due to deteriorated packing, missing pipe support brackets allowing pipes to shake and vibrate when flowing water, air leaks in the sprinkler piping causing the air compressor to run frequently, a sprinkler system control valve that does not fully close, an air compressor that continuously trips the

electrical overload breaker, a water motor gong alarm that does not work, a low air supervisor alarm switch that does not work, and supervisory alarms that will not clear on the fire alarm control panel.

PRC-PRO-FP-40420 also requires the assessor to evaluate the status of the fire protection system ITM programs, including trending results from fire system impairments. The facility assessments adequately describe the fire protection systems installed to protect the facilities, but do not discuss the evaluation of the fire protection systems ITM programs, completion of ITM records, and trending results from fire protection system impairments as required by PRC-PRO-FP-40420. CHPRC FPEs are not performing CRRS reviews of outstanding fire protection issues or evaluating the fire protection system ITM programs as required by Section 2.2.f of PRC-PRO-FP-40420. **(Deficiency)**

During walkthroughs of the CWC and T Plant facilities and reviews of associated documentation, the EA assessment team observed the following deficiencies with building fire protection systems:

- The east and west dry pipe sprinkler risers in 2403WD do not have hydraulic design information signs as required by NFPA 13, *Standard for the Installation of Sprinkler Systems*, Section 25.5, and NFPA 25, *Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, Section 5.1.1. **(Deficiency)** Although the 2403WD facility assessment indicates that dry pipe riser work packages for the 3-month, 6-month, and 24-month ITM were reviewed and no discrepancies were noted, the assessment team identified that the hydraulic design information sign was not provided on the sprinkler risers. The hydraulic design information sign identifies the minimum water supply required for that specific sprinkler system and is meaningful to emergency responders when supplementing water to the sprinkler system utilizing the system fire department connection.
- Eight portable fire extinguishers installed outdoors at the CWC and T Plant facilities were not protected from environmental elements as required by PRC-PRO-FP-54129, *Portable Fire Extinguishers*, Section 3.3.5, and NFPA 10, *Standard for Portable Fire Extinguishers*, Section 6.1.3.7. **(Deficiency)** Portable fire extinguishers that are not protected from environmental elements are subject to accelerated degradation of hoses, pressure gauges, and nozzles that can render the extinguisher unsafe for use.
- As required by PRC-PRO-FP-40425, *Fire Protection System Inspection, Testing, and Maintenance*, Section 3.3, three fire barrier walls in the T Plant 2706-T and 2706-TA buildings were not properly labeled, and none of the through penetrations in the fire barriers employed a means to provide traceability. **(Deficiency)**
- The January 16, 2018, main drain test for the 2403WD dry pipe system riser #2 did not meet the tolerance acceptance criteria, and no corrective action was documented on the data sheet as required by FS0024, *Performing Bypass/Restoration and Valve Status or Main Drain Test*, Section 6.3. **(Deficiency)**
- The annual fire hydrant maintenance record for T Plant hydrant 4-T indicates that the number of turns to open (25) and to close (19.5) are not equal, and no action is documented for correction as required by FS0026, *Fire Hydrant Ground Gate Valve Inspection, Testing, and Maintenance*, Section 7.0. **(Deficiency)** Inconsistencies in the number of turns during operation of the valve are an indicator that the hydrant valve may have failed.

### 5.1.5 Baseline Needs Assessment

*Criterion:*

*The site emergency response capabilities meet site needs as established in the baseline needs assessment (BNA), safety basis requirements, and applicable regulations, codes and standards. (DOE Order 420.1C, Attachment 2, Chapter II; applicable codes and standards from the site-specific contract; site FPP description document; site emergency preparedness program)*

The HFD provides emergency fire and medical response to the CWC and T Plant facilities and is responsible for maintaining and updating the fire department BNA. The site BNA in HNF-SP-1180, *Hanford Fire Department Emergency Needs*, describes what emergency response services are required for Hanford, using protection goals that are defined in DOE Order 420.1C, Change 1; DOE-STD-1066-2012; and applicable NFPA codes and standards. The established BNA adequately describes structural firefighting, wildland firefighting, emergency medical service, hazardous material response, technical rescue, emergency communications, training and certifications, pre-incident plans, and fire response apparatus. The BNA also adequately provides the minimum requirements for staffing and response times, training, emergency communication and alarm dispatch, pre-incident plan review frequency, and front-line/reserve emergency fire and medical apparatus. The assessment team toured the Area 200 Fire Station 92 to validate the HNF-SP-1180 content and determined that, overall, the site BNA adequately analyzes the emergency response needs for the CWC and T Plant facilities as delineated in DOE-STD-1066-2012, Section 6.1. MSA is sufficiently staffed and equipped to respond to emergency events as evaluated in the BNA. During this tour, the assessment team also identified a **Best Practice** for the MSA self-contained breathing apparatus program, which sponsors MSA technicians to attend the manufacturer's continuing education program every two years.

As required by DOE Order 420.1C, Change 1, Attachment 2, Chapter II, Section 3.e(1)(d), the HFD conducts reviews of the BNA at least every three years. The last review of the needs assessment confirmed that no further update was required, as documented in MSA-1601002, *RL Approval, Contract Deliverable CD0037, Hanford Fire Needs Assessment*, March 30, 2016, with concurrence from RL via 16-SEI-0146, *Contract No. DE-AC06-09RL147280 Contract Deliverable CD0037, Hanford Fire Needs Assessment*, July 27, 2016.

The HFD emergency response capabilities, as analyzed and described in the BNA, are adequate.

### 5.1.6 Pre-Incident Plans

*Criterion:*

*Pre-incident strategies, plans, and standard operating procedures have been established to enhance the effectiveness of emergency response activities. (DOE Order 420.1C, Change 1, Attachment 2, Chapter II)*

The MSA program for developing pre-incident plans is defined in HFD-PRO-FPFCI-60699 (2.E.2), *Pre-Incident Planning*, and includes how the HFD develops and maintains pre-incident plans to effectively manage and respond to fires at the CWC and T Plant facilities. The assessment team reviewed pre-incident plans, including *Central Waste Complex; 2402 and 2403 Complex*, dated May 2018, and *T Plant 2706-T, 2706-TA, 2706-TB*, dated September 2018, and determined that the documents are current and are reviewed and revised, as necessary, on an annual frequency as required by HFD-PRO-FPFCI-60699, Section 5.5. Information provided in the pre-incident plans is consistent with the requirements in HFD-PRO-FPFCI-60699 and guidance provided in NFPA 1620, *Standard for Pre-Incident Planning*. During walkthroughs of the selected facilities, the assessment team verified that the pre-incident plans were consistent with facility conditions.

The *Central Waste Complex; 2402 and 2403 Complex* and the T Plant 2706-T, 2706-TA, 2706-TB pre-incident plans are consistent with guidelines established in NFPA 1620 and meet the expectations of DOE Order 420.1C, Change 1, Attachment 2, Chapter II, Section 3.e(2) and DOE-STD-1066-2012, Section 6.3.

### 5.1.7 Wildland Fire

*Criterion:*

*Consistent with the Federal Wildland Fire Management Policy, the site contractor has an integrated site-wide wildland fire management plan that has been established and implemented in accordance with relevant portions of NFPA 1143, Standards for Wildland Fire Management. (DOE Order 420.1C, Change 1, Attachment 2, Chapter II)*

MSA has adequately established and implemented a sitewide wildland fire management plan in HNF-8599, *Hanford Site 2018 Wildland Fire Management Plan*. This plan establishes an effective structure and approach to implement an integrated sitewide fire management plan as required in DOE Order 420.1C, Change 1, Attachment 2, Chapter II, Section 3.g. The plan addresses three technical areas that are located on DOE-owned land and remote test areas and other wildlands controlled and managed by DOE under the oversight of RL and the DOE Office of River Protection.

RL and the HFD have an active program of coordinating activities with the U.S. Fish and Wildlife Service (USFWS) regarding firefighting and fire management to determine the best tactics for fighting fires on the Hanford reservation and other USFWS land. The goal of the program is to minimize, to the extent possible, the damage created by a wildland fire by implementing a variety of activities including, but not limited to: Wildland-Urban Interface standards, construction plan reviews, prescribed fire application, management strategies for fire fuel manipulation, positive control breaks and anchors, fire/weather analysis, and prevention/education. As part of the CWC and T Plant facility tours, the assessment team verified that management strategies for removing accumulated tumbleweeds from fence lines were adequately implemented and that positive fire breaks and anchors were maintained around facility boundaries and outside storage areas.

The MSA wildland fire management plan is consistent with the guidelines established in NFPA 1143 and NFPA 1144, *Standard for Reducing Structural Ignition Hazards from Wildfire*, as required in DOE-STD-1066-2012, Section 8.1.

### 5.1.8 Fire Protection Program Conclusion

CHPRC and MSA have comprehensive, documented FPPs that include established policy statements and procedures, and use applicable building codes and NFPA codes and standards. CHPRC has developed and maintains current the FHAs for the facilities reviewed, and combustible controls are well managed. The HFD emergency response capabilities meet the site's needs as analyzed and established in the site BNA. MSA has prepared and maintains pre-incident plans for the reviewed CHPRC facilities and has established an adequate sitewide wildland fire management plan. The formation and operation of the Hanford Fire Protection Forum, and the MSA self-contained breathing apparatus program, were identified as **Best Practices**. The assessment team identified deficiencies with the CHPRC facility fire protection assessments of CRRS open fire protection issues, performing required reviews of the fire protection ITM program, and with various fire protection systems and equipment conditions.

## 5.2 Fire Prevention and Protection Structures, Systems, and Components (SSCs) and Design Requirements

The assessment team reviewed the engineering design documents and analyses to determine whether they are technically adequate and implement the requirements of the facility safety basis such that adequate protection of the public, the workers, and the environment from fires and other hazards is demonstrated (10 CFR 830.122, *Quality assurance criteria*; DOE Order 420.1C, Change 1, Attachment 2, Chapter II).

### *Criteria:*

*Key design documents, including design basis and supporting documents, are established to support facility safety basis development and implementation. (10 CFR Part 851; DOE Order 420.1C, Change 1, Attachment 2, Chapter II; applicable NFPA codes and standards from the site-specific contract)*

*Fire protection design requirements are documented and incorporated into plans and specifications, including protection thresholds that are consistent with the safety authorization basis and FHA. (10 CFR Part 851; DOE Order 420.1C, Change 1, Attachment 2, Chapter II; site documented safety analysis (DSA); site and facility FHAs; applicable NFPA codes and standards from the site-specific contract)*

*A complete spectrum of fire prevention controls and procedures have been developed and implemented as required by applicable fire safety criteria. (DOE Order 420.1C, Change 1, Attachment 2, Chapter II; applicable NFPA codes and standards from the site-specific contract)*

*The results of the FHA have been coordinated with and integrated into the facility safety basis. (10 CFR Part 830; 10 CFR Part 851; DOE Order 420.1C, Change 1, Attachment 2, Chapter II; NFPA 801, Standard for Fire Protection for Facilities Handling Radioactive Materials)*

*Engineered SSCs and processes are designed using sound engineering/scientific principles and appropriate standards. (10 CFR 830.122, Criterion 6)*

*The adequacy of the fire protection design is verified or validated by individuals or groups other than those who performed the work. Verification and validation of the fire protection design is completed before approval and implementation of the design. (10 CFR 830.122, Criterion 6)*

The assessment team reviewed the safety analysis, HNF-14741. The scope of the SWOC MDSA includes the Hanford Low-Level Burial Grounds, the CWC, the T Plant Complex, and the Waste Receiving and Processing Facility. The scope of this EA assessment only included the safety basis controls for fire events at the CWC and the T Plant.

The assessment team's review of the fire protection systems was to confirm, in part, that they are appropriate for the facility fire scenarios identified in the safety basis documents, the FHAs, and other documents and calculations. Because the SWOC is comprised of multiple facilities, several FHAs were developed to capture the fire hazards from the various facilities. To facilitate integration of the bounding fire hazards into the common SWOC MDSA, CHPRC-03081, *Fire Analyses for the SWOC MDSA*, was developed to present, in a more concise manner, the analysis sections from the various FHAs. CHPRC-03081 adequately describes the possible fire hazards and associated events, and includes analyses and references that support these events. Also included were analyses and bases for permitted combustible loading in the facilities. The assessment team determined CHPRC-03081 to be an effective approach for consolidating and integrating the various fire related analyses that support the SWOC MDSA.

The assessment team toured the 200W Raw Water Pump House and Treatment Facility, interviewed responsible MSA personnel, and reviewed MSA-ENG-61731, *System Health and Status Report for*

*INFRA-RW*, which addresses the Hanford raw water system. The raw water system's main function is to provide and distribute untreated water to facilities in 200E and 200W areas, including supplying raw water to fire hydrants, facility FSSs, and the 283W filtration plant. MSA-ENG-61731 indicates that the raw water system is reliable and able to provide water to Hanford, even when some subsystems are inoperable for various reasons. To address system deficiencies, a proactive system upgrade program has been initiated, as identified in HNF-5828, *Hanford Site Water System Master Plan*. Numerous upgrade projects are in progress, planned, or proposed. The completion of project L-894 will provide a new 30-inch, cross-site pipe directly connecting the east and west raw water grids. This project is currently funded and being implemented. Project L-895 will provide all new variable speed process pumps for the raw water system. However, despite ongoing and planned upgrades, the underground piping infrastructure is aged and currently subject to unplanned outages. The MDSA safety basis document appropriately identifies this vulnerability in the system performance evaluation.

The assessment team performed facility walkdowns at multiple buildings at the CWC, the 2706-T and 2706-TA buildings, and portions of 221-T and 271-T. The SS fire water suppression systems consist of dry pipe sprinkler systems that service the CWC buildings and wet pipe systems in the 2706-T and 2706-TA buildings. These SS systems are credited to minimize the effects of fire by reducing the potential for fire growth and thus reducing or limiting the potential release of radioactive and hazardous material. The assessment team identified deficiencies regarding certain aspects of these systems, which include:

- The ACT-2 SS confinement ventilation system provides active ventilation confinement through high-efficiency particulate air (HEPA) filters for the 2706-TA facility. The walls separating the ACT-2 and electrical rooms from 2706-TA are credited structural confinement boundaries as documented in the MDSA, Section 4.4.6.2. The fire resistive construction of the 2706-TA walls was not credited in the MDSA or the FHA. These walls were designed and built according to UL *Fire Resistance Directory* (UL 1997) design number U-425, which provides a two-hour fire resistance rating. However, ducting penetrating the two-hour fire-rated wall separating the ACT-2 room from the work area has no fire damper. A fire damper is required to preserve the two-hour fire wall rating according to NFPA 90A-2015, Section 5.3.1.1. (**Deficiency**)
- A deluge system is provided to protect the 2706-TA ACT-2 confinement ventilation HEPA filters. The deluge system is not credited by the safety basis, but is in service and may activate based on a high exhaust air temperature interlock. The operation of this deluge system is a concern because concurrent actuation of the ACT-2 deluge system and the 2706-TA sprinkler system would reduce flow to the SS 2706-TA sprinkler system, and this possible event has not been analyzed. HNF-16788, *SWOC Facilities Sprinkler Systems Hydraulic Calculations*, provides the design basis hydraulic calculation for the 2706-TA sprinkler system. This calculation is used to demonstrate that the 2706-TA sprinkler system is capable of meeting the performance criteria in the MDSA, Table 4-2, *Performance Criteria and Evaluation for the Automatic Fire Suppression Systems*, and is therefore capable of meeting the MDSA credited safety function. Because HNF-16788 does not analyze concurrent flow of the ACT-2 deluge system and the 2706-TA sprinkler system, the MDSA lacks an adequate technical justification that the 2706-TA sprinkler system can meet the Table 4-2 performance criteria and provide its credited safety function. This lack of adequate technical justification is contrary to Section 830.204(b)(4) of 10 CFR 830, Subpart B, *Safety Basis Requirements*, which requires the MDSA to “demonstrate the adequacy of [derived hazard] controls to eliminate, limit, or mitigate identified hazards.” (**Deficiency**) (Note: CHPRC provided informal documentation during the assessment that the 2706-TA sprinkler system is capable of meeting its performance criteria with the concurrent ACT-2 deluge system hydraulic load; however, the design basis hydraulic calculation does not reflect this data.)

In a previous assessment, EA identified that the T Plant fire protection water distribution system did not fully meet the redundant water supply requirements of DOE Order 420.1C, Change 1, because it does not feature a looped network of piping such that any point in the network is provided with two points of supply. RL approved a temporary exemption accepting the condition unless the T Plant repackaging mission is expanded. This vulnerability is identified in Chapter 4 of the MDSA. If the T Plant repackaging mission is expanded, the temporary exemption would no longer be valid, and an upgrade to the T Plant water supply would have to be evaluated. This is one of the proposed upgrades included in the *Hanford Site Water System Master Plan*.

In the MDSA accident analysis, high mitigated risk (Risk Bin I and II per CHPRC's accident analysis methodology) to the collocated worker and maximally exposed offsite individual exists at the CWC from a seismically induced fire. Section 3.1.4 of the MDSA states, "In accordance with previous RL Nuclear Safety Division direction TSR level controls will be required to reduce the mitigated risk to Risk Bin III or IV unless no controls are practical." The seismically induced fire safety control strategy documented in the MDSA does not reduce risk to Risk Class III or IV in accordance with CHPRC's methodology. RL's safety evaluation report approving the MDSA contained conditions of approval for CHPRC to evaluate the practicality of several controls to lower the mitigated risk classification for the seismically induced fire. CHPRC has completed and provided to RL the evaluation of the potential controls to lower the mitigated risk. At the time of this assessment, RL had not yet responded to the CHPRC letter that transmitted the evaluation.

Overall, the engineering design documents and analyses are technically adequate and support the requirements of the facility safety basis to ensure adequate protection of the public, the workers, and the environment from fires and other hazards. The CWC and T Plant FSSs are generally robust and compliant to DOE and NFPA requirements. MSA has a comprehensive and proactive program to upgrade and maintain a reliable and adequate underground water supply distribution system. However, despite upgrades to the infrastructure, underground piping is aged and vulnerabilities still exist. The assessment team identified two deficiencies in the 2706-TA building: 1) the lack of a fire damper in the ACT-2 ducting degrades the fire resistance of a two-hour fire barrier, and 2) the technical justification for the adequacy of the sprinkler systems does not address the impact of the ACT-2 deluge system. Additional controls to reduce the risk of a seismically induced fire at the CWC are being evaluated by RL. EA will follow up on RL's decisions concerning the need for additional controls.

### **5.3 Operations, Surveillance, Testing, and Maintenance**

The assessment team reviewed the installation and operation of fire protection SSCs, and the implementation of the FPP controls and procedures to ensure that safety systems are available to perform their intended safety functions when required. In addition, the assessment team reviewed whether ITM activities are properly planned, scheduled, and performed to ensure that fire protection systems can reliably perform their intended safety functions when required. (DOE Order 420.1C, Change 1)

#### **5.3.1 Fire Safety Systems Installation, Operation, Testing, and Maintenance**

*Criterion:*

*All fixed fire protection features (e.g., appropriate construction types, fire barriers, fire alarm and signaling systems, manual and automatic fire suppression systems), that are required by authorization basis documents and FHAs, have been installed and are tested and maintained, as required by applicable fire safety criteria. (DOE Order 420.1C, Change 1, Attachment 2, Chapter II; applicable NFPA codes and standards from the site-specific contract)*



MSA is responsible for performing the ITM on sprinkler systems, control valves, and fire hydrants installed at the CWC and T Plant facilities. FS0019, *Inspecting and Testing Dry Riser Fire Sprinkler System*, and FS0024 define work processes for the acceptance and ITM of the CWC dry pipe sprinkler systems, and include instructions for documenting, evaluating, and resolving deficiencies identified during ITM activities. The program documents are generally adequate and consistent with NFPA codes and standards for establishing ITM frequencies and minimum acceptance criteria, with the exception of verifying that hydraulic design information signs are attached to each sprinkler riser and that the design information is legible. MSA ITM procedures did not require an inspection of the sprinkler system hydraulic information sign as required by NFPA 13, Section 25.5, and NFPA 25. (**Deficiency**)

The assessment team reviewed the January 2018 dry pipe risers ITM quarterly inspection and test records for the 2403WB, 2403WD, and 2404WH buildings and determined that, overall, the quarterly ITM records were complete in accordance with ITM procedures. Two quarterly main drain records, 2403WB riser #2, dated January 16, 2018, and 2402WC riser #1, dated February 6, 2018, indicate that the systems did not meet the tolerance acceptance criteria. The records do not document whether the main drain was retested or whether authorities were notified of the discrepancy as required by FS0024, Section 6.3.10. The assessment team also reviewed the 2403WD risers #1 and #2 dry pipe 36-month, full-flow trip test records performed May 8, 2018. The riser #2 documentation was clear and concise and showed satisfactory test results. The field data documentation for the riser #1 test included a retest of the system performed on July 24, 2018, during which the acceptance criteria was met. Overall, MSA is performing the quarterly main drain and 36-month, full-flow trip tests in accordance with FS0019 and FS0024.

FS0026 defines work processes for the acceptance and ITM of the CWC and T Plant fire hydrants, and includes instructions for documenting, evaluating, and resolving deficiencies identified during ITM activities. The assessment team reviewed the records for the annual ITM of four fire hydrants performed on July 25, 2017, and determined that three records were complete in accordance with FS0026. However, as discussed in Section 5.1.4 and the related Deficiency, test results for hydrant 4-T indicate an inconsistency in the number of turns to open and to close the valve, and no action is documented for correction as required by Section 7.0 of FS0026.

The assessment team also evaluated the MSA training and qualification program for technicians performing ITM on fire protection systems. MSA does not have an established formal training program for conducting ITM on fire safety systems, as confirmed in interviews with the MSA ITM manager and three ITM technicians. Fire safety systems ITM training consists only of shadowing on-the-job activities. Contrary to DOE Order 420.1C, Change 1, Attachment 2, Chapter II, Section 3.d(2)(a); NFPA 25, Section 12.3; and DOE-STD-1066-2012, Sections 5.1.2 and 5.2.1.3, MSA does not have an established formal training program to ensure that technicians are qualified and trained to implement the required ITM on fire safety systems. (See **Finding F-MSA-1.**)

### **5.3.2 Applicable System Requirements and Performance Criteria**

#### *Criteria:*

*Surveillance and testing of the fire protection system demonstrates that the system is capable of accomplishing its safety functions and continues to meet applicable system requirements and performance criteria. (DOE Order 420.1C, Change 1, Attachment 2, Chapter II; applicable NFPA codes and standards from the site-specific contract)*

*Surveillance and test procedures confirm that key operating parameters for the overall fire protection system and its major components remain within safety basis, NFPA, and applicable consensus standards operating limits. (DOE Order 420.1C, Change 1, Attachment 2, Chapter II; applicable NFPA codes and standards from the site-specific contract)*

*The acceptance criteria from the surveillance tests used to confirm fire protection system operability are consistent with the safety basis. (DOE Order 420.1C, Change 1, Attachment 2, Chapter II)*

The assessment team reviewed the SWOC TSR limiting condition for operation (LCO) 3.2.1 and surveillance requirement SR 4.2.1 for the SWOC FSSs, as well as their technical bases and derivation in Chapters 4 and 5 of the SWOC MDSA. LCO 3.2.1 sets two limiting conditions to ensure that the SWOC FSSs are operable: 1) a static pressure of greater than 70 pounds per square inch (psi), and 2) water supply isolation valves are open. However, these two limiting conditions only address the availability of the Hanford water supply to the SWOC FSSs. The limiting condition that the SWOC FSS water supply static pressure be greater than 70 psi does not and is not intended to ensure that the water supply can meet the hydraulic demands of the individual SWOC building FSSs. Rather, the 70 psi limiting condition provides an indication that pumps in the site's water supply and distribution system are operating and the integrity of the distribution system is intact (e.g., no major breaks in the piping systems). LCO 3.2.1 is not sufficient to ensure that the SWOC FSSs are capable of providing their SWOC MDSA credited safety function upon demand. LCO 3.2.1 also does not establish "the limits that represent the lowest functional capability or performance level of safety structures, systems, and components required for safety operations," the definition of an LCO in 10 CFR 830, Section 830.3, due to inadequacies in Section 4.4.2 of the SWOC MDSA, where the functional requirements and acceptance criteria for the FSSs are identified and evaluated. Section 830.204(b)(4) of 10 CFR 830, Subpart B, requires that a DSA "derive the hazard controls necessary to ensure adequate protection of workers, the public, and the environment, [and] demonstrate the adequacy of these controls to eliminate, limit, or mitigate identified hazards." Appendix A, Section G.3 of 10 CFR 830, Subpart B, elaborates on DOE expectations to meet Section 830.204(b)(4) and states:

"Safety structures, systems, and components require formal definition of minimum acceptable performance in the documented safety analysis. This is accomplished by first defining a safety function, then describing the structure, systems, and components, placing functional requirements on those portions of the structures, systems, and components required for the safety function, and identifying performance criteria that will ensure functional requirements are met."

In Table 4-2 of the SWOC MDSA, CHPRC identifies the functional requirements and performance criteria for the FSSs. However, not all necessary performance criteria for the FSSs are included, for example:

- Automatic actuation from heat generated in the fire coverage area
- Minimum volume of fire water supply needed for the design fire duration analyzed in Chapter 3 of the MDSA
- Minimum availability of fire water pumps
- Minimum capabilities of the water supply system to adequately meet the hydraulic demands (pressure, flowrate) of the individual FSSs
- Capability of the FSSs to function as designed in below freezing temperatures, which would include such things as dry pipe valve functionality, adequate temperature control in the riser rooms, and adequate functionality of the air compressors supporting the dry pipe FSSs.

The minimum performance criteria for the SWOC FSSs are not specified and evaluated in the SWOC DSA, as required by DOE-STD-3009-94 CN3, §4.4.x.4, *System Evaluation*. This lack of minimum performance criteria results in a set of TSRs for the FSSs that does not fully define the operability requirements and ensure that operable FSSs are available. (See **Finding F-CHPRC-1**.)

Additionally, five-year internal pipe inspections are not being performed for CWC lead-in piping, which is aged ductile iron pipe material. RL has previously identified this issue as a finding.

### 5.3.3 Operations, Surveillance, Testing, and Maintenance Conclusion

Overall, the MSA program and procedures adequately define the work processes for the acceptance and ITM of fire safety systems and equipment, and are generally consistent with NFPA codes and standards. ITM activities are, in general, properly planned, scheduled, and performed to ensure that fire protection systems can reliably perform their intended safety functions when required. However, MSA lacks a formal training program for the technicians performing the required ITM on fire safety systems. In addition, the SWOC MDSA does not adequately identify the necessary performance criteria for the SWOC FSSs as required by 10 CFR 830, Subpart B, which resulted in an inadequate LCO and surveillance requirement for the SWOC FSSs. Finally, MSA procedure FS0019 does not require an inspection of the sprinkler system hydraulic design information signs, as required by NFPA 13, Section 25.5, and NFPA 25.

### 5.4 Contractor Self-Assessment Program

The assessment team reviewed the CHPRC and MSA FPP self-assessments to verify that they are comprehensive and performed by the site contractors at least every three years, or at a frequency with appropriate justification approved by the DOE head of the field element (DOE Order 420.1C, Change 1, Attachment 2, Chapter II).

*Criterion:*

*The site contractor conducts a triennial FPP assessment (or a series of more frequent assessments that when combined, are equivalent to the triennial assessment) that evaluates the full scope of the program. (DOE Order 420.1C, Change 1, Attachment 2, Chapter II)*

The CHPRC requirement to perform a comprehensive self-assessment of the FPP at least every three years is documented in PRC-STD-FP-40404, Section 7.4, and requires that the FPP assessment be performed in accordance with PRC-PRO-FP-40420. The EA assessment team reviewed SHS&Q-2016-MA-16505, *Fire Protection Program Triennial Self-Assessment 2016*, and determined that the assessment is being conducted at least every three years, is performed by a qualified FPE, and adequately evaluates the FPP elements established in DOE-STD-1066-2012, Section 3.2.2. The CHPRC self-assessment evaluated both the CHPRC FPP and the aspects of the MSA FPP that are relied upon in CHPRC-managed buildings. The self-assessment identified 5 best practices, 9 findings, and 23 opportunities for improvement for the CHPRC FPP, and 2 findings and 2 opportunities for improvement for the MSA FPP. The CHPRC triennial self-assessment evaluates the full scope of the FPP, satisfying the requirement of DOE Order 420.1C, Change 1, Attachment 2, Chapter II, Section 3.b(2). Overall, the CHPRC self-assessment was thorough and performed at a level of detail that resulted in the identification of meaningful findings and opportunities for improvement that will improve both the CHPRC and MSA FPPs.

The MSA requirement to perform a comprehensive self-assessment of the FPP at least every three years is documented in MSC-PRO-FP-34037, *Performance of Fire Protection Assessments*. EA reviewed MA-17-0150-16, *MSA Fire Protection Program Self-Assessment*, and determined that the assessment was conducted within the last three years, was performed by a qualified FPE, and adequately evaluated the FPP elements established in DOE-STD-1066-2012. The self-assessment identified 7 findings and 19 opportunities for improvement for the MSA FPP. Overall, the MSA triennial self-assessment was adequately performed and identified meaningful issues needing correction or improvement. However, MSA-related findings and opportunities for improvement identified in the CHPRC triennial self-assessment were not discussed or evaluated in the MSA self-assessment, which represents a missed

opportunity to leverage the results from the CHPRC assessment to tailor and focus the MSA self-assessment.

## **5.5 Configuration Management**

The assessment team reviewed the CHPRC and MSA configuration management programs and processes to verify that they are adequate to ensure that fire protection systems designated as safety systems continue to meet safety basis requirements and that changes are properly controlled (DOE Order 420.1C, Change 1, Attachment 2, Chapter II; 10 CFR 830.122; 10 CFR 830.203, *Unreviewed safety question process*; DOE-STD-1073, *Configuration Management*).

### **5.5.1 Configuration Management and Integration**

*Criteria:*

*The configuration management process adequately integrates the elements of fire protection system requirements and performance criteria, system assessments, change control, work control, and documentation control. (DOE Order 420.1C, Change 1, Attachment 2, Chapter II)*

*Configuration management is used to develop and maintain consistency among system requirements and performance criteria, documentation, and physical configuration for the SSCs within the scope of the fire protection program. (DOE Order 420.1C, Change 1, Attachment 2, Chapter II)*

Both CHPRC and MSA have established configuration management programs to control engineering design information related to fire protection systems and supporting components throughout the change process. CHPRC Procedure PRC-PRO-EN-20050, *Engineering Configuration Management*, appropriately defines the processes for configuration-managed SSCs, whether vital or non-vital safety systems, and requires the assignment of a system engineer or design authority for each configuration-managed SSC, according to its classification. This procedure uses the graded approach for the assignment of an appropriate level of configuration management based on the SSC importance, the associated risks, and the specific phase of the SSC life cycle. According to the procedure, SSCs placed under configuration management are given unique system identifiers, are assigned engineering personnel as technical authorities, and are designated with their appropriate safety classification. This procedure also requires the establishment of the configuration baseline, i.e., the compilation of key technical documents that define the design basis, design requirements, and physical configuration of the SSC.

MSA procedure MSC-PRO-ENG-20050, *MSC Engineering Configuration Management*, defines the process for developing and changing MSA engineering documents. This procedure uses a graded approach according to the level of risk to facility workers and the associated cost of maintaining the change documentation. Per the procedure, the design authority is responsible for ensuring that the design baseline documentation accurately reflects the design basis and the physical configuration for the assigned system. The procedure requires drawings related to FSSs, fire alarms, risers, and fire schematics to be part of the configuration baseline. CHPRC has adequately established configuration management for the fire protection systems in both the T Plant and the CWC. The assessment team reviewed a sample of design documents for the fire protection SSCs and verified that they are listed in the configuration baseline with appropriate configuration controls. Both CHPRC and MSA have assigned system engineers designated as design authorities for the fire protection systems.

## 5.5.2 Change Control

### *Criteria:*

*Fire protection system design basis documentation and supporting documents are kept current using formal change control and work control processes. (DOE Order 420.1C, Change 1, Attachment 2, Chapter II)*

*Changes to fire protection system requirements, documents, and installed components are formally designed, reviewed, approved, implemented, tested, and documented. (DOE Order 420.1C, Change 1, Attachment 2, Chapter II; applicable NFPA codes and standards from the site-specific contract)*

CHPRC procedure PRC-PRO-EN-440, *Engineering Documentation Preparation and Control*, establishes an adequate formal change control process for preparation, review, approval, and release of technical engineering documentation such as drawings, calculations, and system design descriptions related to fire protection. Likewise, CHPRC procedure PRC-PRO-EN-8016, *Design Change Notice Process*, provides an appropriate set of requirements for issuing and controlling engineering documentation for formal projects until turnover and acceptance by Operations.

MSA management control procedure MSC-PRO-ENG-440, *Engineering Document Change*, describes an adequate change control process for issuing or changing engineering textual documents. Similarly, an appropriate process for developing design changes is specified in MSC-PRO-ENG-8016, *Design Change Notice Process*.

Site wide, all engineering documentation is entered into the Hanford configuration management system, known as the Document Management and Control System, or the records management system, known as the Integrated Document Management System. An engineering document change form, or its predecessor, the engineering change request form, or a facility modification package form, as appropriate, is used to enter the documentation into these systems.

The assessment team reviewed 13 engineering design changes related to the fire protection systems of the T Plant and the CWC that were issued during the previous 5 years. For the reviewed sample, the change documents provided adequate descriptions, identified affected documents or drawings, listed design and test criteria, provided vendor information (if applicable), and included marked-up drawings of the changes. The assessment team also randomly sampled the affected fire protection drawings from the Document Management and Control System and verified that the changes had been correctly implemented in accordance with the engineering document change, engineering change request, or facility modification package.

## 5.5.3 Unreviewed Safety Question (USQ)

### *Criterion:*

*An unreviewed safety question process has been established and is being appropriately implemented to control changes to fire protection safety systems. (10 CFR 830.203)*

CHPRC uses PRC-PRO-NS-062, *Unreviewed Safety Question Process*, to review all engineering changes prior to approval to ensure that the change will not challenge the approved safety basis for the facility. All Hanford fire marshal permits, work orders, and engineering changes to the fire protection system are required to have USQ screens. Various minor administrative changes to existing technical and administrative procedures and work instructions are appropriately approved through “categorical exclusions,” which have been pre-evaluated by qualified USQ evaluators. In the 12-month period from March 2017 to March 2018, there were 24 USQ screenings for changes related to the fire protection

systems at the CWC and 25 for the T Plant. The assessment team reviewed a sample of eight of these USQ screening documents and found that, for this sample, the descriptions of the changes and the safety basis discussions are adequate, and the screens are prepared by qualified USQ screeners or USQ evaluators.

MSA does not have responsibility for any nuclear facilities or safety systems and, therefore, does not have a USQ process or conduct USQ reviews.

#### **5.5.4 Configuration Management Conclusion**

Overall, the CHPRC and MSA configuration management processes are adequate in the areas of records management, maintaining drawings, and the USQ process.

#### **5.6 DOE Field Element Oversight**

*Criteria:*

*DOE field element line management has established and implemented effective oversight processes to evaluate the contractor's FPP and verify implementation (including compliance with requirements). (DOE Order 226.1B, Implementation of Department of Energy Oversight Policy)*

*The DOE field element line oversight program includes written plans and schedules for planned assessments, focus areas for operational oversight, and reviews of the contractor's self-assessment of processes and systems. (DOE Order 226.1B, 4b (2))*

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

*DOE field element staff are adequately trained and qualified to perform assigned oversight activities. (DOE Order 226.1B)*

*The DOE field element has an issues management process that is capable of categorizing findings based on risk and priority, ensuring findings are effectively communicated up the line management chain and to the contractors, and ensuring that problems are evaluated and corrected on a timely basis. (DOE Order 226.1B)*

*Facility Representatives provide effective oversight to determine that the contractor is operating DOE facilities in a safe manner. There is adequate Facility Representative coverage for DOE's facilities. A training and qualification program is established and results in well-trained, qualified facility representatives. (DOE-STD-1063-2011, Facility Representatives)*

The assessment team reviewed the procedures that define and implement RL's overall oversight program and processes to validate that the expectations of DOE Policy 226.2, *Policy for Federal Oversight and Contractor Assurance Systems*, and the requirements of DOE Order 226.1B were adequately addressed. DOE-RL-RIMS-CIPE-PD-RL\_Oversight\_of\_Contractors, *RL Oversight of Contractors*, describes RL's overall oversight program and is implemented by three key cross-cutting processes: DOE-RL-RIMS-CIPE-OPLAN, *Oversight Planning*; DOE-RL-RIMS-CIPE-OPER, *Oversight Performance*; and DOE-RL-RIMS-CIPE-EREP, *Evaluation and Reporting*. The RL oversight program is further defined and implemented by a suite of organizational-specific procedures and instructions. RL's oversight program appropriately utilizes a risk-based approach to focus its oversight resources and efforts. DOE-RL-RIMS-CIPE-PD-Training\_&\_Qualification\_for\_Personnel\_Performing\_Contractor\_Oversight, *Training and*

*Qualification for Personnel Performing Oversight*, and the organizational-specific training and qualification procedures establish adequate expectations for the training and qualification levels of the RL personnel overseeing CHPRC and MSA. RL plans, schedules, and tracks its oversight activities in the Integrated Evaluation Plan developed in accordance with procedure DOE-RL-RIMS-CIPE-OPLAN. Based on interviews of RL personnel and review of the fiscal year (FY) 2019 Integrated Evaluation Plan, the assessment team concluded that RL's processes effectively leverage the information and results generated by the CHPRC and MSA contractor assurance systems (CASs) to tailor the Federal oversight and, specifically, RL's oversight of the FPP implementation in the CWC and the T Plant. RL is also routinely evaluating the effectiveness of CHPRC and MSA CASs. The evaluation results of RL's oversight program during this FPP assessment are consistent with the broader EA assessment of RL's oversight program, conducted in June 2018 and documented in the memorandum report, *Office of Enterprise Assessments Assessment of Richland Operations Office Federal Oversight Processes*. The assessment team concluded that RL's overall oversight program is comprehensive and robust.

In addition to assessment and surveillance reports, RL captures observations from its operational awareness activities in an operational awareness database. RL also enters results from many of its surveillances into the operational awareness database. Periodically, RL uses the data in the operational awareness database to support tracking, trending, and analyzing the contractors' performance. The assessment team reviewed a sample (approximately 50) of entries into the operational awareness database by various RL personnel (but predominately the Facility Representatives) over the past three years and concluded that RL is effectively documenting key oversight activities in the operational database.

RL's Safety and Environment department, which includes the Facility Representatives, the FPE, and the safety system oversight (SSO) engineers, develops a monthly safety report that summarizes the results of RL's oversight. The monthly safety report evaluates CHPRC and MSA performance in key functional areas that include fire protection, CAS, nuclear safety, nuclear maintenance, and conduct of operations. The monthly safety reports are an effective tool for ensuring that oversight results are communicated to both RL and contractor management.

RL has one FPE who is also assigned as the SSO engineer for the credited fire protection systems for all RL-managed nuclear facilities at Hanford. The RL FPE is fully qualified in both his FPE and SSO roles in accordance with the DOE and RL technical qualification programs. RL is in the process of implementing a succession strategy for the FPE position, but hiring constraints are challenging the timeliness of this effort. The RL FPE is knowledgeable of the CHPRC and MSA FPPs overall and as implemented at the CWC and the T Plant. He demonstrated a good working relationship with the CHPRC and MSA fire protection engineering staff and management and the HFD. Based on a review of completed assessments, surveillances, and operational awareness database entries during FY 2018, the RL FPE's oversight time in the field was limited due to his other responsibilities and management-established priorities for his time. However, the RL FPE effectively utilizes the results from the CHPRC and MSA assurance systems to focus and tailor his field oversight. RL has defined expectations, through contractual requirements, for the Hanford fire marshal office to perform many oversight activities that parallel RL oversight. The RL FPE has then been able to tailor his oversight based on the fire marshal office's reviews, issues, and concerns. The EA assessment team reviewed a 2018 surveillance report (S-18-NSD-MSA-001) documenting the RL FPE's review of the MSA FPP. The surveillance report identified two concerns (RL's most significant type of issue) identifying significant failures of MSA's ITM program. Some of the MSA ITM noncompliances identified during this EA assessment were indicative of the larger programmatic concerns raised by the RL surveillance. However, RL's oversight did not identify the lack of a formal training program for the MSA technicians performing fire safety system ITM (see **Finding F-MSA-1** and discussion in Section 5.3.1). The concerns and findings in surveillance report S-18-NSD-MSA-001 were effectively communicated to RL management and then to

MSA management, and the causal analysis and corrective action development were underway during the assessment team's visit.

The assessment team interviewed and observed the Facility Representative assigned to the CWC and the T Plant. His Facility Representative qualifications were current. He demonstrated a good knowledge of the fire protection systems in the CWC and the T Plant, as well as the inspections and surveillances required to be performed on the fire protection systems. He also demonstrated a good working relationship with the facility management and staffs at the two facilities. The 2018 staffing analysis for Facility Representative coverage, developed in accordance with instruction FRI 012, *Facility Representative Staffing and Coverage*, identified the need for two qualified Facility Representatives to oversee the SWOC nuclear facilities. RL has one qualified Facility Representative assigned full time to the SWOC. The second SWOC-qualified Facility Representative is temporarily assigned to a team lead role, but is available as needed to provide coverage of the SWOC. The Operations Oversight Division (i.e., the Facility Representative division) effectively plans their oversight strategies in accordance with instruction FRI 005, *Master Oversight Plans*, which are then integrated into RL's Integrated Evaluation Plan on an annual and quarterly schedule. The assessment team reviewed the RL operational awareness database entries associated with the FPP, made by the SWOC Facility Representatives over the past three years. The rigor of oversight was clear by the number of entries made and, in several instances, the significance of the issues identified. Overall, the RL Facility Representative program is effectively implemented.

The assessment team identified a finding concerning the adequacy of the SWOC FSSs LCO and associated surveillance requirements, and their technical bases and derivation, in the SWOC MDSA. (See **Finding F-CHPRC-1** and discussion in Section 5.3.2.) The SWOC MDSA and TSR are RL-approved documents. The assessment team identified the need to evaluate the technical basis for RL's approval of these documents as a follow-up item in Section 8.0.

RL has an adequately documented and established fire protection oversight program. With the exception of the finding areas identified in this assessment, RL is adequately overseeing the overall CHPRC and MSA FPPs, as well as program implementation in the CWC and the T Plant.

## 6.0 FINDINGS

Findings are deficiencies that warrant a high level of attention from management. If left uncorrected, findings could adversely affect the DOE mission, the environment, the safety or health of workers and the public, or national security. DOE line management and/or contractor organizations must develop and implement corrective action plans for EA appraisal findings. Cognizant DOE managers must use site- and program-specific issues management processes and systems developed in accordance with DOE Order 227.1A to manage these corrective action plans and track them to completion. In addition to the findings, deficiencies that did not meet the criteria for a finding are listed in Appendix C, with the expectation from DOE Order 227.1A for site managers to apply their local issues management processes for resolution.

### **CH2M HILL Plateau Remediation Company:**

**Finding F-CHPRC-1:** CHPRC has not specified and evaluated the minimum performance criteria for the SWOC FSSs in the SWOC DSA, as required by DOE-STD-3009-94 CN3, §4.4.x.4. This results in a set of TSRs for the FSSs that do not fully define the operability requirements and ensure that operable FSSs are available. (DOE-STD-3009-94 CN3, §4.4.x.4; 10 CFR 830, Subpart B, Section 830.204(b)(4) and Appendix A, Section G.3)



## **Mission Support Alliance:**

**Finding F-MSA-1:** MSA has not established the required formal training program to ensure that technicians are qualified and trained to implement the required ITM on fire safety systems. (DOE Order 420.1C, Change 1, Attachment 2, Chapter II, Section 3.d(2)(a); NFPA 25, Section 12.3; and DOE-STD-1066-2012, Sections 5.1.2 and 5.2.1.3)

## **7.0 OPPORTUNITIES FOR IMPROVEMENT**

The assessment team did not identify any opportunities for improvement during this assessment.

## **8.0 ITEMS FOR FOLLOW-UP**

- Verify RL's approval of the CHPRC FPP document PRC-STD-FP-40404 (see Section 5.1.3).
- Assess RL's determination of whether additional controls are practical to reduce the mitigated risk for the seismically induced fire scenario at the CWC (see Section 5.2).
- Evaluate RL's technical basis for approving SWOC TSR LCO 3.2.1 and its derivation in Chapter 4 of the SWOC MDSA (see Sections 5.3.2 and 5.6).

## **Appendix A Supplemental Information**

### **Dates of Assessment**

Onsite Assessment:     September 17-21, 2018  
                                  October 8-11, 2018

### **Office of Enterprise Assessments (EA) Management**

Nathan H. Martin, Director, Office of Enterprise Assessments  
John S. Boulden III, Acting Deputy Director, Office of Enterprise Assessments  
Thomas R. Staker, Director, Office of Environment, Safety and Health Assessments  
C.E. (Gene) Carpenter, Jr., Director, Office of Nuclear Safety and Environmental Assessments  
Kevin G. Kilp, Director, Office of Worker Safety and Health Assessments  
Gerald M. McAteer, Director, Office of Emergency Management Assessments

### **Quality Review Board**

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

### **EA Site Lead for Hanford RL**

Ron Bostic

### **EA Assessors**

Ron Bostic – Lead  
Rosemary Reeves  
Joseph Panchison  
Barry Snook

**Appendix B**  
**Key Documents Reviewed, Interviews, and Observations**

**Documents Reviewed**

- Plateau Remediation Contract, Contract NO. DE-AC06-09RL14728, *Attachment J.2, Modification 642*
- 12-SED-0080, Contract NO. DE-AC06-09RL14728 – *Recommended Revisions to the Charter for the Hanford Fire Marshal and Charter for the Hanford Fire Protection Forum*, October 22, 2012
- 15-SES-0054, Contract NO. DE-AC06-09RL14728 - *Richland Operations Office Approval Hanford Fire Department Program Plan*, MSC-MP-58194, March 18, 2015
- 15-NSD-0037\_RL, Contract NO. DE-AC06-08RL14788 – *Review of CH2M Hill Plateau Remediation Company (CHPRC) Facility Fire Protection Assessments (S-15-NSD-PRC-005)*, April 22, 2015
- 16-SEI-0146, Contract NO. DE-AC06-09RL14728 – *Contract Deliverable CD0037, Hanford Fire Needs Assessment*, July 27, 2016
- 17-NSD-0041\_RL, Contract NO. DE-AC06-09RL14788 – *Approval of the 2016 Annual Update to the “Solid Waste Operations Complex Master Documented Safety Analysis,” HNF-14741, Revision 12: the Technical Safety Requirements for the “Solid Waste Operations Complex,” HNF-15280, Revision 12,; the Unreviewed Safety Question Determinations Summary: and the “Solid Waste Operations Complex Fire Hazards Analysis,” HNF-21239, Revision 7*, July 31, 2017
- CHPRC-1703616A R1, Contract NO. DE-AC06-09RL14788 – *Transmittal of RL Directed Actions from Safety Evaluation Report 17-NSD-0041\_RL*, January 23, 2018
- MSA-1304429A R2, RL Approve, *Hanford Fire Department Program Plan*, MSC-MP-58194, October 7, 2014
- MSA-1601002, RL Approval, *Contract Deliverable CD0037, Hanford Fire Needs Assessment*, March 30, 2016
- PRC-STD-FP-40404, *Fire Protection Program*, Rev. 2, Chg. 0, 8/1/2018
- PRC-STD-FP-40404, *Fire Protection Program*, Rev. 1, Chg. 0, 4/30/2015
- PRC-POL-FP-40402, *Fire Protection Program Policy*, Rev. 0, Chg. 3, 7/9/2015
- MSC-POL-FP-36200, *Fire Protection Program Policy*, Rev. 3, Chg. 0, 3/15/2018
- MSC-MP-58194, *Hanford Fire Department Program Plan*, Rev. 0, October 2014
- MSC-RD-FP-9118, *Fire Protection Design/Operations Criteria*, Rev. 5, Chg. 1, 9/17/2018
- Contractor Requirements Document (Supplemental) Form, *CRD O 420.1C, Chg. 1, Facility Safety*, Rev. 1, 4/6/2017
- HNF-14741, *Solid Waste Operations Complex Master Documented Safety Analysis*, Rev. 12, October 2017
- HNF-15280, *Solid Waste Operations Complex Technical Safety Requirements*, Rev. 12, October 2017
- CHPRC-03096, *Safety Basis Criteria Document for the T Plant and Waste Handling Facilities Documented Safety Analyses*, Rev. 0, April 2018
- CHPRC-03081, *Fire Analyses for the Solid Waste Operations Complex Master Documented Safety Analysis*, Rev. 1, September 2017
- HNF-18377, *Central Waste Complex Fire Suppression System Design Description*, Rev. 11, December 2017
- HNF-21239, *Solid Waste Operations Complex Fire Hazards Analysis*, Rev. 9, March 2019
- HNF-52336, *Authority, Responsibilities, and Duties of the Hanford Fire Marshal (AKA Fire Marshal’s Charter)*, Rev. 0, October 29, 2012
- HNF-59192, *T Plant Fire Hazards Analysis*, Rev. 3, March 2018
- HNF-SP-1180, *Hanford Fire Department Emergency Needs*, Rev. 4, Volume 1, February 14, 2014
- HNF-51041, *Fire Protection Flow-Down of Roles, Responsibilities, Authorities, and Enforcement*, Rev. 0, December 4, 2011

- HNF-8599, *Hanford Site 2018 Wildland Fire Management Plan*, Rev. 17, April 2018
- SHS&Q-2016-MA-16505, *Fire Protection Program Triennial Self-Assessment 2016*, Rev. 1, 8/30/16
- 17-0150-16, *MSA Fire Protection Program Self-Assessment*, 12/27/2016
- HFD-PRO-FPFCI-60699 (2.E.2), *Pre-Incident Planning*, Rev. 5, Chg. 0, 8/22/2018
- Area/Complex Pre-Incident Plan, *Central Waste Complex; 2402 and 2403 Complex*, 5/2018
- Area/Complex Pre-Incident Plan, *2706-T, 2706-TA, 2706-TB*, 9/2018
- PRC-STD-EN-40259, *Engineering Calculations*, Rev. 0, Chg. 1, 6/28/2016
- PRC-STD-FP-54128, *Fire Protection System Design*, Rev. 0, Chg. 0, 8/29/2018
- PRC-STD-FP-54133, *Control of Combustible Materials*, Rev. 0, Chg. 0, 8/29/2018
- PRC-PRO-EN-20050, *Engineering Configuration Management*, Rev. 0, Chg. 9, 8/15/2017
- PRC-PRO-FP 40420, *Fire Protection Analyses/Evaluations*, Rev. 3, Chg. 0, 8/1/2018
- PRC-PRO-FP-40424, *Equivalencies, Exemptions, and Interpretation/Clarification Requests (ICRs)*, Rev. 1, Chg. 1, 7/8/2015
- PRC-PRO-FP-40425, *Fire Protection System Inspection, Testing, and Maintenance*, Rev. 1, Chg. 0, 8/1/2018
- PRC-PRO-FP-40426, *Fire Protection System Discrepancies*, Rev. 0, Chg. 1, 7/8/2015
- PRC-PRO-FP-54129, *Portable Fire Extinguishers*, Rev. 0, Chg. 0, 8/29/2018
- MSC-RD-FP-7899, *Fire Protection System Testing/Inspection/Maintenance/Deficiencies*, Rev. 9, Chg. 0, 2/19/2015
- MSC-PRO-FP-34037, *Performance of Fire Protection Assessments*, Rev. 6, Chg. 3, 3/15/2018
- FS0024, *Performing Bypass/Restoration and Valve Status or Main Drain Test*, Rev. 1, Chg. 0, 4/3/2018
- FS0026, *Fire Hydrant Ground Gate Valve Inspection, Testing, and Maintenance*, Rev. 2, Chg. 0, 3/22/2017
- FS0019, *Inspecting and Testing Dry Riser Fire Sprinkler System*, Rev. 5, Chg. C, 4/13/2017
- CHPRC-02621, *CHPRC Facility Fire Protection Assessments 2015 Master List*, Rev. 0, August 2015
- CHPRC Spreadsheet, *Discrepancy Log*, 10/2/2018
- *Exemptions from DOE Requirements*, August 1, 2017
- TPLN-PRO-OP-51750, *Combustible Material Control Surveillance*, Rev. 6, Chg. 2, 3/19/2018
- DO-040-024, *Appendix B - Combustible Material Control Surveillance Checklist*, Rev. 6, Chg. 1, 3/8/18
- DO-040-024, *Appendix B - Combustible Material Control Surveillance Checklist*, 4/4/18
- DO-040-024, *Appendix B - Combustible Material Control Surveillance Checklist*, 4/11/18
- DO-040-024, *Appendix B - Combustible Material Control Surveillance Checklist*, 4/16/18
- DO-040-024, *Appendix B - Combustible Material Control Surveillance Checklist*, 4/25/18
- DO-040-024, *Appendix B - Combustible Material Control Surveillance Checklist*, 5/1/18
- DO-040-024, *Appendix B - Combustible Material Control Surveillance Checklist*, 5/3/18
- DO-040-024, *Appendix B - Combustible Material Control Surveillance Checklist*, 6/11/18
- DO-040-024, *Appendix B - Combustible Material Control Surveillance Checklist*, 6/14/18
- DO-040-024, *Appendix B - Combustible Material Control Surveillance Checklist*, 7/9/18
- DO-040-024, *Appendix B - Combustible Material Control Surveillance Checklist*, 7/10/18
- DO-040-024, *Appendix B - Combustible Material Control Surveillance Checklist*, 7/12/18
- DO-040-024, *Appendix G - Outside Area Combustible Material Control Surveillance Checklist*, 5/1/18
- DO-040-024, *Appendix G - Outside Area Combustible Material Control Surveillance Checklist*, 7/5/18
- ECR-13-000611-00, *Replace Deluge Valve Tamper Switch*, 5/2/14
- ECR-14-000441-00, *As-Built FMP to Capture As-Left Configuration of Deluge Tamper Switch Wiring*, 5/2/14
- ECR-14-000646-00, *Smaller Batteries for 2706-T FACP*, 6/30/14
- ECR-17-000919-00, *Add Egress Route in 2706T/TA/TB and T Plant Trailers*, 12/5/17

- ECR-18-000956-00, Allow Like-For-Like Replacements for Obsolete Fire Alarm System Components, 10/1/18
- ECR-14-000658-00, Grinnell F512 Check Valve Replacement with Viking Model G-1, 6/30/14
- ECR-14-000842-00, Correct System Pressure Requirement on Hydraulic Design Information, 7/29/14
- ECR-15-000493-00, Revision to CWC Fire Suppression System Design Description, 4/27/15
- ECR-16-000517-00, 2403-WD East Riser Compressor Upgrade, 11/3/16
- ECR-16-000689-00, Change 2402WE Fire System Compressor Model Number, 6/21/16
- ECR-17-001321-00, Update HNF-SD-WM-SEL-012, LLBG and CWC Safety Equipment List, 8/21/17
- ECR-17-001925-00, Revision to CWC Fire Suppression System Design Description, 12/6/17
- ECR-18-000859-00, 2403-WD East Riser Room Upgrades, 6/25/18
- FRI 005, *Master Oversight Plans*, 4/1/17
- FRI 009, *Reporting*, 4/1/17
- FRI 012, *Facility Representative Staffing and Coverage*, 12/13/2017
- FRI 014, *FR Qualification*, 3/1/2016
- FT-17-07279 FT-27760, *2403WC 3M Dry Riser Testing and Inspections*, Dry Riser #1, 1/8/18
- FT-17-07279 FT-24437, *2403WC 3M Dry Riser Testing and Inspections*, Dry Riser #2, 1/8/18
- FT-17-07277 FT-24466, *2402WH 3M Dry Riser Testing and Inspection*, 1/9/18
- FT-17-07273 FT-26309, *2403WD 3M Dry Riser Testing and Inspections*, Dry Riser #1, 1/8/18
- FT-17-07273 FT-24442, *2403WD 3M Dry Riser Testing and Inspections*, Dry Riser #2, 1/8/18
- FT-17-07272 FT-24798, *2403WB 3M Dry Riser Testing and Inspection*, Dry Riser #1, 1/16/18
- FT-17-07272 FT-28553, *2403WB 3M Dry Riser Testing and Inspection*, Dry Riser #2, 1/16/18
- FT-17-08103 FT-28535, *2403WB 3M Dry Riser Testing and Inspection*, Dry Riser #1, 2/6/18
- FT-18-00405 FT-26308, *2403WB 36M Dry Riser Testing and Inspection*, Dry Riser #1, 5/10/18
- FT-18-00405 FT-26309, *2403WB 36M Dry Riser Testing and Inspection*, Dry Riser #1, 5/8/18
- FT-18-00405 FT-24442, *2403WB 36M Dry Riser Testing and Inspection*, Dry Riser #2, 5/10/18
- FT-18-00405 FT-24444, *2403WB 36M Dry Riser Testing and Inspection*, Dry Riser #2, 7/24/18
- FT-18-00405 FT-24446, *2403WB 36M Dry Riser Testing and Inspection*, Dry Riser #2, 7/24/18
- FP-17-00658 FP-24943, *T Plant Annual Hydrant Main PMS*, Hydrant 4-T, 7/25/17
- FP-17-00658 FP-26096, *T Plant Annual Hydrant Main PMS*, Hydrant 5-T, 7/25/17
- FP-17-00658 FP-27157, *T Plant Annual Hydrant Main PMS*, Hydrant 6-T, 7/25/17
- FP-17-00658 FP-28512, *T Plant Annual Hydrant Main PMS*, Hydrant R-1-T, 7/25/17
- Facility Fire Protection Assessment – Long Format, *2402WK*, 4/25/2017
- Facility Fire Protection Assessment – Long Format, *2403WD*, 4/25/2017
- FY2019 Integrated Evaluation Plan
- DOE-RL-RIMS-CIPE-PD-RL-Oversight\_of\_Contractors, *RL Oversight of Contractors*, February 2017
- DOE-RL-RIMS-CIPE-OPLAN, *Oversight Planning*, June 2017
- DOE-RL-RIMS-CIPE-OPER, *Oversight Performance*, June 2017
- DOE-RL-RIMS-CIPE-EREP, *Evaluation and Reporting*, June 2017
- DOE-RL-RIMS-RLPI-RLFI, *RL Feedback and Improvement Process*, January 2018
- DOE-RL-RIMS-CIPE-PD-Training\_&\_Qualification\_for\_Personnel\_Performing\_Contactor\_Oversight, *Training and Qualification for Personnel Performing Oversight*, May 2015
- PTS-2015-WSA-8965, *Triennial Fire Protection Assessment – T Plant Complex Buildings*, June 25, 2015
- MSA-ENG-61731, *System Health and Status Report for INFRA-RW*, Revision 2, 7/19/2018
- HNF-5828, Revision 5, *Hanford Site Water System Master Plan*
- HNF-16788, *SWOC Facilities Sprinkler Systems Hydraulic Calculations*
- USQ-SW-18-023, *HFMP and Work Package for 2402 Series Building Electrical Work*, 03/19/18
- USQ-SWOC-18-030, HNF-21239, Revision 9, *Solid Waste Operations Complex Fire Hazards Analysis*, 03/20/18

- USQ-SWOC-18-031, FS0012, Rev. 2-0, *Maintenance on Fire Systems Dry Pipe Valves*, 03/21/18
- USQ-T-17-053, CHPRC-03295, *2706-T Fire Suppression System Operability Evaluation*, 06/08/17
- USQ-T-17-081, *Work package 2T-15-D3738 2706 5yr Inspection Distribution Panels & MCCs and Hanford Fire Permit 2017-392 RO*, 08/09/17
- USQ-T-18-009, *Fire Suppression System Testing and Inspection Data Sheets*, 01/23/16
- USQ-WRP-17-011, ECR-17-000369, *Update 2404WB and 2404WC Fire System Drawings*, 03/29/17
- PRC-PRO-NS-062, *Unreviewed Safety Question Process – Appendix C, GCX-7 Categorical Exclusion for Minor Changes in Existing Technical and Administrative Procedures or Work Instructions*, Rev. 3, 10/01/16
- USQ-T-18-017, *Combustible Material Control Surveillance*, 03/07/18
- Table of USQ Screens and USQ Determinations for CWC and T Plant from 03-01-2017 to 03/31/2018
- Assessment memorandum report, *Office of Enterprise Assessments Assessment of Richland Operations Office Federal Oversight Processes*, 9/5/2018

## **Interviews**

CHPRC Fire Protection Manager  
 CHPRC Lead FPE/Deputy Fire Marshal  
 FPE/Deputy Fire Marshal (CWC and T Plant)  
 CHPRC FPE (Building Assessments)  
 CHPRC System Engineer (CWS)  
 CHPRC System Engineer (T Plant)  
 CHPRC Director - Engineering  
 CHPRC Manager - Engineering  
 CHPRC Manager - Maintenance  
 MSA Fire Chief  
 MSA Fire Marshal/FPE  
 MSA Manager - Fire Suppression Systems  
 MSA Maintenance Manager - Fire Systems  
 MSA Fire System Technicians (3)  
 MSA Utilities Engineers (2)  
 RL FPE/FP SSO  
 RL Facility Representative  
 RL Facility Representative Team Lead (acting)  
 RL Director, Operations Oversight Division  
 RL Assistant Manager for Safety and Engineering  
 RL Quality Assurance Team Member  
 RL Chief Engineer  
 RL Director, Security and Emergency Services  
 RL Director, Nuclear Safety and Engineering  
 RL SWOC Nuclear Safety Lead

## **Observations**

SWOC Water Plant – Tour  
 282WC Pump House – Tour  
 CWC Walkthroughs (2)  
 T Plant Walkthrough (3)  
 Area 200 Main Fire Station 92 – Tour  
 CWC and T Plant Fire Breaks and Anchors

## **Appendix C Deficiencies**

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

- CHPRC FPEs are not performing CRRS reviews of outstanding fire protection issues or evaluating fire protection systems ITM programs as required by PRC-PRO-FP-40420, Section 2.2.f. (See Section 5.1.4, page 7.)
- The east and west dry pipe sprinkler risers in 2403WD did not have hydraulic design information signs as required by NFPA 13, Section 25.5, and NFPA 25, Section 5.1.1. (See Section 5.1.4, page 7.)
- CHPRC was not protecting eight portable fire extinguishers installed outdoors at the CWC and T Plant facilities from environmental elements as required by PRC-PRO-FP-54129, Section 3.3.5, and NFPA 10, Section 6.1.3.7. (See Section 5.1.4, page 7.)
- CHPRC did not properly label some fire barrier walls in the T Plant 2706-T and 2706-TA buildings, and none of the through penetrations in the fire barriers employed a means to provide traceability, as required by PRC-PRO-FP-40425, Section 3.3. (See Section 5.1.4, page 7.)
- The January 16, 2018, main drain test for the 2403WD dry pipe system riser #2 did not meet the tolerance acceptance criteria as required by FS0024, Section 6.3. (See Section 5.1.4, page 7.)
- The annual fire hydrant maintenance record for T Plant hydrant 4-T indicated that the number of turns to open (25) and to close (19.5) were not equal, and no action was documented for correction as required by FS0026, Section 7.0. (See Section 5.1.4, page 7.)
- Ducting penetrating the two-hour, fire-rated wall in 2706-T separating the ACT-2 confinement ventilation room from the work area had no fire damper. NFPA 90A-2015, Section 5.3.1.1 requires a fire damper to preserve the two-hour fire wall rating. (See Section 5.2, page 11.)
- Calculation HNF-16788 did not model flow through the deluge system concurrent with flow to the sprinkler heads. Flow through the deluge system would negatively impact flow to the sprinkler system and is not analyzed. (See Section 5.2, page 11.)
- MSA ITM procedures did not require an inspection of the sprinkler system hydraulic information sign as required by NFPA 13, Section 25.5, and NFPA 25, Section 5.1.1. (See Section 5.3.1, page 12.)