

Independent Assessment of the Fire Protection Program at the Paducah Site

October 2026



U.S. DEPARTMENT
of **ENERGY**

Office of Enterprise
Assessments

Table of Contents

Acronyms.....	ii
Executive Summary	iii
1.0 Introduction.....	1
2.0 Methodology	1
3.0 Results	2
3.1 Fire Protection Program	2
3.2 Transitional Fire Hazards Analysis and Documented Safety Analysis Integration	8
3.3 Fire Protection Structures, Systems, and Components Design	9
3.4 Fire Protection System Inspection, Testing, and Maintenance	10
3.5 Contractor Fire Protection Program Self-Assessment.....	12
3.6 Federal Oversight.....	13
4.0 Best Practices	14
5.0 Findings.....	14
6.0 Deficiencies.....	14
7.0 Opportunities for Improvement.....	15
Appendix A: Supplemental Information.....	A-1
Appendix B: Office of Environmental Management Response Memorandum	B-1

Acronyms

BNA	Baseline Needs Assessment
CAHJ	Contractor Authority Having Jurisdiction
CFR	Code of Federal Regulations
CMC	Combustible Material Control
CRAD	Criteria and Review Approach Document
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
EA	Office of Enterprise Assessments
ERO	Emergency Response Organization
ETAS	Enterprise Technical Assistance Services, Inc.
FDC	Fire Department Connection
FPE	Fire Protection Engineer
FPP	Fire Protection Program
FR	Facility Representative
FRNP	Four Rivers Nuclear Partnership, LLC
IOP	Integrated Oversight Plan
ITM	Inspection, Testing, and Maintenance
MCSA	Mission Conversion Services Alliance, LLC
MSA	Material Sizing Area
NFPA	National Fire Protection Association
OFI	Opportunity for Improvement
OSMS	Operations and Site Mission Support
PAD	Paducah Site
PFD	Paducah Fire Department
PIP	Pre-incident Plan
PIV	Post-indicating Valve
PPPO	Portsmouth/Paducah Project Office
SE	System Engineer
SFWS	Sanitary and Fire Water System
SSCs	Structures, Systems, and Components
TFHA	Transitional Fire Hazards Analysis

INDEPENDENT ASSESSMENT OF THE FIRE PROTECTION PROGRAM AT THE PADUCAH SITE

Executive Summary

The U.S. Department of Energy Office of Enterprise Assessments (EA) conducted an independent assessment of the fire protection program (FPP) at the Paducah Site Building C-333 in February and March 2026. Building C-333 is a hazard category 2 nuclear facility and one of four remaining large cascade facilities formerly used for uranium enrichment at the Paducah Gaseous Diffusion Plant. Deactivation activities in Building C-333 are ongoing in preparation for eventual demolition. The deactivation and remediation contractor is Four Rivers Nuclear Partnership, LLC (FRNP), and the operations and site mission support contractor is Mission Conversion Services Alliance, LLC (MCSA), which provides and manages the FPP. This assessment evaluated the effectiveness of MCSA in managing and maintaining the FPP, including fire and related safety hazards analyses; transitional fire hazards analysis and documented safety analysis integration; fire prevention and protection design requirements; and inspection, testing, and maintenance. This assessment also evaluated the effectiveness of FRNP FPP contractor self-assessment. Federal oversight by the Portsmouth/Paducah Project Office (PPPO) relating to fire protection was also evaluated.

EA identified the following strengths:

- The FRNP Site Operations Director immediately assessed an EA identified safety concern and appropriately initiated a work pause related to the hazard of dispensing flammable Class I liquids (i.e., gasoline) without required safety controls.
- Observed firefighter protective clothing is in very good condition, and other response equipment is well maintained.

EA also identified several weaknesses, including one finding, as summarized below:

- MCSA does not have adequate controls in place for dispensing flammable Class I liquids within Buildings C-333 and C-337. (Finding)
- MCSA has not collected performance data for water-based fire suppression systems. Lack of data collection prevents trend analysis and reevaluation of the technical justification for extended inspection and testing intervals.
- MCSA has not developed a qualification standard for fire protection engineers (FPEs) to ensure that they are adequately trained and qualified for this technical support position.
- MCSA has not repaired or implemented compensatory measures for an impaired fire hydrant to ensure adequate fire water for manual firefighting efforts during freezing weather.
- MCSA has not performed a dust hazard analysis for the dust collection system installed within the Material Sizing Area to ensure sufficient fire protection controls.
- MCSA has not implemented effective fire protection-related inspections in accordance with codes and standards.

In summary, MCSA has established a generally adequate FPP, and PPPO is performing adequate Federal oversight relating to fire protection. However, this assessment identified weaknesses related to the dispensing of flammable Class I liquids, equivalency justification, FPE qualification, compensatory measures, hazard analyses, and fire protection-related inspections. Until the concerns identified in this report are addressed or effective mitigations are put in place, the weaknesses outlined in this report could compromise the integrity of fire protection measures, increase the likelihood of hazardous incidents, and hinder the ability to ensure a safe working environment at the Paducah Site.

The Office of Environmental Management (EM) disagrees with two of the deficiencies identified in the report. EM's response memorandum is provided as appendix B to this report in accordance with DOE Order 227.1A, *Independent Oversight Program*.

INDEPENDENT ASSESSMENT OF THE FIRE PROTECTION PROGRAM AT THE PADUCAH SITE

1.0 INTRODUCTION

The U.S. Department of Energy (DOE) Office of Nuclear Safety and Environmental Assessments, within the independent Office of Enterprise Assessments (EA), conducted an assessment of the fire protection program (FPP) at the Paducah Site (PAD) Building C-333. Assessment activities were conducted in February and March 2026.

In accordance with the *Plan for the Independent Assessment of the Fire Protection Program at the Paducah Site, March 2026*, this assessment evaluated the FPP, including policies, procedures, and fire and related safety hazards analyses; transitional fire hazards analysis (transitional fire hazards analysis [TFHA]-approved by PPPO) and documented safety analysis (DSA) integration; fire prevention and protection design requirements; inspection, testing, and maintenance (ITM); contractor self-assessment; and Federal oversight relating to fire protection. The scope of this assessment focused on Building C-333, a hazard category 2 nuclear facility and one of four remaining large cascade facilities formerly used for uranium enrichment at the Paducah Gaseous Diffusion Plant. Deactivation activities in Building C-333 are ongoing in preparation for eventual demolition.

The deactivation and remediation contractor is Four Rivers Nuclear Partnership, LLC (FRNP), which was previously responsible for the FPP until October 1, 2025. The current operations and site mission support (OSMS) contractor is Mission Conversion Services Alliance, LLC (MCSA), which provides and manages the FPP. Federal oversight is provided by the Portsmouth/Paducah Project Office (PPPO).

2.0 METHODOLOGY

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

As identified in the assessment plan, this assessment considered requirements related to 10 CFR 830, *Nuclear Safety Management*; DOE Order 420.1C, Change 3, *Facility Safety*; and DOE-STD-1066-2023, *Fire Protection*. EA used objectives 4.1, 4.2, 4.3, 4.4, 4.5, and 4.6 of EA CRAD 31-12, Revision 2, *Fire Protection Program*.

EA examined key documents, such as system descriptions, work packages, procedures, manuals, analyses, policies, and training and qualification records. EA also interviewed key personnel responsible for developing and executing the associated programs; observed fire protection-related activities; and walked down significant portions of Building C-333, focusing on aspects of the FPP. In addition, EA observed MCSA simulations of vehicle refueling activities in Buildings C-333 and C-337 (the second of four uranium enrichment facilities scheduled for deactivation). The members of the assessment team, the Quality Review Board, and the management responsible for this assessment are listed in appendix A.

There were no previous EA findings to follow up on during this assessment.

3.0 RESULTS

3.1 Fire Protection Program

This portion of the assessment evaluated MCSA's FPP documentation and implementation.

3.1.1 Program Description

OSMS-PLN-332, *Paducah Fire Protection Plan*, in general, adequately addresses requirements in DOE Order 420.1C, attachment 2, chapter II, and was approved by PPPO. OSMS-PLN-332 is comprehensive and incorporates the guidance of DOE-STD-1066-2023 for each fire protection element, including a process for self-assessment and identification of National Fire Protection Association (NFPA) codes and standards. OSMS-PLN-332 adequately describes the MCSA FPP and clearly documents the roles and responsibilities of the FPP Manager, fire protection engineers (FPEs), and technical staff who support and monitor fire protection. The MCSA site services' fire protection system engineer (SE), a deployed FPE from the fire protection organization, appropriately performs systems engineering, monitors maintenance, and fulfills support roles and responsibilities identified in OSMS-PLN-332. The interviewed FPE/fire protection contractor authority having jurisdiction (CAHJ), fire protection SE, and the SE organization personnel demonstrated an adequate understanding of the roles and responsibilities of FPEs and the SE.

OSMS-PLN-332 also adopts a 1994 DOE equivalency that addresses extended time intervals for the ITM of water-based fire suppression systems. This equivalency requires data collection on system performance to support trend analysis and identification of any need for reevaluation. However, contrary to the 1994 DOE equivalency, MCSA has not collected data on system trends, which precludes the ability to reevaluate the technical justification for this equivalency in accordance with DOE Order 420.1C, attachment 2, chapter II, section 3.d.(2)(c). (See **Deficiency D-MCSA-1**.) Not updating technical justifications that evaluate inspection and testing protocols against current NFPA standards and code requirements could result in missing negative trends and manufacturer recommendations. The frequency for inspecting and testing fire protection and alarm systems is specified in OSMS-PLN-332, section 4.13, which is based on NFPA 25-1990 and a DOE equivalency approved on June 28, 1994, by the DOE Oak Ridge Operations Office, Safety and Health Divisions (which, at the time, had authority over the Paducah and Portsmouth Sites). This 1994 approved DOE equivalency requires the continuous collection of auditable performance data to monitor system trends and detect significant degradation over time. Such data is not being collected, and, therefore, a technical reevaluation cannot be performed.

3.1.2 Codes and Standards

OSMS-PLN-332 and CP2-EP-1000/FR4, *Paducah Site Emergency Management Plan for Paducah Gaseous Diffusion Plant, Kentucky*, appropriately identify applicable NFPA codes and standards and DOE-STD-1066-2023, in accordance with DOE Order 420.1C, attachment 2, chapter II, section 3.a.(2). These applicable codes and standards are generally implemented through a suite of procedures. MCSA applies parts of NFPA 72, *National Fire Alarm and Signaling Code*, to the "dry-hybrid" (an MCSA specific term) fire suppression system as an alarm function to alert firefighting capability. Although the sanitary and fire water system (SFWS) is more than adequate to deliver water to the dry-hybrid fire suppression system with the availability of five pumps, the water supply, hydrants, and other components are not maintained to NFPA standards, such as NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*. (See section 3.4 of this report for further discussion.)

3.1.3 FPE Qualification

MCSA staff includes an adequately qualified FPE. The FPE is also appropriately designated by PPPO as the CAHJ. The interviewed FPE/CAHJ described their qualifications, which included their academic degree in physics, current professional licensure as a mechanical engineer, certificate from NFPA as a certified fire protection specialist, and 11 years of experience as an FPE at PAD. These qualifications are consistent with DOE-STD-1066-2023, section 1.5. However, contrary to DOE Order 426.2A, Change 1, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*, attachment 1, chapter I, section 3.a, OSMS-PLN-332 does not provide or reference a qualification standard for FPEs to ensure that the candidate is adequately trained and qualified for this technical support position. (See **Deficiency D-MCSA-2.**) Without a defined FPE qualification standard and evidence of completion, MCSA cannot demonstrate support by qualified FPEs to ensure that OSMS-PLN-332 implementation is consistent with safety basis requirements. OSMS-PLN-332 appropriately identifies training requirements from DOE Order 426.2A but does not provide or reference a documented mechanism, procedure, or forms to implement this program.

3.1.4 Program Procedures

MCSA has established and implemented a generally adequate set of sitewide implementing procedures. Detailed operating procedures for fire protection systems appropriately use maintenance instructions with checklist criteria for performing and documenting surveillances to verify system functionality. For example, CP4-FP-2019, *Sanitary Fire Water Hydrant*, provides minimum flow requirements; DUF6-C-FPP-3501, *Monthly TSR Valve Inspection*, provides confirmation of valve alignments; and OSMS-C-OM-PR-003, *Portable Fire Extinguisher Monthly Inspection and Annual External Examination*, verifies access to and visibility of fire extinguishers. Also, MCSA procedures for using, handling, and storing combustible, flammable, and hazardous materials adequately address DOE Order 420.1C, attachment 2, chapter II, section 3.d.(1); DOE-STD-1066-2023, section 5.1; and the requirements of applicable NFPA codes and standards, including:

- CP3-FP-2031, *Control of Combustible Material and Ignition Sources*, used for the management and control of flammable and combustible liquids and ordinary combustibles, is generally consistent with the requirements of NFPA 30, *Flammable and Combustible Liquids Code*, with one exception regarding observed refueling performance issue (see the Finding F-MCSA-1 discussion in section 3.1.8).
- CP3-HS-2031, *Storage and Handling of Compressed Gas Cylinders*, adequately governs the use and storage of flammable and combustible gas cylinders.
- CP3-OP-1117, *Walk-Through Inspection - Combustible Controls and Life Safety*, adequately governs the use of flammable and combustible liquids, flammable and combustible gas cylinders, and ordinary combustible materials.

3.1.5 Impairment Control and Compensatory Actions

MCSA has established and implemented generally adequate impairment identification and control using CP3-FP-2003, *Fire Protection Impairments*; CP3-FP-2003-F02, *Fire Protection Impairment Permit*; and CP3-FP-2003-F01, *Fire Patrol Log*, under the responsibility of the Fire Chief/FPP Manager. Planned and unplanned impairments using procedure CP3-FP-2003 adequately describe responsibilities, site actions, impairment identification and control, compensatory measures, fire patrols, and system restoration. CP3-FP-2003 also appropriately addresses the adoption of a Waste Isolation Pilot Plant lesson learned, which emphasizes the need for communication with the local site office (PPPO) for impairments (rendering the systems non-functional) within 90 days and completion of corrective actions within 180 days. Reviewed

quarterly reports by MCSA to PPPO of impairment metrics demonstrated effective management attention to impairments through system health reports for Building C-333 and the PAD fire water supply.

Reviewed compensatory actions for two current and three former impairments were generally adequate. However, contrary to CP3-FP-2003, section 6.1.14, MCSA has not repaired or implemented compensatory measures (considering freezing temperatures) for the currently impaired fire hydrant FH-M-16-N1. (See **Deficiency D-MCSA-3.**) Without adequate compensatory measures for an impaired fire hydrant, timely and adequate fire flow for manual firefighting efforts may not be available during freezing weather. Fire hydrant FH-M-16-N1, located on the southeast side of Building C-333, was observed to have approximately one inch of ice build-up on the side and base of the hydrant due to cold weather and a dripping leak. This condition could render the fire hydrant inoperable. A reviewed record confirmed that impairment 20646 occurred July 30, 2025, and it notes that the fire hydrant would not shut completely and includes a request for repair under work order 2610010; the record shows the hydrant continues to be operational. The interviewed Water Plant Manager confirmed awareness of the hydrant's impairment and condition and explained that repairs were delayed pending availability of qualified excavation personnel.

3.1.6 Ordinary Combustible Material Control

OSMS-PLN-332 adequately addresses ordinary combustible material control (CMC) in accordance with DOE Order 420.1C, attachment 2, chapter II, section 3.d.(1)(d), and DOE-STD-1066-2023, section D.6.1.4. The CMC program is, in general, adequately implemented through CP3-FP-2031 and CP3-OP-1117. CP3-OP-1117 appropriately provides inspection requirements and frequencies through form CP3-OP-1117-F08, *Facility Walk-Through Inspection – Facility TFHA Inspections*, which contains a checklist that clearly requires verification that there are no more than five full waste bags per boundary control station exit or accumulation area. Ten reviewed combustible control inspection reports for Building C-333 demonstrated adequate performance in accordance with CP3-OP-1117.

3.1.7 Hot Work Program/Ignition Sources

A hot work permit system is adequately described in OSMS-PLN-332 and implemented through OSMS-U-SHP-0801, *Hot Work*. OSMS-PLN-332 appropriately requires all site contractors and subcontract personnel to comply with hot work protocols involving burning, welding, grinding, or other hot work. OSMS-U-SHP-0801 appropriately assigns the Fire Chief the responsibility of managing a hot work permit database and provides instruction for ignition control (guided by DOE-STD-1066-2023). OSMS-U-SHP-0801 also identifies applicable criteria from NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*. OSMS-U-SHP-0801 appropriately requires any exceptions to be approved by the CAHJ. Interviews and simulated evolutions generally validated conformance to procedure controls for combustibles and hot work duration; no hot work operations were being performed during the onsite portion of this assessment.

3.1.8 Compressed Gases and Flammable and Combustible Liquids

OSMS-PLN-332 adequately addresses flammable and compressed gases in accordance with DOE Order 420.1C, attachment 2, chapter II, section 3.d.(1)(d), and DOE-STD-1066-2023, section 4.3.3. Flammable and compressed gas controls are adequately implemented through CP3-FP-2031, CP3-HS-2031, and CP3-OP-1117. These procedures provide appropriate instructions for the use, handling, and storage of flammable and compressed gases. A facility walkdown and four reviewed inspection reports confirmed adequate control of flammable and compressed gas cylinders.

OSMS-PLN-332 adequately addresses flammable and combustible liquids in accordance with DOE Order 420.1C, attachment 2, chapter II, section 3.d.(1)(d), and DOE-STD-1066-2023, section 4.3.3.

Interviewed workers were aware of the need to control flammable and combustible liquid hazards as addressed in CP3-FP-2031, which aligns with the TFHA. However, contrary to NFPA 30, section 18.6.1 and table 18.5.4, CP3-FP-2031 and the TFHA do not contain adequate controls for dispensing flammable Class I liquids within Buildings C-333 and C-337. (See **Finding F-MCSA-1.**) Without adequate flammable and combustible liquid controls, workers are exposed to elevated fire risks. NFPA 30 requirements for dispensing Class I liquids (flammable liquids with a flash point below 100°F) are strictly regulated to prevent the ignition of volatile vapors. NFPA 30 also requires that any electrical component(s) within five feet of the dispensing point be rated as Class I, division 1 (high risk) per NFPA 70, *National Electrical Code*. Addendum 4 of the TFHA allows refueling of vehicles or equipment using a single five-gallon safety can. While no actual refueling was scheduled during the onsite portion of this assessment, MCSA workers were observed simulating the refueling of an aerial lift and forklift inside Buildings C-333 and C-337, respectively, with gasoline (a Class I liquid). The interviewed workers explained that refueling is allowed anywhere within Buildings C-333 and C-337. Several observations demonstrated the potential for increased fire risk. For example:

- There was no pre-inspection requirement to ensure that the safety features (spring action handle, rubber gasket, etc.) of the gasoline can were functional.
- In Building C-333, refueling occurred from above a worker's shoulder level using a five-gallon safety can in an awkward position, which was close to the worker's breathing zone and his radio.
- Workers wore personal protective equipment clothing that was not fire rated for flash fires.
- During the simulated evolution, a fire extinguisher remained in proximity, but no worker independent of the refueling was available to handle the fire extinguisher in the event of a flash fire.
- No grounding and bonding was used during the refueling of plastic and metal vehicle tanks, posing an electrostatic hazard.
- The observed indoor areas had no supplemental ventilation to remove ignitable vapors.
- The TFHA limits a refueling team to a single five-gallon safety can but has no limitation on the number of daily evolutions (TFHA, addendum 4, section 3.K). Workers explained that multiple work teams can perform this evolution up to three times per day (requiring 15 gallons) under the direction of the Facility Manager. However, NFPA 30 also includes a cumulative limit of 30 gallons over 24 hours, which is not specified in the TFHA. Accordingly, performing multiple and simultaneous evolutions could collectively exceed the NFPA cumulative limit.
- Reviewed training, provided through general employee computer-based training, does not address the specific hazards of refueling or emergency response actions to a spill or fire.

These performance weaknesses result from inadequacies in CP3-FP-2031 and the TFHA. In response to this identified concern, the Site Operations Director for Building C-333 appropriately initiated a work pause to evaluate this hazard.

3.1.9 Availability and Maintenance of Facility Firefighting Equipment

MCSA ensures generally adequate availability and maintenance of facility firefighting equipment. The PAD emergency response organization¹ (ERO) operates from the site's fire station (Guard and Fire Headquarters) Building C-200, located within the limited containment area and near the largest PAD buildings, such as Building C-333. Consequently, fire response time to any building at PAD is exceptional, with less than four minutes from initial dispatch to PAD building arrival; this response

¹ The ERO is an all-hazards response organization providing emergency medical, structural firefighting, and hazardous materials response.

time is half the eight minute goal for a full response specified in NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations*. The interviewed Fire Chief explained that first response is occasionally provided by PAD to the offsite community as the closest available medical response for some vehicle accidents. Emergency resources are available to PAD through agreements with select offsite agencies for medical assistance and fire control, if requested. CP2-EP-1000/FR4 adequately describes letters of agreement, memoranda of understanding, and mutual aid with nearby agencies. Reviewed documents and observed scenarios (two table-top exercises and an emergency medical response) demonstrated that firefighter staffing met minimum levels.

Walkdowns confirmed the adequacy of the PAD fire station, offices, and equipment that supports emergency response. Interviews, shift-turnover observations, reviewed documents describing physical fitness and wellness, and an observed dedicated exercise and weight room at the fire station adequately demonstrated conformance with key criteria within NFPA 1500, *Standard on Fire Department Occupational Safety, Health, and Wellness Program*. The reviewed compressor and filtration system certificate, dated March 2, 2026, demonstrated appropriate authorization for the safe refilling of self-contained breathing apparatus. Observed firefighter protective turn-out pants, jackets, and hoods (i.e., bunker gear) are nearly new and in very good condition, conforming to NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*. The PAD fire station provides adequate resources for decontaminating bunker gear and other launderable protective clothing in a designated inspection and cleaning area. This area includes a front-load extractor washing machine and recommended detergent, meeting the instructions outlined in NFPA 1851, *Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*.

MCSA, in general, adequately ensures the availability of apparatus and response equipment. Observed apparatus and response equipment were in good condition. Reviewed equipment inspection logs and observed daily checks demonstrated effective maintenance. Details describing ERO equipment and staffing, manual firefighting, and response are adequately described in CP5-FP-0001/FR3, *Emergency Response Baseline Needs Assessment [BNA] for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*. However, MCSA has not exercised the use of a ladder-tower truck at PAD under a mutual aid agreement with the local community fire department. (See **OFI-MCSA-1**.) The PAD ladder-tower truck was damaged in 2025, which required offsite repair by the manufacturer. Delays encountered by the manufacturer have resulted in an absence of the ladder truck from PAD service since August 18, 2025. An equivalent ladder apparatus is available to respond to PAD from the West McCracken Fire District, when requested by the ERO.

3.1.10 Transitional Fire Hazards Analysis

TFHA-C-333T_TFHA/R0/A4, *Transitional Fire Hazard Analysis (TFHA) for C-333 and Annex at Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, documents a generally adequate TFHA in accordance with DOE Order 420.1C, attachment 2, chapter II, section 3.f.(1); DOE-STD-1066-2023, section B.6; and NFPA codes and standards. The TFHA adequately identifies applicable design criteria and analysis to demonstrate that fire safety objectives will be met, despite a combustible roof consisting of built-up tar and gravel and the absence of an automatic fire suppression system. The TFHA appropriately includes a list of approved equivalencies and exemptions, including the bases, approval status, and validation of approval conditions. However, the TFHA does not include any technical justification for the limit of “five waste bags at a boundary control station exit” or for the storage of ordinary combustibles in a “2500 square foot area” as specified in CP3-FP-2031. (See **OFI-MCSA-2**.)

3.1.11 Building Fire Protection Assessments

Facility fire protection assessments of Building C-333 and other PAD buildings are adequately described in OSMS-PLN-332 and managed under the responsibility of the Fire Chief using CP3-OP-1117, *Facility Inspections*. Reviewed assessments, six annual and one triennial, were adequately performed during 2023 through 2026 in accordance with CP3-FP-2006, *Fire Safety Inspection, Facility Assessment, and Fire Hazard Analysis*, and DOE Order 420.1C, attachment 2, chapter II, section 3.f.(2), by or under the supervision of the PAD FPE. The assessment reports adequately met objectives in DOE-STD-1066-2023 for program and physical fire protection features. The interviewed Building C-333 Facility Manager explained that identified self-assessment issues are managed in accordance with CP3-QA-3001, *Issues Management*, which was confirmed by observing an entry in the tracking system.

3.1.12 Baseline Needs Assessment

The BNA (CP5-FP-0001) describes minimum fire department staffing, apparatus and equipment requirements, and tactics and procedures, which are appropriately based on credible fire response scenarios as described within DOE-STD-1066-2023, section 6.1, and NFPA 1710. A walkdown of the C-200 fire station confirmed that on-shift station staffing, apparatus inventory, and equipment were generally consistent with the BNA descriptions. However, several issues identified in the 2025 BNA remain unresolved pending corrective action completion (e.g., equipment truck squad #2 remains beyond reliable service years and unreplaced (2025-BNA-Deficiency-1); C-200 fire station remains non-compliant with the current standard (2025-BNA-Deficiency-2); and engine #1 (backup) remains beyond reliable service years and unreplaced (2025-BNA-Recommendation-1)).

The Paducah Fire Department (PFD) on-shift staffing levels and mutual aid response resources from adjacent community fire departments are adequate to mitigate escalating fire scenarios, significant hazardous material releases, and/or a concurrent unrelated medical response event in accordance with DOE-STD-1066-2023, section 6.1.8. MCSA has appropriately established mutual aid agreements with West McCracken Fire District, the Paducah City Fire Department, and other agencies that enable the BNA approach. The BNA clearly defines and affirms emergency response in accordance with these mutual aid agreements, which support the PAD emergency management program and the PFD, and describes the mechanisms to request and activate mutual aid agency response. Additionally, the MCSA PAD emergency management program leads monthly meetings to discuss planning and preparedness activities (including fire protection) associated with DOE requirements.

The PAD emergency operations center (EOC) is adequately constructed to resist tornadic wind forces, filter airborne hazardous materials, and operate independently on electrical power for 72 hours via a standby diesel generator. The EOC has redundant methods for communication with PAD personnel during an emergency, including the plant phone system, cellular phones, a satellite phone, and radio base stations transmission between local emergency organizations. CP3-EP-1004, *Maintenance of Emergency Facilities and Equipment*, appropriately provides guidance for conducting inventories of emergency equipment, supplies, communications, and operational testing of emergency equipment through CP3-EP-1004-F02, *Emergency Operations Center (EOC) Readiness Checklist*. This checklist clearly requires weekly fuel level verification to ensure that the standby diesel generator can provide electrical power to the EOC for a minimum of 72 hours during severe events or commercial infrastructure disruptions.

3.1.13 Pre-incident Plans

OSMS-C-333-PIP, *Pre-incident Plan – Building C-333* [PIP], established by the ERO, describes emergency response actions at the facility level that are generally adequate for emergency responders. The reviewed PIP includes summary text and pictorial floorplan information, meeting objectives outlined

in DOE-STD-1066-2023, sections 6.3.2 through 6.3.4. The observed PIP is kept in the response vehicles. The PIP is consistent with DOE Order 420.1C; NFPA 1620, *Standard for Pre-Incident Planning*; and CP3-FP-2033, *Pre-Incident Planning*. Additionally, the interviewed Fire Chief and Deputy Chief confirmed that the PIP is revised when facility hazards change and reviewed by firefighters to maintain awareness of changing hazards. However, the PIP for Building C-333 does not adequately provide easily discernable warnings for firefighters, in preparation for a fire response to specific moderator-controlled locations, which could pose an unanticipated criticality hazard. (See **OFI-MCSA-3**.) The current PIP for Building C-333 provides a generic warning of moderator hazards in the material sizing areas (MSAs) but does not specifically identify these hazardous locations within the building. The dynamic nature of this work could result in open system piping, which, if near a building fire, can pose a criticality hazard from a directed water stream. Existing PFD staff, who are very familiar with these configurations and hazards, are being lost to turnover, resulting in less familiarity among newer firefighters.

3.1.14 Wildland Fire Management Plan

MCSA has established and implemented, and PPPO has approved, an adequate wildland fire management plan (CP2-FP-1005/FR0, *Wildland Fire Management Plan*) in accordance with DOE Order 420.1C, attachment 2, chapter II, section 3.g. The wildland fire exposure risks to Building C-333 are adequately described and evaluated within the associated facility TFHA. A walkdown of Building C-333 confirmed that there are no adverse wildland fire exposure concerns, attributable to effective vegetation management in the vicinity of the buildings, consistent with the TFHA exposure risk assessment.

Fire Protection Program Conclusions

MCSA has established and implemented generally adequate FPP elements for the site facilities, its operations, and the onsite ERO. However, weaknesses were identified in the areas of equivalency justifications, FPE qualifications, compensatory measures, and controls for dispensing flammable Class I liquids within Buildings C-333 and C-337.

3.2 Transitional Fire Hazards Analysis and Documented Safety Analysis Integration

This portion of the assessment evaluated the effectiveness of MCSA's integration of the Building C-333 TFHA into associated safety design basis documentation and fire protection controls, as described in the facility safety bases.

MCSA has appropriately integrated the TFHA into the facility DSA to ensure that analyzed fire hazards are sufficiently mitigated through controls for normal, abnormal, and accident conditions. In general, the TFHA and DSA appropriately evaluate fire sprinkler and standpipe suppression systems and associated fire scenarios. The evaluated fire scenarios and supporting conclusions in the TFHA are adequately included in the DSA hazard evaluations and accident analyses sections in accordance with CP3-OP-0002, *Developing and Maintaining Performance Documents*. DSA key elements, including combustible controls, fire suppression, and life safety egress, were appropriately elevated from FPP elements and observed to be adequately implemented through specific administrative procedures. Nuclear criticality safety evaluations adequately identify and evaluate moderator hazards while supporting technical safety requirement controls to mitigate the risk of water intrusion into equipment or containers due to fire sprinklers and fire-fighting response activities. This approach reduces the risk of criticality and ensures the protection of workers, the public, and the environment in accordance with DOE-STD-3009-94, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*, and 10 CFR 830.

Transitional Fire Hazards Analysis and Documented Safety Analysis Integration Conclusions

MCSA has appropriately integrated the TFHA into the facility DSA. The DSA evaluates and analyzes accidents to adequately support the implementation of the safety bases.

3.3 Fire Protection Structures, Systems, and Components Design

This portion of the assessment evaluated design requirements, engineering design, and system engineering for fire protection structures, systems, and components (SSCs) in accordance with DOE Order 420.1C, attachment 2, chapter II, section 3.c.

3.3.1 Design Requirements

MCSA has established and implemented an appropriate set of fire protection system design requirements in accordance with DOE Order 420.1C, attachment 2, chapter II, section 3.c.(1). Applicable sections of OSMS-PLN-332 that govern the operation, testing, and inspection of fire protection SSCs appropriately include respective design requirements that align with the corresponding calculations. Interviewed MCSA FPEs and SEs demonstrated adequate knowledge of design requirements.

3.3.2 Engineering Design

MCSA has established and implemented adequate programs for conduct of engineering and control of design of fire protection SSCs. CP3-EN-0203, *Design Change Process*; CP3-EN-0213, *Design Analysis and Calculations*; and CP2-EN-0201, *Configuration Management Program Description*, appropriately incorporate requirements in accordance with DOE Order 420.1C, attachment 2, chapter II, section 3.c, for fire protection design, design control, review and approval, and acceptance. Two reviewed design change packages (DDP-FA5290-01, *C-333 High Pressure Fire Water Dry Hybrid Conversion* and DDP-FA6100-01, *C-333 Material Sizing Area*) appropriately included unreviewed safety question (USQ) determinations, identification of affected documents, engineering instructions detailing the scopes of work, materials for installation, and design requirements with NFPA code references. The USQs supporting the design change packages included adequate descriptions for the proposed activities, justifications, and screening, as required by DUF6-U-NSP-0002, *Unreviewed Safety Question (USQ) Process*. However, contrary to NFPA 652, *Standard on the Fundamentals of Combustible Dust*, MCSA has not performed a dust hazard analysis for the dust collection system installed within the MSA. (See **Deficiency D-MCSA-4.**) Omission of a dust hazard analysis can result in an incomplete design with insufficient fire controls. Two recent incidents revealed visible signs of thermal exposure (charring/burnt filter) from the MSA plasma cutting operations, indicating incomplete controls for the dust collection system. Continuing operations within Building C-333 will continue to produce dust associated with plasma cutting.

3.3.3 System Engineering

MCSA has established appropriate qualification requirements for SEs through CP4-EN-0001, *Cognizant System Engineer Program*, and ES-0.9-21, *System Engineering Assignments*, in accordance with DOE Order 420.1C, attachment 2, chapter V, section 3.e. The interviewed SE for the mission critical dry-hybrid fire suppression system was qualified and knowledgeable of the system, including the status of current maintenance activities, procurement of replacement parts, and ongoing challenges to system operability and reliability.

MCSA has established and implemented an adequate program for routine performance monitoring of the Building C-333 dry-hybrid fire suppression system in accordance with ES-0.9-24, *Equipment Condition Monitoring and Aging and Degradation*. Reviewed system health reports appropriately documented

system monitoring results based on periodic walkdowns and condition assessments performed by SEs. Four reviewed quarterly condition assessments for the fire water system appropriately included metrics for system reliability, trends of key parameters, summaries of preventive and corrective maintenance, tracking of corrective action commitments, and identification of ongoing performance issues.

Fire Protection Structures, Systems, and Components Design Conclusions

MCSA has established and implemented an appropriate set of fire protection system design requirements and adequate programs for the conduct of engineering and configuration management. However, a weakness related to dust hazard analysis was identified.

3.4 Fire Protection System Inspection, Testing, and Maintenance

This portion of the assessment evaluated whether MCSA has developed and implemented comprehensive and adequate ITM and impairment control programs for fire protection and life safety systems and equipment in accordance with DOE Order 420.1C, attachment 2, chapter II, section 3.d.(1)(c).

In general, MCSA has established and implemented an adequate ITM program in accordance with DOE Order 420.1C, attachment 2, chapter II, section 3.d.(1)(c), in the areas of fire alarm and fire system panels; fire extinguishers; exit sign inspection and emergency lighting; fire hydrants and post-indicator valves (PIVs); fire water tanks/pumps; hose carts/standpipes; sprinkler systems and fire department connections (FDCs); and fire barriers (walls and exit doors) as addressed below.

MCSA, in general, adequately maintains fire alarms, fire system panels, and Building C-333 column- and wall-mounted fire alarm boxes with alarm activation achieved by manual level-pull action (see the Deficiency D-MCSA-5 discussion below for one identified weakness). Reviewed records confirmed that annual inspections and tests were adequately conducted for each fire alarm box. Weekly tests are adequately performed for the red-phones (firefighting capability for communication) in Building C-333 by completing the red handle phone check procedure described in CP3-OP-0313, *Repetitive Task Schedule*.

MCSA has established and implemented an adequate inspection program for fire extinguishers through OSMS-C-0M-PR-0003, *Portable Fire Extinguisher Monthly Inspection and Annual External Examination*. OSMS-C-0M-PR-0003 appropriately addresses plans, schedules, and inspections of fire extinguishers that can prevent the progression of an incipient fire from impacting the facility. OSMS-C-0M-PR-0003 appropriately includes maintenance instructions with checklists for performing and documenting inspection criteria and to verify functionality. Acceptance criteria are sufficiently documented and well defined within these checklists and serve as baseline requirements. Interviews confirmed that inspections are performed by knowledgeable personnel and supported by qualified design authority engineers to satisfy NFPA 10, *Standard for Portable Extinguisher*.

CP3-FP-2006-F01, *Fire Safety Inspection*, provides adequate instruction for monthly exit sign inspections to ensure that signs are visible and/or internally illuminated. In contrast to NFPA 101, *Life Safety Code*, task order DE-DT0007774, *Fluor Federal Services, Inc., Paducah Deactivation Project—Emergency and Exit Light Testing Equivalency*, provides alternate instructions on internally luminated exit signs and emergency lighting test frequencies and test durations recommended by the CAHJ. CP3-OP-0314, *Testing of Self-Contained Emergency Lighting Power Systems*, appropriately implements this equivalency. Observed pathways used for walking and vehicle travel exhibited generally adequate levels of illumination. However, normal illumination is not adequate for many areas of Building C-333 because some fluorescent ballast tubes have burned out. The Facility Manager explained that evaluation and maintenance are pending based on available resources.

MCSA has established and implemented a generally adequate inspection program for fire hydrants and PIVs (see the Deficiency D-MCSA-5 discussion below for one identified weakness). MCSA appropriately plans, schedules, and performs inspections of hydrants and PIVs for manual firefighting that can prevent a major fire from impacting the remainder of the facility. The reviewed inspection procedures demonstrated, and interviews confirmed that inspections are performed by knowledgeable personnel and supported by qualified design authority engineers to satisfy NFPA requirements. Fire hydrant water flow testing is adequately conducted on the SFWS using a pitot tube with a calibrated gauge that is recertified annually. Two reviewed hydrant flow test records from 2024 to 2025 exhibited appropriate documentation of instrument calibration and acceptance criteria. An interviewed SE explained that a portable calibrated air instrument gauge is used during inspection of the Building C-333 dry-hybrid fire suppression system, which is an effective practice based on the large number of such systems.

MCSA adequately maintains an elevated water tank and multiple pumps to provide fire suppression capability. Multiple flow paths for the SFWS underground looped-piping network are available from supply points originating from the C-611 SFWS pumphouse and the C-611-0 sanitary water tower, leading to hydrants located on each side of Building C-333. Water supply pressure is adequately maintained at approximately 75 pounds per square inch gauge by the elevated water supply of the water tower, consistent with OSMS-PLN-332. Drawings and observations confirmed that the underground SFWS piping network is supplied by one of five pumps located at the C-611 SFWS pumphouse, providing dependable reliability through multiple flow paths for redundancy. Reviewed records, observations of pumphouse operations, and interviews with the Water Plant Manager and Operations Manager confirmed adequate inspection and testing performance, ensuring a consistently reliable and redundant water supply network for PAD facilities.

MCSA has established and implemented an adequate inspection program that addresses hose carts. Hose carts provide floor coverage for manual firefighting capability in Building C-333. Reviewed “tour” work orders for hose cart inspection checklists demonstrated that appropriate quantities and hose lengths are provided on each hose cart. Interviews confirmed that inspections are performed by knowledgeable personnel and supported by qualified design authority engineers to satisfy NFPA requirements.

Water is supplied to standpipes via the manual supply of water to the dry-hybrid fire suppression system, which is normally kept isolated and dry, unless there is a fire event. This design precludes the ability to meet NFPA 25 requirements for ITM. The risk of standpipe degradation/failure has been accepted by PPPO based on its approval of the dry-hybrid fire suppression system equivalency.

MCSA, in general, appropriately performs ITM of the Building C-333 sprinkler system (see the Deficiency D-MCSA-5 discussion below for one identified weakness). This system was converted from wet pipe sprinklers in 2019 to a dry-air pressurized system manually supplied with water through an exterior FDC; the fire alarm activates through a low air pressure switch. The connection for the supply of water to the Building C-333 dry-hybrid fire suppression system is provided on the exterior of the building for each system riser through an FDC. Each FDC is comprised of two 2 ½ inch threaded swivel inlets, allowing for firefighter hose connection(s). An FDC check valve remains installed adjacent to each system riser. Reviewed inspection records (one monthly, two semiannual, and two annual) were generally adequate. During walkdowns of the exterior of Building C-333, the observed signs above each FDC location were adequate and provided the corresponding riser number and system area. Generally, the protective caps covering each FDC 2 ½ inch threaded swivel inlets were observed to be in place and secured. (See the Deficiency D-MCSA-5 discussion below for two identified weaknesses).

Fire barriers in Building C-333 are not credited in the TFHA, and, therefore, there are no periodic inspection requirements. However, in general, exit doors are inspected for any obstruction of egress per

CP3-OP-1117-F01, *Facility Walk-Through Inspection - Combustible Controls and Life Safety*, and CP3-FP-2006-F01 (see the Deficiency D-MCSA-5 discussion below for one identified weakness).

While many aspects of the ITM program were adequate, contrary to the requirements detailed below, MCSA has not implemented effective fire protection-related inspections for all fire alarm panels, exit doors, hydrants, PIVs, FDC check valves, and FDC connections. (See **Deficiency D-MCSA-5**.) Inadequate fire protection-related inspections can result in increased risk of fire. Specifically:

- MCSA does not maintain records of semiannual fire alarm panel and manual fire alarm box inspections, contrary to DOE Order 414.1D, *Quality Assurance*, attachment 2, section 4.b. PPPO OSMS Contract Number 89303325DEM000122, Modification P00019, section C, requires inspection and testing in accordance with NFPA 72.
- MCSA does not comprehensively inspect, test, and maintain every hydrant and PIV, contrary to DOE Order 420.1C, attachment 2, chapter II, section 3.d.(1)(c). CP4-FP-2019-F01, *Sanitary Fire Water Hydrant Data Sheet*, and reviewed work orders showed that not all hydrants are subject to annual inspection and testing. Also, interviewed SFWS personnel explained that only certain PIVs are inspected and tested.
- MCSA does not specify a five-year inspection and test requirement of the FDC check valve in CP4-FP-2043 F, *Inspection, Testing, and Maintenance of Dry Hybrid Sprinkler Systems*, contrary to NFPA 25, section 13.4.2.
- CP3-FP-2006-F01 does not include a checklist item to visually inspect FDC connections, contrary to NFPA 25, table 5.1.1.2.
- CP3-FP-2006-F01 does not require fully exercising exit doors during inspections, contrary to NFPA 101, section 7.1.10.1. Two observed horizontal sliding doors on the north wall of Building C-333 marked with exit signs and credited as part of emergency evacuations would not fully open.

Fire Protection System Inspection, Testing, and Maintenance Conclusions

MCSA has generally implemented adequate ITM activities to ensure that fire protection systems can reliably perform their intended safety functions, when required. However, weaknesses related to fire protection inspections were identified.

3.5 Contractor Fire Protection Program Self-Assessment

This portion of the assessment evaluated FRNP's performance of FPP self-assessments² for continued strengthening of implementation through critical review and the identification and correction of weaknesses and vulnerabilities.

FRNP has appropriately performed FPP self-assessments pursuant to CP3-QA-1003, *Management and Self-Assessment*, in accordance with DOE Order 420.1C, attachment 2, chapter II, section 3.b.(3), satisfying the required three-year frequency. FRNP appropriately completed an FPP self-assessment (MA-FY25-0003, *Fire Protection Program*) as required by FRNP-24-7986, *Four Rivers Nuclear Partnership, LLC-Deliverable No. 278-Triennial Self-Assessment of Fire Protection Program*. The self-assessment was performed in accordance with CP3-QA-1003, with the engagement of a qualified FPE, as specified by DOE-STD-1066-2023, section 3.2.1. While the self-assessment did not identify any

² At the time of this assessment, MCSA (the current OSMS contractor) had not yet completed an FPP self-assessment. Accordingly, this section of the report discusses the performance of FPP self-assessments by FRNP, the contractor responsible for the FPP prior to MCSA.

weaknesses, it did not evaluate all minimum FPP elements suggested in DOE-STD-1066-2023, section 3.2.2. Notably, MCSA asserted that CP3-QA-1003 will be updated to require an evaluation of all suggested minimum FPP elements in DOE-STD-1066-2023, section 3.2.2. MCSA has scheduled completion of the next FPP self-assessment on or before April 1, 2027, which would be within the three-year frequency required by DOE Order 420.1C, attachment 2, chapter II, section 3.b.(3).

Contractor Fire Protection Program Self-Assessment Conclusions

FRNP appropriately conducted an FPP self-assessment that was within the three-year frequency required by DOE Order 420.1C.

3.6 Federal Oversight

This portion of the assessment evaluated the effectiveness of PPPO's oversight of MCSA's FPP implementation at Building C-333, including field oversight of FPP-related activities.

Procedure PPPO-OA-PRO-1, *Oversight Process*, provides clear directions for implementing DOE oversight requirements outlined in DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*. This procedure specifies a series of oversight processes to evaluate MCSA's operations, activities, programs, and management systems. The implementation of PPPO's oversight is described in PPPO-OA-PLN-1, *Oversight Program Plan*. Examples of activities listed in this plan include independent assessments, surveillances, field observations, and document reviews. Requirements for performing PPPO assessments and surveillances are detailed in PPPO-QA-PRO-2, *Assessment and Surveillance Process*. PPPO produces an annual integrated oversight plan (IOP), which details the planned assessments and surveillances for each fiscal year. Issues identified during oversight are tracked using the management tracking system. PPPO appropriately communicates its fire protection oversight results and monitors associated corrective action development, execution, and closure through close coordination with MCSA.

PPPO's functions, responsibilities, and authorities are assigned in PPPO-M-413.1-1, *Management Plan*. Appendix A of this plan provides a crosswalk table linking individual requirements from DOE directives to the corresponding responsible PPPO organizational managers and lead support positions. Attachment A designates a Nuclear Safety Oversight Lead (NSOL) as the lead support position responsible for conducting comprehensive self-assessments and assessments of MCSA's fire protection requirements from DOE Order 420.1C and DOE-STD-1066-2023. The NSOL also serves as the functional lead for fire protection. The NSOL's fire protection-related roles and responsibilities are described in PPPO-FAC-PRO-4, *Authority Having Jurisdiction Fire Protection Program Equivalencies and Exemption*. PPPO does not staff a full-time DOE technical qualification program qualified FPE. Instead, PPPO retains the support of a remote support service contractor FPE, who is assigned to specific tasks as needed. This approach allows PPPO to access expert fire protection engineering support for tasks, such as reviewing site events or near misses, reviewing major documents or designs, and resolving technical fire protection issues or questions. The remote FPE also conducts periodic site visits to review field conditions, ensuring that technical expertise is available when required.

A Facility Representative (FR) provides routine field oversight of Building C-333, including fire protection, and is qualified per DOE-STD-1151, *Facility Representative Functional Area Qualification Standard*. To supplement its Federal workforce, PPPO engages Enterprise Technical Assistance Services, Inc. (ETAS), a support service contractor that provides technical and oversight support services. These services include fire protection, emergency management, and industrial safety.

Administrative instruction PPPO-OA-AI-1, *Integrated Oversight Plan*, describes the generation and maintenance of the IOP. The IOP identifies regulatory and performance areas through baseline, supplemental, and reactive oversight activities. It also includes operational awareness activities (OAAs) that PPPO categorizes as “required” or “routine.” Notably, PPPO’s fiscal year 2025 IOP included only two oversight activities related to FRNP’s FPP and none for MCSA. According to the fiscal year 2026 IOP, there is a required OAA scheduled for September 2026. This would be the first PPPO oversight activity related to MCSA’s FPP.

In addition to formal fire protection assessment activities, PPPO effectively conducts fire protection-related field oversight, reviews documents, and interprets data from MCSA. FRs and ETAS staff provide operational fire protection oversight through facility walkdowns. From October 2023 through October 2026, the Building C-333 FR identified and entered three fire protection-related issues into the management tracking system for tracking and resolution by MCSA. There were no entries for MCSA during this period.

Federal Oversight Conclusions

Overall, PPPO performs Federal oversight of MCSA’s FPP-related activities in accordance with DOE Order 226.1B. PPPO appropriately communicates its fire protection oversight results and monitors associated corrective action development, execution, and closure through close coordination with MCSA.

4.0 BEST PRACTICES

No best practices were identified as part of this assessment.

5.0 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 findings. Cognizant DOE managers must use site- and program-specific issues management processes and systems developed in accordance with DOE Order 226.1B to manage the corrective actions and track them to completion.

Mission Conversion Services Alliance, LLC

Finding F-MCSA-1: MCSA does not have adequate controls in place for dispensing flammable Class I liquids within Buildings C-333 and C-337. (NFPA 30, sec. 18.6.1 and table 18.5.4)

6.0 DEFICIENCIES

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

Mission Conversion Services Alliance, LLC

Deficiency D-MCSA-1: MCSA has not collected data on system trends, which precludes the ability to reevaluate the technical justification for the equivalency in accordance with DOE Order 420.1C, attachment 2, chapter II, section 3.d.(2)(c). (1994 DOE equivalency applied to water-based fire suppression systems)

Deficiency D-MCSA-2: MCSA's OSMS-PLN-332 does not provide or reference a qualification standard for FPEs to ensure that the candidate is adequately trained and qualified for this technical support position. (DOE Order 426.2A, att. 1, ch. I, sec. 3.a)

Deficiency D-MCSA-3: MCSA has not repaired or implemented compensatory measures (considering freezing temperatures) for the currently impaired fire hydrant FH-M-16-N1. (CP3-FP-2003, sec. 6.1.14)

Deficiency D-MCSA-4: MCSA has not performed a dust hazard analysis for the dust collection system installed within the MSA. (NFPA 652)

Deficiency D-MCSA-5: MCSA has not implemented effective fire protection-related inspections for all fire alarm panels, exit doors, hydrants, PIVs, FDC check valves, and FDC connections. (DOE Order 414.1D, att. 2, sec. 4.b; NFPA 72; NFPA 101, sec. 7.1.10.1; DOE Order 420.1C, att. 2, ch. II, sec. 3.d.(1)(c); NFPA 25, sec. 13.4.2; and NFPA 25, table 5.1.1.2)

7.0 OPPORTUNITIES FOR IMPROVEMENT

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

Mission Conversion Services Alliance, LLC

OFI-MCSA-1: Consider exercising the capabilities of the ladder truck that is available under a mutual aid agreement with the local community fire department to be assured of effective use for building access to the second floor and roof levels.

OFI-MCSA-2: Consider revising the TFHA to include technical justification for the limit of "five waste bags at a boundary control station exit" and the storage of ordinary combustibles in a "2500 square foot area" as specified in CP3-FP-2031.

OFI-MCSA-3: Consider revising the PIP to include easily discernable warnings for firefighters, in preparation for a fire response to specific moderator-controlled locations, such as describing the variability of locations, identifying a facility contact who would know the location of such potential hazards, and providing images of open pipe configurations.

Appendix A Supplemental Information

Dates of Assessment

February 23 to March 31, 2026

Office of Enterprise Assessments (EA) Management

Mark D. Barth, Acting Director, Office of Enterprise Assessments
VACANT, Deputy Director, Office of Enterprise Assessments
Jack E. Winston, Acting Director, Office of Environment, Safety and Health Assessments
Tamara D. Powell, Director, Office of Nuclear Safety and Environmental Assessments
David Olah, Director, Office of Worker Safety and Health Assessments
Dr. Wade W. Gough, Acting Director, Office of Emergency Management Assessments
Brent L. Jones, Director, Office of Nuclear Engineering and Safety Basis Assessments

Quality Review Board

Vacant, Advisor
David A. Young, Acting Chair
Dr. Wade W. Gough
Harrichand Rhambarose
William A. Eckroade

EA Site Lead for Paducah Site

Tamara D. Powell

EA Assessment Team

Jonathan Ortega-Luciano, Lead
Gregory L. Merryfield
Jeffrey L. Robinson
Barry L. Snook
Dean Z. Tolete

Appendix B
Office of Environmental Management Response

(This page intentionally left blank)



Department of Energy
Washington, DC 20585

EM-2026-000502

September 10, 2026 MEMORANDUM

FOR MARK BARTH

ACTING DIRECTOR
OFFICE OF ENTERPRISE ASSESSMENTS

FROM:

TIMOTHY J. WALSH 
ASSISTANT SECRETARY
FOR ENVIRONMENTAL MANAGEMENT

SUBJECT:

Independent Assessment of the Fire Protection Program at the
Paducah Site

The Office of Environmental Management (EM) acknowledges the report titled, *Independent Assessment of the Fire Protection Program at the Paducah Site*, and provides the comments below regarding the identification of two deficiencies (D-MCSA-1 and D-MCSA-4).

Deficiency D-MCSA-1: Mission Conversion Services Alliance, LLC (MCSA) has not collected data on system trends, which precludes the ability to reevaluate the technical justification for the equivalency in accordance with DOE Order 420.1C, attachment 2, chapter II, section 3.d.(2)(c). (1994 DOE equivalency applied to water-based fire suppression systems).

EM Comment: Documentation exists that references an obsolete equivalency. This finding should be categorized as an observation and not a deficiency. The Office of Enterprise Assessment's (EA) response noted that the actions identified within the equivalency are not being performed, and this is because the equivalency was deemed obsolete.

Deficiency D-MCSA-4: MCSA has not performed a dust hazard analysis for the dust collection system installed within the MSA. (NFPA 652).

EM Comment: The dust generated by the plasma arc cutting was sampled and determined to be non-combustible. Consequently, the actions cited by EA as having not been performed are not required.

If you have any questions or comments on the contents of this memorandum, please contact Ms. Brenda Hawks, Associate Deputy Assistant Secretary for Field Operations Oversight, Chief of Nuclear Safety, at (865) 805-0391.