



Independent Assessment of the Fire Protection Program at the Los Alamos National Laboratory Transuranic Waste Facility

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Acronyms

AHJ	Authority Having Jurisdiction
BNA	Baseline Needs Assessment
CFR	Code of Federal Regulations
CRAD	Criteria and Review Approach Document
CSE	Cognizant System Engineer
CWSB	Characterization and Waste Storage Building
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
EA	Office of Enterprise Assessments
FFPA	Facility Fire Protection Assessment
FHA	Fire Hazards Analysis
FPE	Fire Protection Engineer
FPP	Fire Protection Program
FPPM	Fire Protection Program Manual
FSS	Fire Suppression System
ITM	Inspection, Testing, and Maintenance
LAFD	Los Alamos County Fire Department
LANL	Los Alamos National Laboratory
LCO	Limiting Condition for Operation
MP	Management Procedure
NA-LA	NNSA Los Alamos Field Office
NFPA	National Fire Protection Association
NNSA	National Nuclear Security Administration
OFI	Opportunity for Improvement
PIP	Pre-incident Plan
SAC	Specific Administrative Control
SD	Supplemental Directive
SR	Surveillance Requirement
SSCs	Structures, Systems, and Components
Triad	Triad National Security, LLC
TRU	Transuranic Waste
TSR	Technical Safety Requirement
TWF	Transuranic Waste Facility
WSB	Waste Storage Building

INDEPENDENT ASSESSMENT OF THE FIRE PROTECTION PROGRAM AT THE LOS ALAMOS NATIONAL LABORATORY TRANSURANIC WASTE FACILITY

Executive Summary

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted an independent assessment of the fire protection program (FPP) at the Los Alamos National Laboratory (LANL) Transuranic Waste Facility (TWF) from January to March 2024. LANL is managed and operated by Triad National Security, LLC (Triad) for the National Nuclear Security Administration (NNSA) and is overseen by the NNSA Los Alamos Field Office (NA-LA). This assessment evaluated the effectiveness of Triad in managing and maintaining the FPP at TWF, including fire and related safety hazards analyses; fire hazards analysis and documented safety analysis integration; fire prevention and protection design requirements; associated technical safety requirement surveillances; inspection, testing, and maintenance (ITM); and contractor self-assessment. Federal oversight by NA-LA relating to fire protection was also evaluated.

EA identified the following strengths:

- Triad maintains a crosswalk spreadsheet to compare the Triad FPP against 37 criteria based on all FPP elements required by DOE Order 420.1C, *Facility Safety*, and DOE-STD-1066-2016, *Fire Protection*, that was effectively used for its self-assessment.
- NA-LA FPP oversight is effectively performed by an experienced fire protection engineer (FPE).

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

- Triad has not established procedures for conducting ITM on fire hydrants and their associated block valves and the TWF fire water distribution system control valves; and does not maintain records of previously completed ITM performed on the wet pipe sprinkler systems. (Finding)
- Triad has not maintained completed training records for FPEs and fire protection specialists.
- Triad has not incorporated procedures to perform ITM work on non-credited fire protection systems into the TWF FPP implementing program documentation.
- Triad did not adequately manage a fire impairment for the inoperable fire door in Waste Storage Building 63-0154.
- Triad has not developed training procedures addressing the performance of facility fire protection assessments, which were not performed by or under the direction of a qualified FPE.
- Triad exceeded the total transient combustible loading surveillance requirement limit of 35 pounds of ordinary combustibles or equivalent.

In summary, Triad has established a generally effective FPP and NA-LA is adequately performing Federal oversight. However, this assessment identified several weaknesses related to ITM, program implementation, documentation, and surveillances. Resolution of the weaknesses identified in this report will enhance the effectiveness of Triad's FPP.

INDEPENDENT ASSESSMENT OF THE FIRE PROTECTION PROGRAM AT THE LOS ALAMOS NATIONAL LABORATORY TRANSURANIC WASTE FACILITY

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 Los Alamos National Laboratory (LANL) Transuranic Waste Facility (TWF). Assessment activities were conducted from January to March 2024. This assessment was part of an ongoing review of fire protection at hazard category 1, 2, and 3 nuclear facilities across the DOE complex.

In accordance with the *Plan for the Independent Assessment of the Fire Protection Program at the Los Alamos National Laboratory Transuranic Waste Facility, January 2024*, this assessment evaluated the FPP, including policies, procedures, and fire and related safety hazards analyses; fire hazards analysis (FHA) and documented safety analysis (DSA) integration; fire prevention and protection design requirements; technical safety requirement (TSR) surveillances and inspection, testing, and maintenance (ITM); contractor self-assessment; and Federal oversight relating to fire protection. The scope of this assessment focused on the TWF, which is a hazard category 2 nuclear facility for radioactive waste material management. TWF activities include storage, characterization, and intra-site shipping of transuranic (TRU) and mixed TRU waste.

LANL is managed and operated by Triad National Security, LLC (Triad) for the National Nuclear Security Administration (NNSA) and is overseen by the NNSA Los Alamos Field Office (NA-LA). LANL's priority roles are serving as a nuclear weapons design agency and a nuclear weapons production agency; addressing nuclear threats; and performing national security science, technology, and engineering.

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, *Facility Safety*; and DOE-STD-1066-2016, *Fire Protection*. EA used objectives 4.1, 4.2, 4.3, 4.4, 4.5, and 4.6 of criteria and review approach document (CRAD) 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 the TWF, focusing on aspects of the FPP. 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 findings for follow-up addressed during this assessment.

3.0 RESULTS

3.1 Fire Protection Program

This portion of the assessment evaluated the effectiveness of Triad's FPP policy and implementing procedures, codes and standards, training and qualification, impairment control and compensatory actions, combustible controls, equivalencies and exemptions, FHA, facility fire protection assessments (FFPAs), baseline needs assessment (BNA), pre-incident plans (PIPs), and wildland fire management planning.

Fire Protection Program Policy and Administration Documents

Triad has adequately established and implemented a laboratory-wide fire protection and emergency response program, defined in PD1220, *Fire Protection Program*, which NA-LA approved as required by DOE Order 420.1C, section 5.d.(5). PD1220 appropriately includes a policy statement that affirms Triad's expectations and commitment to provide a fire protection and emergency response program that meets the requirements of 10 CFR 851, *Worker Safety and Health Program*; 10 CFR 830; DOE Order 420.1C, attachment 2, chapter II, *Fire Protection*; and DOE-STD-1066-2016 (which is invoked by PD1220). PD1220 also appropriately identifies the fire safety codes and standards that are applicable, including DOE technical standards, building codes, National Fire Protection Association (NFPA) codes and standards, and other industry practices. Correspondence letter FO: 37JF-NNSA-2022-007621 addresses the level of authority needed to execute duties and demonstrates that Triad has appropriately designated the fire protection and building code official contractor authorities having jurisdiction (AHJs) (primary and backup).

PD1220, section 6.0, also adequately establishes the training requirements that must be met for fire protection engineers (FPEs) and fire protection technicians, system engineers and cognizant system engineers (CSEs), design and project engineers, fire watch personnel, LANL emergency response personnel and Los Alamos County Fire Department (LAFD) firefighters, and technicians that perform ITM of fire protection equipment. PD1220 appropriately references lower-level training implementation documents for each of these types of positions. Interviewed Triad FPEs, CSEs, TWF operations staff, and LAFD emergency response personnel. All exhibited knowledge and understanding of the codes and standards in effect.

LANL FPPM-1220-100, *Fire Protection Program Manual* (FPPM), is the Function Series document for implementing PD1220. The FPPM contains an adequate description of the topic and the established requirement(s) for implementing FPP elements and appropriately addresses the individual sections of PD1220.

At TWF, the LANL sitewide FPP is generally adequately implemented through PA-AP-01261, *TWF Fire Protection Program*. PA-AP-01261 adequately addresses the FPP key elements of DOE-STD-1066-2016, including roles and responsibilities, performance requirements for TSRs, operational limits and surveillance requirements (SRs), administrative controls, specific administrative controls (SACs), and design features. The reviewed qualification standards for the TWF site FPE, AHJ/Fire Marshal, fire protection specialist, and LAFD firefighters adequately meet the requirements of DOE Order 420.1C, attachment 2, chapter II, section 3.d.(1)(b), and DOE Order 426.2A, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*, attachment 1, chapter I.

While most Triad fire protection documents are generally adequate, the following weaknesses were identified:

- Contrary to DOE Order 420.1C, attachment 2, chapter II, section 3.d.(2)(a), and DOE Order 426.2

Change 1, attachment 1, chapter I, section 10, Triad has not maintained completed training records for FPEs and fire protection specialists. (See **Deficiency D-Triad-1.**) Training records that are not maintained are not easily auditable. Triad is in the process of reconstituting records, conducting a series of job analyses for FPEs and fire protection specialists, and implementing a process to maintain training records. Interviewed FPEs demonstrated the requisite qualifications to perform work in accordance with the FPP and the TWF safety basis.

- Contrary to DOE Order 420.1C, attachment 2, chapter II, section 3.d.(1)(c), PA-AP-01261 does not include procedures for the performance of ITM work on non-credited fire protection systems. (See **Deficiency D-Triad-2.**) Without defined ITM procedures, Triad cannot ensure that non-credited fire protection systems will perform as designed. PA-AP-01261 only identifies applicable NFPA codes and standards for performing ITM on non-credited fire protection systems. Further, PA-AP-01261 does not identify instructions to address, for example, work scope, required equipment and calibration information, training requirements, cautions, acceptance criteria, and data recording methodology.
- Contrary to PD1220, and operations and maintenance (O&M) criterion 733, *Fire Protection System Impairment Control Program*, section 6.1.2, Triad did not adequately manage the impaired northeast self-latching fire door for Building 63-0154 after the door failed to latch. (See **Deficiency D-Triad-3.**) Improperly managed impairments to fire protection and life safety structures, systems, and components (SSCs) may result in compensatory actions not being adequately identified and implemented. Triad discovered the impaired fire door during the performance of SR 4.3.6.1, *WSB/CWSB [Waste Storage Building/Characterization and Waste Storage Building] Noncombustible Exterior Walls – Personnel Door Inspections*. The reviewed SR 4.3.6.1 performance record demonstrated that the appropriate limiting condition for operation (LCO) actions were promptly taken. However, the FPE was not contacted, resulting in programmatic requirements not being met, including evaluating requirements related to life safety and identifying corresponding compensatory actions until the fire door was returned to service.

Program Procedures

Triad has established an adequate hot work program as documented in P101-26, *Welding, Cutting, and Other Spark- or Flame-Producing Operations*. Instructions for temporary hot work operations and designated hot work areas are clear and concise, each requiring an area walkdown, a hot work permit from an approved issuing authority, and a trained fire watch. P101-26 incorporates essential program elements established in NFPA 51B, *Standard for Fire Prevention during Welding, Cutting and Other Hot Work*, and American Welding Society Z49.1, *Safety in Welding, Cutting and Allied Processes*, to ensure the prevention of the loss of life, injury to personnel, and asset/property damage resulting from fire.

Triad has established adequate indoor and outdoor combustible loading and flammable material control procedures, PA-DOP-01942, *TWF Indoor Combustible Loading Control (SR 4.3.3.1, SR 4.3.3.2, SR 4.3.3.3, SR 4.3.3.4, SR 4.3.3.5, SR 4.3.3.6, and SR 4.3.3.7)*, and PA-DOP-01972, *TWF Outdoor Equipment, Combustible Loading, and Flammable Material Control (SR 4.3.1.1 and SR 4.3.2.1)*, that meet the requirements of DOE Order 420.1C, attachment 2, chapter II, section 3.d.(1). These detailed operating procedures provide clear and concise instructions for performing and documenting TSR SRs. Additionally, important TSR implementation steps and procedural attachments provided for the recording of results of surveillance performance steps are denoted by a bolded dollar sign (\$) as required by two procedures addressing indoor and outdoor combustible loading control.

Equivalencies and Exemptions

The FPPM chapter entitled *Evaluation, Equivalencies, Exemptions and Variances* appropriately implements DOE Order 420.1C and LANL P310-1, *Exemptions to Appendix G Requirements*.

Furthermore, P310-1 adequately defines the process to develop and request equivalencies and exemptions, including the process for either performing a vulnerability assessment or establishing sufficient analysis that supports the basis for such requests. The TWF FHA, 102355-HA-00001, *Fire Hazard Analysis TA-63, TRU Waste Facility Los Alamos National Laboratory*, section 9.5, lists one active exemption (approved by DOE/NNSA) and four active equivalencies (approved by NA-LA). Observed controls identified in the exemption (LANL-DOE-ORDER 420.1B EX2013-002, *Request for Permanent Exemption Approval to DOE Order 420.1B Fire Protection for the LANL TA-63 TWF Seismic Switch Enclosures*) were verified. This exemption omits remotely monitored automatic extinguishing system protection for the redundant safety class seismic switch enclosures. Observed conditions including a four-inch-thick masonry enclosure around the seismic switches with a gravel base and open top devoid of combustibles and vegetation adequately support the exemption.

Fire Hazards Analysis

The TWF FHA adequately assesses the hazards of and potential damage from fire, verifies that fire safety objectives are met, and is aligned with the DSA. The FHA is current (updated within the last three years) and adequately analyzes facility fire hazards consistent with the requirements of DOE-STD-1066-2016, section 7.1 and appendix B, and NFPA 801, *Standard for Fire Protection for Facilities Handling Radiological Materials*, section 4.3. A concise description of building construction is provided, and fire-rated separations are identified as required by DOE-STD-1066-2016. Building fire areas are adequately defined and bounded by fire-rated construction with openings protected by equivalently rated fire doors and penetration seals. The FHA adequately identifies applicable design criteria and analysis to demonstrate that fire safety objectives will be met. The FHA appropriately includes a list of approved equivalencies and exemptions, including the bases, approval status, and validation of approval conditions.

Facility Fire Protection Assessments

Triad has established a generally adequate FFPA program as documented in AP-FPDO-INSP, *Fire Protection Facility Assessment Procedure*. The procedure properly requires an FFPA to be performed annually for high hazard facilities and buildings with a replacement value in excess of \$100 million. Additionally, AP-FPDO-INSP identifies the programmatic and physical features to be assessed, which are consistent with DOE-STD-1066-2016, section 7.2. Reviewed 2023 TWF FFPAs for the waste storage facilities, waste characterization facilities, and calibration source storage building addressed in the FHA demonstrate that TWF FFPAs are being performed within the required frequency. The interviewed FFPA assessor, designated as a TWF fire protection specialist, stated that walkdowns of the facilities were performed to evaluate life safety features such as illuminated exit signs, emergency egress lighting, and emergency exit pathways, which a review of the FFPAs confirmed. However, the following weaknesses were identified:

- Contrary to DOE-STD-1066-2016, section 7.2.2 (invoked by AP-FPDO-INSP, section 3.0), and AP-FPDO-INSP, section 3.2, the 14 TWF FFPAs conducted in calendar year 2023 were not performed by, or under the direction of, a qualified FPE. (See **Deficiency D-Triad-4**.) A lack of qualified FPE involvement in FFPAs diminishes the credibility of feedback information and the assurance that FPP requirements are properly implemented. All reviewed TWF FFPAs showed that FPEs were copied on the completed assessment transmittals. The interviewed FFPA assessor confirmed that this was their first time performing FFPAs and that no FPE was involved in performing the 2023 assessments.
- Contrary to DOE Order 420.1C, attachment 2, chapter II, section 3.d.(1)(b), and DOE-STD-1066-2016, section 5.1.2, Triad has not developed training procedures addressing the performance of FFPAs. (See **Deficiency D-Triad-5**.) Without appropriate training on performing FFPAs, fire protection assessors may not thoroughly evaluate implementation of the FPP, including ITM procedures, ITM records, work packages, impairments and compensatory measures, applicability of

exemptions and equivalencies, facility FHA(s), PIPs, and BNA. The interviewed FFPA owner and an FFPA assessor confirmed that Triad has no formal training for conducting FFPAs, but training was in development. While the FFPA owner and FFPA assessor stated that some training on the FFPA checklist was performed but not documented, none of the training addressed the procedural content of AP-FPDO-INSP. Although the procedural content of AP-FPDO-INSP adequately addresses important nuclear safety terminology (e.g., SSCs, safety significant, or safety class), safety basis TSRs (e.g., combustible controls and sprinkler systems), DSA credited fire protection systems (e.g., fire barriers and fire doors), and TWF operation descriptions, none of the reviewed FFPAs indicate that these FPP features were assessed.

- Each FFPA record consists of an assessment report memorandum (required by AP-FPDO-INSP) that includes the Computerized Maintenance Management System (CMMS) schedule of completed and planned ITM and an attached assessment checklist (AP-FPDO-INSP, attachment E). All 14 reviewed completed FFPA checklists denoted each applicable FPP element with an “OK” without any reference or comments to ITM performed in accordance with the CMMS schedule. Further, completed checklists do not provide any evidence that the adequacy of this work was ensured or reference any reviewed FPP documentation, such as ITM work packages, procedures, or data records to support the results that proper ITM is “OK.”

Baseline Needs Assessment

Triad has performed a comprehensive BNA of the fire protection and emergency response organizations. LA-CP-211-20811, *Los Alamos National Laboratory Baseline Needs Assessment for Fire Protection and Emergency Response*, dated September 22, 2021, demonstrates that the BNA is being performed within the required three-year frequency in accordance with DOE Order 420.1C, attachment 2, chapter II, section 3.e.(1)(d), and adequately defines and documents roles and responsibilities, command and control, communications protocols, available apparatus and equipment, emergency medical response, and training for site emergency services and the fire department. The BNA provides the status of open finding actions from the 2018 BNA and the current needs to align with NFPA 1710-2020, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*, chapter 5, specifically in the area of staffing for on-duty personnel. The BNA was appropriately developed in conjunction with the emergency response organization and approved by NA-LA in accordance with DOE Order 420.1C, attachment 2, chapter II, section 3.e.(1). Additionally, walkdowns and interviews demonstrated that the mobile emergency apparatus inventory is sufficient and adequately maintained for response operations during site emergencies.

Pre-Incident Plans

LAFD has developed and implemented generally adequate PIPs for TWF that serve to enhance the effectiveness and safety of emergency response activities. The PIPs were appropriately prepared in accordance with DOE Order 420.1C, attachment 2, chapter II, section 3.e.(2), using criteria established in DOE-STD-1066-2016, section 6.3, and NFPA 1620, *Standard for Pre-Incident Planning*. Reviewed PIPs for the five WSBs, the CWSB, and the TWF records center appropriately address access information, worker assembly point(s), emergency utility shut off locations, firefighting water runoff containment provisions, building exposures, sprinkler system types and fire department connection (FDC) locations, fire alarm panel information, and fire hydrant locations. However, because both the primary and secondary access points are located directly south of the WSBs and the CWSB, a fire and/or a hazardous materials release during a prevailing north wind could render both access points inaccessible. Further, only a single assembly point, which is also located directly south of the WSBs and the CWSB, is established in the PIPs. (See **OFI-Triad-1.**)

The reviewed most recent after-action report (FY23-0289, *Transuranic Waste Facility Drill*) confirmed that performance-based drills/exercises are being performed at TWF to validate emergency response capabilities. Walkdowns confirmed access to manual firefighting systems (fire hydrants and sprinkler system FDCs) and building emergency response equipment (building fire alarm panel, sprinkler system, portable fire extinguishers, and spill kits) was adequate and consistent with PIPs. However, emergency spill kits and their designated locations are not identified in any of the five WSB PIPs.

Wildland Fire Management

Triad has established an adequate wildland fire management plan, EM-PLAN-100, *Los Alamos National Laboratory Emergency Plan*, annex Q, *Wildland Fire Program*, in accordance with relevant portions of NFPA 1143, *Standards for Wildland Fire Management*, and DOE Order 420.1C, attachment 2, chapter II, section 3.g. Observed fire breaks (50 feet from any structure) were present and adequately maintained around TWF in accordance with the plan. Further, during a fire station walkdown, it was verified that adequate emergency response equipment such as firefighting brush trucks were readily available to respond to a wildland fire laboratory wide.

Fire Protection Program Conclusions

Triad has established and implemented a comprehensive sitewide policy and FPP approved by NA-LA, assigned an appropriate individual as the fire protection contractor AHJ, and implemented a generally adequate set of sitewide and facility-specific FPP procedures. Triad maintains an adequate BNA and ensures that LAFD personnel are familiar with important elements of pre-incident planning through performance-based drills/exercises. Triad has also developed and implemented an adequately integrated sitewide wildland fire management plan. However, identified weaknesses include a lack of training records for FPE and fire protection specialist incumbents; a lack of ITM work procedures for non-credited fire protection systems; an inadequate response to an impaired self-latching fire door; FFPAs not being performed by, or under the direction of, a qualified FPE; and a lack of training procedures for performing FFPAs.

3.2 Fire Hazards Analysis and Documented Safety Analysis Integration

This portion of the assessment evaluated the integration of the TWF FHA into associated safety design basis documentation, and the adequacy of fire protection controls for implementation of the facility safety basis.

Overall, Triad has appropriately integrated the FHA into the facility DSA to ensure that analyzed fire hazards are prevented or sufficiently mitigated through controls for normal, abnormal, and accident conditions. The FHA and DSA appropriately evaluate credited fire systems and associated fire scenarios, possible locations, and consequences. The evaluated fire scenarios and supporting conclusions in the FHA are appropriately included in the DSA hazard evaluations and accident analyses sections in accordance with SBP-114-2-R9, *Hazard Evaluation and Accident Analysis*. The TWF credited fire suppression and barrier systems, and the combustible loading SAC, are adequately based on fire hazard identification and supporting accident analyses to ensure 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. Although the fire-related recommendations necessary for TWF start-up in 2017 have been closed, the DSA identifies a fire risk related to the characterization trailers constructed of combustible materials, which is documented in the *Planned Design and Operational Safety Improvements* (section 3.3.2.3.1 of the TWF DSA). This operational safety improvement remains open with no scheduled forecast for completion.

Fire Hazards Analysis and Documented Safety Analysis Integration Conclusions

Triad has appropriately integrated the FHA into the DSA. The DSA evaluates and analyzes accidents to adequately support the development of required controls for the prevention or mitigation of hazard events for the implementation of the facility safety basis.

3.3 Fire Protection Structures, Systems, and Components Design

This portion of the assessment evaluated design requirements, engineering, and design verification for fire protection SSCs.

Design Requirements

Triad has established and implemented an appropriate set of fire protection system design requirements. The procedures for operating, testing, and inspecting the fire protection SSCs contain design requirements aligned with corresponding calculations. Triad FPEs and CSEs demonstrated adequate knowledge of the design requirements during interviews.

Engineering

Triad has established and implemented adequate programs for conduct of engineering and configuration management of fire protection SSCs. PD340, *Conduct of Engineering and Configuration Management for Facility Work*; P341, *Facility Engineering Processes Manual*; and AP-341-519, *Engineering Functional Series Document*, appropriately incorporate requirements for fire protection design, design control, review and approval, and acceptance. Site-specific fire protection design criteria and guidance are appropriately established within PD1220.

Three reviewed design change packages (replacement of fire pump controllers, installation of QuickVic flexible couplings, and removal of the 12-inch check valve) appropriately included unreviewed safety question (USQ) determinations, identification of affected documents, engineering instructions detailing the scopes of work, SSC grade levels, 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 SBP-112-3-R5.3, *Unreviewed Safety Question (USQ) Process*.

Triad has established appropriate qualification requirements for CSEs through P343, *Facility Engineering Training and Qualification Manual*, Curriculum 3612, *Conduct of Engineering for Facility Work*, in accordance with DOE Orders 420.1C and 426.2A. The interviewed CSEs for the fire suppression system (FSS) and building structure (fire barriers) were qualified and knowledgeable of their systems, including the status of current maintenance activities, procurement of replacement parts, and ongoing challenges to system operability and reliability.

Triad has established and implemented an adequate program for routine performance monitoring of TWF's vital safety systems (VSSs) as directed in AP-341-901, *Performing Vital Safety System Assessments*. VSSs are appropriately monitored and CSEs perform periodic VSS walkdowns and annual condition assessments. Three reviewed annual condition assessments for the FSS 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 in accordance with AP-341-802, *System Health Reporting*.

Design Verification

Triad has established and implemented an effective design verification and configuration management process. PD340, *Conduct of Engineering and Configuration Management for Facility Work*, and AP-341-620, *Review and Verification of Design Documents*, appropriately require CSEs to be involved in design development and design changes. Three reviewed design change packages for SSC modifications properly documented the adequacy of the fire protection design, engineering review, and independent design verification. PD340 appropriately establishes the configuration management program for LANL fire protection SSCs. Observed fire system equipment and component labeling were consistent with design drawings and implemented as required by STD-342-100, *Engineering Standards Manual*. A critical parts list was appropriately documented in accordance with FSS AP-341-521, *Identification and Control of Critical Spare Parts*. During a walkdown of the level-B (for materials sensitive to environmental conditions) storage area, the three selected parts from the FSS critical spare parts list, including those requiring significant lead time for procurement (e.g., fire pump impeller) and routine maintenance repair (e.g., packing kits and electric pressure switches), were observed to be stored properly and available for use.

Fire Protection Structures, Systems, and Components Design Conclusions

Triad has established and implemented an appropriate set of fire protection system design requirements and adequate programs for FPP conduct of engineering and configuration management. Further, Triad has established and implemented an effective design verification process. Observed critical spare parts were stored properly and available for use.

3.4 Surveillances and Inspection, Testing, and Maintenance

This portion of the assessment evaluated Triad's performance of TSR surveillances and ITM of fire protection systems and equipment.

TSR Surveillances

Triad appropriately plans, schedules, and performs TSR surveillances to ensure that DSA-credited fire sprinkler and fire barrier systems in TWF provide adequate fire protection for other safety significant SSCs, critical process equipment, and high-value property, and can prevent a major fire from impacting the remainder of the facility. The Triad detailed operating procedures (DOPs) for the fire systems appropriately contain "use every time" attachments for performing and documenting SRs to verify system operability. Acceptance criteria are well defined and serve as baseline requirements. The reviewed surveillance procedures demonstrated, and interviews confirmed, that surveillances are performed by knowledgeable personnel and supported by qualified design authority engineers to satisfy NFPA requirements. Observed surveillances of *TWF System Alignment Checklist for Fire Suppression System* (SR 4.3.7.6), *Indoor Combustible Loading Control*, (SR 4.3.3.1, SR 4.3.3.2, SR 4.3.3.3, SR 4.3.3.4, SR 4.3.3.5, SR 4.3.3.6, SR 4.3.3.7) and simulated performance of surveillances of *TWF Operability Fire Water Pump Start Test*, SR 4.3.7.5, *TWF Fire Suppression System Testing and Inspection* SR 4.3.7.7, SR 4.3.7.8, SR 4.3.7.9 demonstrated that personnel have adequate knowledge of system operability limits and equipment control settings as described in the TSR bases. The reviewed TWF surveillances for the FSS and fire barriers over the past three years (FSS) and past four years (fire barriers/dampers) confirmed that the systems have met their respective TSR acceptance criteria as currently defined. However, the following weaknesses were identified:

- Contrary to DOE Order 420.1C, attachment 2, chapter II, section 3.d.(1)(c), and SR 4.3.3.1, Triad exceeded the total transient combustible loading SR limit of 35 pounds of ordinary combustibles or equivalent. (See **Deficiency D-Triad-6.**) Exceeding the combustible loading SR limit and not

entering the appropriate LCO action could result in exceeding the analyzed hazard, potentially resulting in higher consequences requiring additional safety controls or compensatory measures. Specifically, the limit was exceeded during the performance of the *Indoor Combustible Loading Control, SR 4.3.3.1*, when an electric forklift was observed entering and then operating within the WSB without entering the LCO action statement for exceeding the total transient combustible limit. The operation of the electrical forklift associated with deficiency D-Triad-6 is necessary within the WSB to support drum handling; however, the indoor combustible loading SAC does not explicitly exclude the forklift for acceptable transient materials within the WSB. The basis for LCO 3.3.3 excludes combustible materials being used by facility personnel for required activities and an electric forklift fire is evaluated in the DSA and FHA without crediting the Indoor Combustible Loading Control, but this is not explicitly stated in the list of exempted items in the LCO.

- Contrary to 10 CFR 830, subpart B, appendix A, paragraph G.4.(iii), and SR 4.3.7.6, *Fire Suppression System Alignment*, Triad has not documented the inspection and testing of the FSS supply system (yard valves) confirming the required fully open valve position. (See **Deficiency D-Triad-7**.) Misaligned FSS valves could adversely affect the required fire water supply and subsequent performance of the WSB sprinkler systems.

Fire Protection System and Equipment Inspection, Testing, and Maintenance

PD1220 properly requires ITM procedures to be developed, implemented, and maintained by the LANL Maintenance and Site Services Division, which includes performance by appropriately trained and qualified ITM personnel. Triad has established adequate ITM procedures for the wet pipe sprinkler systems as documented in 721-C, *Wet Automatic Sprinkler Systems Six-Month Inspection and Testing* and 721-D, *Wet Automatic Sprinkler Systems Yearly Inspection and Testing*. Technicians who perform ITM on fire protection systems are qualified to LOG-QS-MW-001, *Log Maintenance Worker Qualification Standard*, which includes at least one year of job-related experience and successful completion of OJT #14037, *Logistics Division OJT for Pipefitter—Fire Protection Suppression Course #: 14037*. However, contrary to DOE Order 420.1C, attachment 2, chapter II, section 3.d.(1)(c) and DOE-STD-1066-2016, section 5.1, Triad has not established procedures for conducting ITM on fire hydrants and associated block valves and the TWF fire water distribution system control valves; and does not maintain records of previously completed ITM performed on wet pipe sprinkler systems. (See **Finding F-Triad-1**.) Without established procedures and readily available records of completed ITM, Triad cannot ensure that ITM on fire protection systems is performed in accordance with DOE and PD1220 requirements.

Surveillances and Inspection, Testing, and Maintenance Conclusions

In general, Triad adequately performs TSR surveillances and ensures their operation in accordance with safety basis documents, and applicable codes and standards. However, identified weaknesses include exceeding the total transient combustible loading SR limit, and not documenting the inspection and testing of the FSS supply system yard valves. Additionally, Triad has not established procedures for conducting ITM on fire hydrants and the TWF fire water distribution system control valves and does not maintain records of previously completed ITM performed on the wet pipe sprinkler systems.

3.5 Contractor Self-Assessment

This portion of the assessment evaluated Triad's self-assessment of its FPP.

Triad has performed a comprehensive self-assessment of its FPP, *Assessment Report for the Los Alamos National Laboratory Fire Protection Program Joint Assessment, September 2023*. The self-assessment was a joint effort performed to help promote cross organizational learning and foster teamwork between

NA-LA and Triad. The assessment process used a crosswalk spreadsheet to compare the FPP against 37 review criteria based on all FPP elements required by DOE Order 420.1C and DOE-STD-1066-2016. Using a crosswalk spreadsheet is considered a strength because it ensures that requirements will not be missed during the assessment. The joint self-assessment contained sufficient breadth, depth, and rigor for adequately assessing the Triad FPP. Triad appropriately performed the self-assessment within the required three-year frequency and adequately entered the results of the assessment into Triad's issues management software tool (iLINK).

Contractor Self-Assessment Conclusions

Triad is appropriately performing triennial FPP self-assessments within the required frequency. The latest assessment was of sufficient breadth, depth, and rigor to meet the requirements of DOE Order 420.1C and DOE-STD-1066-2016.

3.6 Federal Oversight

This portion of the assessment evaluated the effectiveness of NA-LA's oversight of Triad's implementation of the FPP at TWF, including program and field oversight of FPP-related activities.

NA-LA has established and implements its oversight program using management procedure (MP) 00.08, *Implementation of NA-LA Line Oversight*, which adequately describes processes consistent with DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy* (and NNSA supplemental directive (SD) 226.1C, *NNSA Site Governance*). Oversight activities include independent assessments, operational awareness activities, document reviews, and shadowing of assessments. The NA-LA Site Integrated Assessment Plan appropriately identifies planned assessments of fire protection and operational oversight related to fire protection.

NA-LA's oversight of the Triad FPP is implemented by MP 06.07, *NA-LA Fire Protection Program*, which defines the roles and responsibilities as related to FPP oversight for the NA-LA Fire Protection Program Manager, FPEs, safety system oversight (SSO) staff, and Facility Representatives (FRs). NA-LA staffs one FPE, who is also the Fire Protection Program Manager, and is qualified in accordance with DOE-STD-1137-2014, *Fire Protection Engineering Functional Area Qualification Standard*, and the NA-LA site-specific SSO qualification standard. The need for an additional FPE position has been identified, and there are efforts in progress to fill the vacant FPE position. TWF has an assigned FR providing oversight, and they are appropriately qualified pursuant to DOE-STD-1151, *Facility Representative Functional Area Qualification Standard*, and the NA-LA FR program facility-specific qualification for TWF, which appropriately addresses fire protection related basics and issues. The FR demonstrated adequate knowledge and awareness of fire protection hazards, systems, and controls, and coordinates with the FPE to perform effective oversight.

The NA-LA FPE regularly attends meetings with Triad counterparts to discuss fire protection related issues. The NA-LA FPE has monthly FPP interface meetings with the Triad fire protection office, during which the status of items such as FHAs, FFPAs, and impairments are discussed. The NA-LA FPE is experienced and knowledgeable, employs a questioning attitude, and doesn't hesitate to raise issues in a collegial manner. The relationship between the NA-LA FPE and Triad FPP counterparts is one of open communication and respect. Reviewed FPP assessments conducted by the NA-LA FPE were thorough and adequately documented. For example, a recent assessment focused on the high-level processes for Life Safety, fire impairments, and existing building change of use resulted in six observations with two out of the three objectives being partially met, and one objective not being met. The results of fire protection assessments are tracked in NA-LA's issues management system. Additionally, the NA-LA

FPE separately tracks issues from assessments in a spreadsheet, including references to the Triad iLINK number and status.

Federal Oversight Conclusions

Overall, NA-LA performs Federal oversight of Triad FPP-related activities in accordance with DOE Order 226.1B (and NNSA SD 226.1C). NA-LA appropriately communicates its fire protection oversight findings and monitors associated corrective action development, execution, and closure through close coordination with Triad.

4.0 BEST PRACTICES

No best practices were identified during 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 226.1, *Implementation of Department of Energy Oversight Policy*, to manage the corrective actions and track them to completion.

Triad National Security, LLC

Finding F-Triad-1: Triad has not established procedures for conducting ITM on fire hydrants and associated block valves and the TWF fire water distribution system control valves; and does not maintain records of previously completed ITM on the wet pipe sprinkler systems. (DOE Order 420.1C, att. 2, chap. II, sec. 3.d.(1)(c), and DOE-STD-1066-2016, sec. 5.1)

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.

Triad National Security, LLC

Deficiency D-Triad-1: Triad has not maintained completed training records for FPEs and fire protection specialists. (DOE Order 420.1C, att. 2, chap. II, sec. 3.d.(2)(a), and DOE Order 426.2, chg. 1, att. 1, chap. I, sec. 10)

Deficiency D-Triad-2: Triad document PA-AP-01261 does not include procedures for the performance of ITM work on non-credited fire protection systems. (DOE Order 420.1C, att. 2, chap. II, sec. 3.d.(1)(c))

Deficiency D-Triad-3: Triad did not adequately manage the impaired northeast self-latching fire door for Building 63-0154 after the door failed to latch. (PD1220, O&M criterion 733, sec. 6.1.2)

Deficiency D-Triad-4: Triad did not ensure that the 14 TWF FFPAs conducted in calendar year 2023 were performed by, or under the direction of, a qualified FPE. (DOE-STD-1066-2016, sec. 7.2.2, and AP-FPDO-INSP, sec. 3.2)

Deficiency D-Triad-5: Triad has not developed training procedures addressing the performance of FFPAs. (DOE Order 420.1C, att. 2, chap. II, sec. 3.d.(1)(b), and DOE-STD-1066-2016, sec. 5.1.2)

Deficiency D-Triad-6: Triad exceeded the total transient combustible loading SR limit of 35 pounds of ordinary combustibles or equivalent. (DOE Order 420.1C, att. 2, chap. II, sec. 3.d.(1)(c), and SR 4.3.3.1)

Deficiency D-Triad-7: Triad has not documented the inspection and testing of the FSS supply system (yard valves) confirming the required fully open valve position. (10 CFR 830, subpart B, app. A, par. G.4.(iii), and SR 4.3.7.6)

7.0 OPPORTUNITIES FOR IMPROVEMENT

EA identified the OFI 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. This OFI is offered only as a recommendation for line management consideration; it does not require formal resolution by management through a corrective action process and is not intended to be prescriptive or mandatory. Rather, it is a suggestion that may assist site management in implementing best practices or provide potential solutions to issues identified during the assessment.

Triad National Security, LLC

OFI-Triad-1: Consider establishing an alternate emergency access location and a secondary assembly point at the north end of TWF.

Appendix A Supplemental Information

Dates of Assessment

January 8 to March 5, 2024

Office of Enterprise Assessments (EA) Management

John E. Dupuy, Director, Office of Enterprise Assessments
William F. West, Deputy Director, Office of Enterprise Assessments
Kevin G. Kilp, Director, Office of Environment, Safety and Health Assessments
David A. Young, Deputy Director, Office of Environment, Safety and Health Assessments
Thomas E. Sowinski, Director, Office of Nuclear Safety and Environmental Assessments
Kimberly G. Nelson, Director, Office of Worker Safety and Health Assessments
Jack E. Winston, Director, Office of Emergency Management Assessments
Brent L. Jones, Director, Office of Nuclear Engineering and Safety Basis Assessments

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