Independent Assessment of TA-55 Fire Water Pump Safety System Management at the Los Alamos National Laboratory

July 2022

Office of Enterprise Assessments
U.S. Department of Energy

Table of Contents

Acronyms

ASME NQA	American Society of Mechanical Engineers Nuclear Quality Assurance
CDNS	Chief of Defense Nuclear Safety
CFR	Code of Federal Regulations
CGD	Commercial Grade Dedication
CM	Configuration Management
CMMS	Computerized Maintenance Management System
CSE	Cognizant System Engineer
DCF	Design Change Form
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
EA	Office of Enterprise Assessments
ES-DO	Engineering Services Division Office
FDG	Fire Diesel Generator
FPW	Fire Protection-Water Supply
FR	Facility Representative
IM	Issues Management
ITM	Inspection, Testing, and Maintenance
KW	Kilowatt
LANL	Los Alamos National Laboratory
MP	Management Procedure
NA-LA	National Nuclear Security Administration Los Alamos Field Office
NFPA	National Fire Protection Association
NNSA	National Nuclear Security Administration
OFI	Opportunity for Improvement
OPEX	OPEXatLANL Tool
ORPS	Occurrence Reporting and Processing System
P&ID	Process and Instrumentation Diagram
PF	Plutonium Facility
RLM	Responsible Line Manager
SHR	System Health Report
SSCs	Structures, Systems, and Components
SSO	Safety System Oversight
STP	Surveillance Test Procedure
TA	Technical Area
TSR	Technical Safety Requirement
USQ	Unreviewed Safety Question
WI	Work Instruction

INDEPENDENT ASSESSMENT OF TA-55 FIRE WATER PUMP SAFETY SYSTEM MANAGEMENT AT THE LOS ALAMOS NATIONAL LABORATORY

Executive Summary

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted an independent assessment of safety system management for Technical Area (TA)-55 fire water pumps at the Los Alamos National Laboratory (LANL) from February 14 to March 10, 2022. LANL is managed and operated by Triad National Security, LLC (Triad) for the National Nuclear Security Administration (NNSA) and overseen by the NNSA Los Alamos Field Office (NA-LA).

This assessment evaluated the effectiveness of Triad's programs, processes, and activities used to ensure the reliability of the TA-55 safety class diesel and electric fire water pumps and support systems for these pumps, including the diesel generators supplying backup power for the electric fire water pumps. Additionally, this assessment evaluated NA-LA oversight of Triad safety system management.

EA identified the following strengths, including one best practice:

- Triad's cognizant system engineer development and maintenance of system health reports, updated quarterly, and use of the "Path to Green" approach to drive system performance improvement in support of Operations and Maintenance are considered a best practice.
- Triad defined an effective configuration management process and implementing procedures.
- Triad's cognizant system engineering program is well developed, staffed with knowledgeable personnel, and has an effective training/qualification program.
- Triad personnel responsible for performing inspection, testing, and maintenance displayed a high level of knowledge of system operability.

EA also identified several weaknesses:

- Reviewed Triad design documents reflect inadequacies in establishing conservative design margins, inaccuracies caused by missing or outdated design inputs, and incorrect results due to misapplication of engineering principles. (Finding)
- The Triad issues management process has weaknesses in the identification of issues and the timeliness of corrective actions.
- Reviewed Triad surveillance test procedures do not include all required acceptance criteria.
- The Triad Occurrence Reporting and Processing System (ORPS) reporting process is not fully compliant with causal analysis requirements contained in DOE Order 232.2A, *Occurrence Reporting and Processing of Operations Information*.
- Triad lacks a well-defined continuing training program for technical support personnel working at TA-55.
- NA-LA does not comply with all requirements for developing and implementing an effective oversight program commensurate with the level of risk of the activities.

In summary, Triad has established an effective collection of implementing procedures. However, weaknesses were identified in the areas of procedure compliance, technical adequacy of design products, surveillance testing, ORPS causal analyses, and continuing training. In addition, weaknesses were identified in NA-LA's development and implementation of their oversight program commensurate with the risk of activities. Until the concerns identified in this report are addressed, or effective mitigations are put in place, increased risk associated with the TA-55 fire water system's weaknesses will remain.

INDEPENDENT ASSESSMENT OF TA-55 FIRE WATER PUMP SAFETY SYSTEM MANAGEMENT AT THE LOS ALAMOS NATIONAL LABORATORY

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 safety system management at the Los Alamos National Laboratory (LANL). Specifically, EA assessed the effectiveness of Triad National Security, LLC (Triad) programs, processes, and activities used to manage and maintain the performance and reliability of the Technical Area (TA)-55 safety class diesel and electric fire water pumps and safety class portions of their support systems. This assessment also evaluated the National Nuclear Security Administration (NNSA) Los Alamos Field Office (NA-LA) processes for conducting oversight of safety systems at LANL. Remote assessment planning and document collection activities began in January 2022, with onsite assessment activities conducted from February 14 to 17, 2022, and March 7 to 10, 2022.

TA-55 is a modern plutonium science and manufacturing facility that supports a wide range of national security programs involving stockpile stewardship, plutonium processing, nuclear materials stabilization, materials disposition, nuclear forensics, nuclear counterterrorism, and nuclear energy. Over the past several years, a number of unplanned outages of the diesel fire water pumps occurred that resulted in restricted operations at TA-55. To minimize unplanned outages, Triad subsequently purchased, installed, and commissioned two new safety class skid-mounted 450-kilowatt (KW) diesel generators and supporting components (e.g., electric switchgear and panels) in March 2020 to provide backup electric power for the electric fire water pumps. Additionally, Triad has procured and is in the process of replacing two skid-mounted diesel fire water pumps and associated components. Replacement of the first diesel fire water pump in the TA-55 West Pump House was underway during the EA site visit; commissioning tests and final acceptance are tentatively scheduled for mid-2022. The diesel fire water pump in the TA-55 East Pump House will be installed thereafter.

2.0 METHODOLOGY

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

As identified in the assessment plan, the criteria used to guide this assessment were based on objectives SS.1 through SS.9 of EA Criteria and Review Approach Document (CRAD) 31-15, Rev. 1, *Safety Systems Management Review*. In addition, EA used elements of CRAD EA-30-07, Rev. 0, *Federal Line Management Oversight Processes*, to collect and analyze data on NA-LA oversight activities. To gather relevant assessment data, EA reviewed Triad policies, processes, procedures, and records relating to design and engineering, quality assurance, maintenance and work planning, surveillance and testing, operations, training and qualification, and issues management (IM). The scope of this review included the TA-55 Fire Protection-Water Supply (FPW), which includes fire water storage tanks, diesel and electric fire water pumps, and associated piping; the fire protection-sprinkler system; and the new 450-KW fire diesel generators (FDGs) that power the electric fire water pumps. EA observed routine operational activities and surveillance testing. EA also interviewed contractor and Federal oversight

personnel associated with the TA-55 fire water pump safety system management. The members of the assessment team, the Quality Review Board, and management responsible for this assessment are listed in appendix A.

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

3.0 RESULTS

3.1 Engineering Design Documents and Analyses

This portion of the assessment evaluated whether Triad Engineering design documents and analyses are technically adequate and implement the requirements of the documented safety analysis (DSA).

Triad conduct of engineering procedures (including P341, *Facility Engineering Processes Manual*, and supplemental implementing procedures in the AP-341 series) describe an effective process for performing calculations (i.e., analyses), drawings, and design changes. The requirements in these procedures are adequate, if implemented appropriately, to ensure that structures, systems, and components (SSCs) and processes are designed using sound engineering/scientific principles and incorporate applicable requirements from consensus standards and the safety design bases. These requirements include the use of independent reviewers to verify design work. Further details on procedural compliance with respect to independent verification are provided in section 3.2 of this report.

While many reviewed engineering design documents were technically adequate, EA noted a lack of technical adequacy in calculations and drawings important to the overall technical baseline for the fire suppression system, FPW, and FDG. Five of 19 reviewed engineering calculations that form a portion of the technical baseline exhibited weaknesses; three representative examples are described below.

- Calculation CALC-10-TA55-0004-022-FP, *TA-55 FSS Tank NPSH* [Net Positive Suction Head], does not consider loss of water inventory due to either the pump packing leak-off or the cooling water to the diesel fire pump engine, both of which go to drains. While not affecting the NPSH portion of this calculation, these losses affect the embedded calculation of the minimum required volume of available water in the fire water storage tank for fire suppression that is required by TA55-TSR-2020, *TA55 Technical Safety Requirements* [TSRs]." Triad created IM record # LANL-C-2022-6485 in response to this EA-identified issue.
- Further, CALC-10-TA55-0004-022-FP was not updated when the DSA was revised to reflect that new environmental data showed that the site ambient temperature is 17 degrees higher, making the calculation results non-conservative.
- Calculation 290-060-E001, *TA55, PF-10 & PF-11 Diesel Generators-Load Flow, Short Circuit, Voltage Drop and Arc-Flash Calculation*, does not consider an 800-ampere (amp) output breaker on the FDG feeding a load bank that must be operated to perform the monthly TSR-required surveillance. The breaker setting affects the amount of energy available should an arc-flash occur. Personnel performing certain work activities may not be properly protected if the available arc-flash energy is underestimated.

Furthermore, Triad did not demonstrate that it has a documented margin management process to ensure that these identified non-conservative calculation results are and will be properly managed. Therefore, contrary to 10 CFR 830.122, criterion 6, reviewed design documents exhibited incorrect results due to inadequacies in using sound engineering principles, such as establishing conservative design margins, and contained inaccuracies caused by missing or outdated design inputs. (See **Finding F-Triad-1**.)

Inadequate design documents may result in a flawed technical baseline and have adverse impacts on safety system performance.

Some drawings were also inaccurate. Contrary to STD-342-100 Attachment 1, *Engineering Standards Manual PFD*, three of nine reviewed process and instrumentation diagrams (P&IDs) contain errors and omissions. (See **Deficiency D-Triad-1**.)

- Two FPW P&IDs do not show the controllers and instrument interlocks for the jockey pumps (low volume pumps that keep the piping pressurized) or the safety class electric and diesel (high volume) fire water pumps.
- Drawing 55Y-002865-F-6001, *West Fire Pump House PF-11 P&ID*, exhibits drafting errors. Those errors are significant enough to cause misinterpretation of system function and flow paths.

Errors or missing information on P&IDs can adversely affect the depiction of system functions.

EA also identified two related weaknesses. Reviewed portions of the TA-55 DSA contain a discrepancy in the reporting of fire water storage tank volume. DSA Table 4-8 inappropriately contains a calculation for the tank volume that is inconsistent with an existing calculation, CALC-10-TA55-0004-22-FP. Also, P341 and sub-tier procedure AP-341-517, *Design Change Form* [DCF], allow deferral of the unreviewed safety question (USQ) determination process until the design modification package is complete and the work package process is underway. Consideration of the potential for a USQ at this late stage of the modification process increases the risk of schedule delays and higher costs, should changes to a planned modification be necessary to meet safety analysis requirements. In response to this identified weakness, Triad entered it into its IM system as record # IM-2022-6474. (See **OFI-Triad-1**.)

Engineering Design Documents and Analyses Conclusions

Triad conduct of engineering procedures provide an effective process for performing calculations, drawings, and design changes. However, five of the 19 reviewed calculations contained technical errors that affected the results. Three of nine reviewed P&IDs contained errors. Additionally, specific weaknesses were identified in the TA-55 DSA and with the USQ process.

3.2 Quality Assurance

This portion of the assessment evaluated whether Triad has effectively implemented quality assurance program elements for the verification of safety system design, procurement, and modifications.

Design Verification

Triad conduct of engineering procedures provide an adequate process to conduct independent design verification to ensure that engineering products are technically accurate and complete. These procedures effectively implement American Society of Mechanical Engineers Nuclear Quality Assurance (ASME NQA) NQA-1-2008/2009a, Part I, Requirement 3, Section 500, *Design Verification*. Forty-two reviewed design products (i.e., 19 calculations, 1 DCF, 8 design form revisions, and 14 drawings) were marked as signed and independently verified. However, contrary to P341, AP-341-517, and AP-341-605, *Calculations*, 17 of these 42 design products do not meet documentation completeness requirements, including 16 reviewed calculations and one DCF that do not contain sufficient information, such as all design inputs and assumptions identified and information sources referenced, to allow a qualified individual to understand the analyses and verify that the results are correct. (See **Deficiency D-Triad-2**.)

For example:

- Calculation 079901.18.1-S-001, *Anchorage Analysis of New PF-10/11 Diesel Fire Pump Skids and Associated Equipment*, incorrectly specifies two "design inputs" that are actually unverified assumptions. Specifically, design input (3) provided assumed locations of control panel anchor tabs, and design input (4) provided assumed yield and tensile properties for the control panel's material. Further, the component was installed prior to verifying that these two design inputs, as well as three unverified assumptions listed in the calculation's assumption section, were correct. Use of unverified design inputs and assumptions prior to installation could lead to rework once those design inputs and assumptions are finalized.
- Calculation CALC-10-TA55-0004-019-FP, *Fire Suppression System Hydraulic Analysis*, does not list piping arrangement drawings in the reference section, and these drawings are not listed in the hydraulic computer model inputs; therefore, the hydraulic model cannot be verified.
- DCF-19-55-0011-2724, *Diesel Fire Pump Replacement*, does not contain the required design output documents list. A complete design output documents list ensures that all documents affected by a design change are updated accordingly.

Furthermore, contrary to AP-341-519, *Design Revision Control*, section 1.0, procedure AP-341-605 incorrectly allows design inputs that are not based on the current revision of controlled design documents. AP-341-605 states that "**If possible** [emphasis added], base the design input on the latest controlled design document," which is inconsistent with the configuration management (CM) expectations specified by P341 and AP-341-519, as well as other lower-tier conduct of engineering procedures. Also, the facility design authority representative function "to ensure that design outputs are based on approved design inputs, and configuration of approved designs is maintained," specified in P341, section 3.0, cannot be successfully implemented if design inputs are not based on the most current revision of controlled design documents. Use of outdated design inputs can result in a loss of configuration control, incorrect field implementation, and poor technical decisions. In response to this identified weakness, Triad revised procedure AP-341-605 to remove "If possible."

Procurement Verification

Triad procured 450-KW FDG and diesel fire water pump replacement skids, supporting components, and technical services through qualified suppliers. Triad appropriately selected suppliers from an Institutional Evaluated Suppliers List, which includes all Triad-approved ASME NQA-1-2008/2009a component and service suppliers. Both acquisitions were performed in accordance with P840-1, *Quality Assurance for Procurements*, and these suppliers' qualifications were appropriately approved by Triad's Quality and Performance Assurance–Institutional Quality organization.

Reviewed commercial grade dedication (CGD) documentation demonstrated proper procurement and acceptance of components, including adequate technical evaluations, identification of critical characteristics, and corresponding acceptance criteria. For example, the CGD package for the replacement 450-KW FDG skids identified critical characteristics with attributes appropriate for the safety function (e.g., LANL-specific seismic response spectra, transfer switch response) and associated acceptance criteria (no loss of critical function under Operating Basis Earthquake/Safe Shutdown Earthquake testing, output discontinuities, or contact chatter, as defined in IEEE Standard 501-1978). The package also used an appropriate acceptance methodology (tests and pre- and post-test inspections) for confirming the acceptability of these attributes.

Modification Control and Verification

Triad conduct of engineering procedures provide an adequate process for modification control and verification. These processes, when adequately implemented, ensure that installed safety class components will function as designed by ensuring that modifications are properly documented, reviewed for USQ, installed in accordance with the design, and tested for proper operation. However, EA identified the following two implementation weaknesses related to the new diesel fire water pump that was undergoing installation at the time of this assessment:

- Contrary to 10 CFR 830.122, criterion 6, and AP-341-517, installation activities for modification DCF-19-55-0011-2724 were performed without approved design documents. (See **Deficiency D--Triad-3**.) To compensate for an unleveled concrete base pad, Triad installed ¾ inch shims between the pad and the new diesel fire water pump skid. The approved design drawing 55Y-004540, sheet S-1000, keyed note 3, specifies use of shims that are ¼ inch or less. The use of larger shims created an unanalyzed condition for seismic qualification, concentration of stresses, and performance under cyclic loading, which could adversely impact the integrity and performance of the pump under both normal operating and accident conditions.
- Drawing 55Y-004540, sheet S-1000, keyed note 1, identifies required anchor locations based on values established in a design calculation, yet the installation work package did not include a quality control (QC) hold point or a post-installation QC inspection to verify the as-installed anchors' locations. Incorrectly installed anchors could also adversely impact the integrity and performance of the pump under both normal operating and accident conditions.

Quality Assurance Conclusions

The Triad conduct of engineering procedures effectively implement requirements of ASME NQA-1-2008/2009a. Reviewed documents demonstrate adequate procurement of SSCs through qualified suppliers and the use of CGD processes. Triad conduct of engineering procedures provide an adequate process for verification of safety system design, procurement, and modifications. However, EA identified procedural implementation weaknesses in the areas of design documentation completeness, allowable use of unverified design inputs, and unanalyzed use of shims that differ in size from those specified on approved drawings.

3.3 Configuration Management

This portion of the assessment evaluated whether Triad effectively implements CM through an institutional program, incorporating design control, work control, change control, document control, and assessments.

Institutional Program

Triad Process Manual P341 provides an excellent roadmap for requirements pertaining to engineering processes and describes how those processes are interrelated. Both P341 and PD340, *Conduct of Engineering and Configuration Management for Facility Work*, appropriately reference DOE-STD-1073-2016, *Configuration Management*, as the source of requirements and guidance for the CM program; DOE-STD-1073-2016 is invoked by DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*, Attachment 1, section 9, which is in the contract List B. An earlier version of the standard, DOE-STD-1073-2003, is referenced in P950, *Conduct of*

Maintenance, and PA-AP-01034, *Configuration Management Program*. (See **OFI-Triad-2**.) Operations-specific guidance on CM is appropriately addressed in P315, *Conduct of Operations Manual*.

Design Control

Triad has implemented an adequate process for identifying, developing, and controlling the technical baseline for TA-55 in AP-341-405, *Identification and Control of Technical Baseline in Operating Facilities*. The AP-341 series of sub-tier procedures defines appropriate guidance for originating, reviewing, and approving technical baseline documents such as calculations, specifications, and design change packages.

The system design descriptions for FPW and FDG were appropriately prepared in accordance with Triad procedure AP-341-611, *System Design Descriptions*; adopted the acceptable methodology of DOE-STD-3024-2011, *Content of System Design Descriptions*; and provide a comprehensive reference for design inputs, performance standards, surveillance requirements, and modification history. However, while the system design descriptions for FPW and FDG are adequate, reviewed calculations, drawings, modification packages, and other engineering documents resulted in numerous identified issues with both quality and content. (See section 3.1 of this report.)

Work Control

Triad procedure P950, *Conduct of Maintenance*, adequately addresses the key CM aspects of work control as defined in DOE-STD-1073-2016. P950, section 3.6.8, appropriately describes integration of the maintenance modification process with the overall CM program. The maintenance modification process is implemented through sub-tier procedures: AP-WORK-002, *Work Planning*; AP-WORK-004, *Work Performance*; and AP-WORK-005, *Work Closeout*. These procedures adequately incorporate provisions of the CM program necessary to ensure that field work is accomplished in accordance with design output and that system configuration is maintained during the maintenance/modification process. Provisions appropriately include measures to accommodate in-process field changes and to consider the impact of changes on the safety basis using the USQ evaluation process.

Change Control

Conduct of engineering procedures, AP-341-517 and AP-341-519, define an adequate change control process. These procedures, when properly implemented, ensure that the facility modification process is accomplished within the constraints of the safety analysis and the CM program.

Document Control

PD1020, *Document Control and Records Management*, with its sub-tier procedures, establishes document control and records management processes that adequately implement the requirements of DOE Order 243-1B, *Records Management Program*, attachment 1, *Contractor Requirements Document*. AP-341-402, *Engineering Document Management in Operating Facilities*, appropriately addresses the handling of revisions to technical records, such as technical baseline documents. The TA-55 document control administrator interviewed is knowledgeable about process requirements.

Assessments

Triad has implemented a multi-organizational assessment program that is active in assessing key institutional processes pertinent to the CM program at TA-55. This program adequately implements the relevant requirements of DOE-STD-1073-2016. For example:

- Program description PD340 requires that the Engineering Services Division Office (ES-DO) perform two assessments annually to verify the effectiveness of engineering processes. This requirement ensures that aspects of the CM program are assessed at least every other year, which assures conformance with DOE-STD-1073-2016. One reviewed report focused on cognizant system engineer (CSE) training and qualification, while another examined conduct of engineering in a broader assessment that included elements of both system engineering and CM. The CSE training assessment resulted in the origination of IM reports 2022-6207 through 2022-6210. Both assessments were adequately critical in achieving their objectives.
- AP-341-901, *Performing Vital Safety System Assessments*, uses a team walkdown of safety-related systems on a triennial basis to validate CM through the physical verification of safety-related system parameters using the system technical baseline. Two reviewed fire protection sprinkler system vital safety system reports were found to be comprehensive and reasonably critical of the system status. There was no current triennial assessment report available for the FDGs, since they were installed two years ago.
- A LANL directorate-level team adequately assessed TA-55 document control and records management in a management assessment report issued in September 2020.
- Limited-scope management assessments and "fact findings" are appropriately performed in response to facility events.

Configuration Management Conclusions

The CM program is well defined in program descriptions, process manuals, and procedures. Key elements of the program are being implemented adequately, except for the technical baseline where problems noted in numerous engineering documents reflected non-compliances with procedural requirements.

3.4 Safety System Maintenance

This portion of the assessment evaluated Triad's implementation of an approved maintenance plan and processes, and performance of inspection, testing, and maintenance (ITM) activities, spare parts and materials control, and system assessments for in-service safety class FPW pumps and FDG systems.

Maintenance Plan and Processes

Triad has appropriately established a documented nuclear maintenance management program (NMMP) that supports maintenance of the FPW and FDG safety systems. Triad's NMMP is documented in P950, which appropriately addresses all aspects of DOE Order 433.1B, *Maintenance Management Program for DOE Nuclear Facilities*. P950 appropriately references PD1220, *Fire Protection Program*, which adequately identifies the requirements for ITM based on National Fire Protection Association (NFPA) 25, *Inspection, Testing and Maintenance of Water-Based Fire Protection Systems*.

ITM is effectively implemented through surveillance test procedures (STPs) and preventive maintenance instructions (PMIs). PMIs include a "use every time" checklist style format, which appropriately documents system performance results and component conditions. Maintenance personnel implement

STPs and PMIs through defined work packages, which document results and provide CSEs with adequate SSC performance information.

Inspection, Testing, and Maintenance

ITM performance requirements and frequencies for the FPW and FDG systems are based on industry practices and operational experience, and are appropriately referenced in P905, criterion 723, *Operations and Maintenance Criteria – Fire Pumps*, and criterion 506-B, *Backup Generator Level 1 Systems Inspection, Testing, and Maintenance*. STPs for the FPW and FDG systems implement and document the respective acceptance criteria based on appropriate NFPA ITM requirements, as well as manufacturer and industry recommendations and/or requirements. Four observed ITM activities (three FPW and one FDG systems) were properly planned, scheduled, and performed to ensure that these systems can reliably perform their intended safety functions. The four associated work packages specified the appropriate ITM requirements and associated frequencies, in accordance with P905, criterion 723 and criterion 506-B, both of which include codes, standards, industry practices, and operational experience. Additionally, the work packages, through well-documented STPs, properly specified acceptance criteria based on appropriate NFPA 25 requirements, and manufacturer and industry recommendations and/or requirements. However, contrary to NFPA 25, the STP for previously completed annual fire pump tests did not verify that the fire pumps can perform at peak horsepower load with alternative power for a minimum of two minutes. (See **Deficiency D-Triad-4**.) The fire pumps are required to be available during the loss of normal power and operate at peak horsepower.

Spare Parts and Materials

Triad is generally effective in maintaining spare parts and materials to ensure safety system availability and operability. The TA-55 Facilities Operations Director and engineering personnel establish minimum and maximum quantities for critical spare parts inventory levels for SSCs and other equipment. Two reviewed critical spare parts lists (CSPL-TA55-FPW-014, *Critical Spare Parts List – Fire Protection – Water Supply (FPW) and Fire Protection – Sprinkler System (FPS)*, and CSPL-TA55-FDG-045, *Critical Spare Parts List for the Fire Diesel Generator*) demonstrated a comprehensive listing of the FPW/FDG parts and materials. However, contrary to AP-341-521, *Identification and Control of Critical Spare Parts*, attributes for eight spare parts in storage were not properly identified. (See **Deficiency D--Triad--5**.) Specifically:

- CSPL-TA55-FPW-014, lines 423 and 424, lists two different rotating trim assemblies for all four electric and diesel fire pumps, which would allow these assemblies to be installed in either electric or diesel fire pumps. However, the electric fire pump and diesel fire pump have different impeller diameters.
- CSPL-TA55-FPW-014 designates a shelf life of "N/A" for six organic material critical spare parts, which could lead to installation of parts with degraded material.

Incorrect designation of spare parts in CSPL-TA55-FPW-014 could adversely impact safety system performance.

EA also selected three parts from the FPW/FDG critical spare parts lists to support a field verification. The selected samples included spare parts requiring significant lead time for procurement (e.g., fire pump impeller) and routine maintenance repair parts (e.g., packing kits and electric pressure switches). Based on a walkdown of two level-B storage buildings (for materials sensitive to environmental conditions), the selected spare parts were found to be stored properly and available for use. Four reviewed system health

reports (SHRs) for the past 12 months demonstrate that the CSEs appropriately assess spare parts and materials inventory monthly as required by AP-341-521.

System Assessments

As discussed further in section 3.6, CSEs develop effective SHRs quarterly to monitor potential safety system degradation, ensuring functionality, availability, operability, and maintainability. Reviewed 2021 SHRs demonstrated that the FPW and FDG systems have not degraded in performance and therefore continue to meet their operability requirements and credited safety functions. However, contrary to P950, criterion 723, equipment failures and respective codes detailing the causes of failures are not being documented in the Triad Computerized Maintenance Management System (CMMS) database. (See **Deficiency D-Triad-6**.) Consequently, CSEs cannot effectively trend equipment failures. Criterion 723 specifies that "maintenance history shall be maintained for fire pumps to include, at a minimum, the fire pump problems (e.g., failure dates, failure root causes)." The interviewed maintenance manager confirmed that equipment failure information is not being entered into CMMS based on his knowledge of past failure data recorded in work packages.

Safety System Maintenance Conclusions

Triad generally implements effective maintenance processes, ITM activities, spare parts and materials control, and system assessment performance. However, EA found weaknesses in the areas of identifying spare parts attributes, verifying FPW performance under all required conditions, and recording safety system component failures in CMMS for trending by CSEs.

3.5 Safety System Surveillance and Testing

This portion of the assessment evaluated whether TSR surveillances demonstrate that the FPW and FDG systems can satisfy their safety functions.

Triad surveillance procedures for installed equipment appropriately implement TSRs and generally ensure that operability limits are met. The surveillance requirements for the FPW and FDG systems are implemented through STPs, including periodic testing. The STPs contain detailed steps for performing and documenting TSR surveillance requirements, which adequately verify the operability of these vital safety systems. The STP attachments include checklists appropriately detailing parameters, requirements, and TSR surveillance requirements to ensure system operability. STPs are performed by trained operations personnel and supported by qualified CSEs to satisfy NFPA requirements; acceptance criteria are well defined and serve as the baseline requirements.

Triad personnel properly performed observed FPW and FDG system surveillances. Surveillances (i.e., weekly fire pump test and inspection; FDG monthly inspection and maintenance; and the LANL Plutonium Facility (PF)-4 fire suppression system, *Control Valve Alignment Inspection*) demonstrated that the respective CSE and operations personnel performing testing and inspections have a high level of knowledge of system operability limits and equipment control settings. A review of STPs completed over the past 12 months confirmed that the FPW and FDG systems have met their respective acceptance criteria as currently defined. However, contrary to NFPA 25, section 8.2.2 (c and d), TA55-STP-301, *PF-10 Weekly Fire Pump Test and Inspection,* and TA55-STP-302, *PF-11 Weekly Fire Pump Test and Inspection*, do not include the following two required acceptance criteria. (See **Deficiency D-Triad-7**.)

- TA55-STP-301 and -302 do not verify that the manually operated ventilation louvers of the fire pump house are fully open and unobstructed. The necessary combustion air for the diesel fire pump's

engine is supplied through the louvers installed in the fire pump house walls. The required area provided by the open louvers is calculated in CAL-14-TA55-FPS-039-M, *Louver/Vent Combustion Air Calculation for Equipment in PF-10/PF-1*. The calculation assumes fully open and unobstructed louvers.

- TA55-STP-301 and -302 do not verify that the fire pump building floor drains are clear and unobstructed. The design and function of the building floor drains preclude the potential risk of a flooding event. The floor drains are necessary to protect the diesel fire pump starter by limiting the flooding height to less than 23 inches as calculated in C49912-CLC-C22, *East and West Pump House Flooding Analysis*.

Triad has appropriately identified the necessary safety basis changes resulting from the installation of the new safety class diesel fire pump in TA55-DSA-2020, addendum 2, *TA55 Diesel Driven Fire Pump Replacement*. This addendum appropriately identifies changes to the bases section for the diesel oil fuel day tank surveillance requirement and the updated setpoint calculation for the safety class diesel fire pumps.

TSR Surveillance Conclusions

TSR surveillances generally demonstrate that the FPW and FDG systems can ensure operability for their credited safety functions. However, TA55-STP-301 and -302 omit two required acceptance criteria for weekly surveillances.

3.6 Cognizant System Engineer Program

This portion of the assessment evaluated the adequacy of Triad's CSE program in accordance with DOE Order 420.1C, attachment 2, chapter V, including system coverage, the CSE role in CM, support for Operations and Maintenance, and training and qualification.

System Coverage

Triad has appropriately assigned CSEs to TA-55 safety class SSCs in accordance with DOE Order 420.1C. Vital safety systems are identified and CSEs are assigned as directed in procedure AP-341-101, *Designating Vital Safety Systems and Cognizant System Engineers*. CSEs are also assigned to systems with important defense-in-depth functions. Interviewed CSEs for the TA-55 FPW system and the FDGs for the electric fire pumps were found to be knowledgeable of their systems.

CSEs provide detailed monitoring of system condition and performance, as evidenced by the SHRs, which are prepared quarterly by the CSEs in accordance with AP-341-802, *System Health Reporting*. Reviewed SHRs from calendar year 2021, for the FPW and FDG systems, appropriately include detailed status, metrics for system reliability, trending of key parameters, summaries of preventive and corrective maintenance, tracking of corrective action commitments, and identification of ongoing performance issues. The TA-55 CSEs also effectively monitor the status of corrective maintenance and modification activities using a "Path To Green" approach, which tracks the resolution of functionality challenges on a real-time basis. The SHR process and "Path to Green" approach, in aggregate, provide an exceptional tool for monitoring the performance and overall status of safety-related systems. TA-55's investment in creating and maintaining these documents has resulted in an effective tool for ensuring that these safety class systems continue to perform with high reliability and is considered a **Best Practice**. The CSEs support the AP-341-802 process by developing appropriate criteria and metrics for use in SHRs to track system-specific operating parameters, detailed in a System Health Reporting Basis, a parent document to the SHR. EA's review of the basis document (last revised in 2010) identified discrepancies with some

current operating parameters. Triad TA-55 Engineering personnel are addressing this issue and have drafted a revision to the basis document that resolves the observed discrepancies.

CSE Role in Configuration Management

The FPW and FDG CSEs demonstrated active involvement in supporting the CM process during the ongoing modification activities (e.g., installation of the new diesel fire water pumps) by participating in reviews of design changes and monitoring field work. The CSE role in CM is adequately described in Triad procedures PD340; P343, *Facility Engineering Training and Qualification Manual*; and AP-341-802. PD340 is an overall program description document, while attachment A, table A-1 in P343 concisely defines CSE roles and responsibilities for CM consistent with DOE Order 420.1C. The CSEs appropriately use system walkdowns to satisfy AP-341-802 requirements for periodic verification of the system physical configuration as compared to the technical baseline documents, such as the system design descriptions, drawings, and master equipment list.

Support for Operations and Maintenance

As discussed in section 3.5, the CSEs provide effective support to the Operations and Maintenance organizations to ensure that both systems comply with safety basis requirements. Roles and responsibilities for the CSEs in this area are adequately defined in attachment A, table A-2 of P343. Interviews with CSEs and reviewed SHRs demonstrated their knowledge of the current maintenance status and issues affecting their systems, such as procurement status of replacement parts and any ongoing challenges to operability and reliability.

Training and Qualification

Triad maintains an adequately trained and qualified CSE staff. Triad procedure P343 establishes training and qualification requirements for CSEs in accordance with DOE Order 420.1C, which requires that CSEs be qualified as described in DOE Order 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*, attachment I. P343 appropriately includes system-specific training, oral qualification board examination, and required biennial requalification. Qualification standard CSE-QSS-004, *Qualification Standard for Cognizant System Engineer*, developed and maintained by the Triad ES-DO, adequately implements P343 and DOE requirements for CSE training and qualification. Reviewed training records for the FPW and FDG CSEs confirmed that they were appropriately selected, trained, and fully qualified. These training records were compliant with the qualification standard and reflected Triad's overall commitment to training and qualification of the CSEs that is comprehensive, well documented, and timely. This program is further strengthened by rotational assignments for the CSEs, resulting in multiple individuals with sufficient knowledge of each system to support and back up the assigned CSEs when necessary.

Cognizant System Engineer Program Conclusions

Triad has implemented an adequate CSE program in accordance with DOE Order 420.1C. The CSEs are appropriately assigned to both active and passive safety systems and effectively monitor their assigned systems, ensure CM is appropriately implemented, and support Operations and Maintenance personnel. TA-55 CSE use of a "Path To Green" approach and periodic system health reporting to effectively monitor the status of corrective maintenance and modification activities was identified as a best practice. The CSEs are well trained and qualified to perform their work.

3.7 Issues Management and Performance Improvement

This portion of the assessment evaluated whether Triad feedback and improvement processes are effective in identifying, addressing, and preventing the recurrence of safety system issues through IM, operating experience and lessons learned, and training by focusing on issues and operating experiences identified at TA-55 during the three years prior to this review.

Issues Management

The Triad IM process defined in P322-4, *Issues Management*, is generally compliant with the requirements of DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*, attachment 1, *Contractor Requirements Document*. However, EA identified process weaknesses that could reduce the effectiveness of this program in driving improvement at the facility (see **OFI-Triad-3**):

- Requirements for Management Review Boards have been eliminated unless specifically requested at the division-leader level or above (P322-4, section 3.7). No other oversight mechanism has been established below the directorate level.
- Issues cannot be originated without the concurrence of a Responsible Line Manager (RLM) (P322-4, section 3.1.3), establishing the RLM as a gatekeeper for issue identification. Identification of issues at the worker level is an important aspect of an effective IM process, since lower significance issues may be precursors to larger, more significant ones.
- RLMs are the sole authority for approval of extensions to corrective action due dates (P322-4, section 3.3.2). Despite this provision, timeliness metrics tracked at the directorate level indicated in January 2022 that 48% of actions were closed late that month, with a rising trend over the previous eight months. Overall, these metrics indicate that both multiple extensions and subsequent late closures are common, leading to concerns regarding the timeliness of corrective actions as required by DOE Order 226.1B, attachment 1.
- No provision is in place to communicate status changes of NA-LA originated issues to the appropriate field office personnel.

These aspects of the IM process reflect challenges to the effectiveness of the program in the areas of issue identification and timely corrective action.

Triad TA-55 personnel initiated approximately 220 issues during the 2021 period following activation of the new iLink tracking tool, with 134 (61%) resulting from assessments/management observations/external sources and the remaining 86 (39%) identified through normal work processes and events at the facility. EA reviewed a limited sample of 32 of these issue reports, finding that, once initiated, the issues were managed effectively, with causal analyses as appropriate and corrective actions adequately structured to fix the problems identified.

The IM process also includes reporting of occurrences to DOE in accordance with DOE Order 232.2A, *Occurrence Reporting and Processing of Operations Information*. The Triad process for Occurrence Reporting and Processing System (ORPS) reporting is described in P322-3, *Performance Improvement from Abnormal Events*. A review of this procedure revealed a discrepancy between its requirements for causal analysis and those of DOE Order 232.2A, which states in the Contractor Requirements Document (attachment 1) that the Facility Manager is to "Determine causes and generic implications and implement corrective actions and closeout activities for [all] reportable occurrences." P322-3 table 2 does not require causal analysis for ORPS events internally categorized as low significance. (See **Deficiency D--Triad-8**.)

Operating Experience and Lessons Learned

Triad implements an adequate operating experience/lessons learned program. Triad uses the OPEXatLANL (OPEX) tool, described in P323-1, *Operating Experience and Lessons Learned Process*, to effectively collect operating experience and lessons learned from all LANL organizations. Individual organizations are appropriately tasked with providing input to OPEX on lessons learned in their respective areas. One noteworthy aspect of this program is the ability of working-level personnel to access the OPEX website and submit suggestions.

Notwithstanding the adequacy of the OPEX program, the content of the operating experience feedback reports varies in quality. EA reviewed seven operating experience reports originated as a result of incidents at TA-55 that were issued during the period 2019-2021. The first, OPEX LANL-2019-1831, *Verify System Response When Operating Equipment*, is an excellent review of an incident caused by an inadequate maintenance procedure. It provides a clear explanation of what went wrong and which human performance tools might have prevented the problem. It goes further to identify how the procedure could have been written in a manner that would be more effective in preventing misapplication. The remaining TA-55 OPEX reports address lessons learned to some degree with varying levels of effectiveness, but do not discuss performance improvement. While the OPEX program is an excellent tool for performance enhancement, it could be used more effectively to maximize its positive effect. (See **OFI-Triad-4**.)

Training

Procedure P343 specifies training requirements for technical support personnel that are compliant with DOE Order 426.2, attachment 1. The ES-DO has published an appropriate qualification standard for design engineers to implement those requirements. However, interviews with Triad TA-55 Engineering personnel demonstrated that this process has not been fully implemented at the facility, with most design engineer qualification training consisting of required reading. The lack of training may have contributed to the weaknesses in procedural compliance and examples of poor quality of engineering products identified in sections 3.1 and 3.2 of this report.

Similar to TA-55 Engineering, TA-55 Maintenance has also implemented baseline requirements for periodic required reading. However, contrary to the requirements of DOE Order 426.2, P343, and ES-DO qualification standards, these organizations have not implemented a continuing training program. (See **Deficiency D-Triad-9**.) Without a continuing training program, Triad cannot ensure that technical support personnel maintain and enhance their knowledge and skills related to functions associated with engineered safety features.

Issues Management and Performance Improvement Conclusions

The process for reporting and distributing operating experience and lessons learned is well developed. Conversely, the IM process has programmatic and implementation weaknesses that could limit the identification of issues and result in untimely corrective actions. Problems were also noted in Triad's compliance with DOE requirements for ORPS event causal analysis and with requirements for continuing training for technical staff.

3.8 Federal Oversight

This portion of the assessment evaluated whether NA-LA has established and implements an effective oversight program for ensuring that safety systems can reliably perform as intended.

Safety System Oversight and Facility Representative Programs

The safety system oversight (SSO) program is implemented by NA-LA management procedure (MP) NA-LA MP 06.02, *Safety System Oversight*, which adequately incorporates DOE Order 426.1A, *Federal Technical Capability Program*, appendix C requirements. Based on interviews with NA-LA staff, the field office intends to revise NA-LA MP 06.02 to reflect DOE Order 426.1B, *Federal Technical Capabilities*, which superseded DOE Order 426.1A in March 2020. The Facility Representative (FR) program is implemented by NA-LA MP 06.04, *Los Alamos Field Office Facility Representative Program*, which adequately addresses the requirements of DOE Order 226.1B and DOE-STD-1063-2011, *Facility Representatives*.

The SSO and FR roles are executed from within the Field Operations Branch of the Technical Operations Division. In recent years, staffing for SSOs and FRs has experienced significant turnover. NA-LA has managed these challenges by aggressively hiring, training, and qualifying incoming staff. Reviewed NA-LA staffing plans and interviews with the assigned SSO engineer and FR for FPW and FDG, as well as NA-LA management and staff, confirmed that additional resource needs in these areas have been identified. The NA-LA SSO and FR qualification programs ensure that SSO and FR personnel can perform their assigned duties. The SSO qualification program is adequately guided by NA-LA MP 02.04, *Technical Qualification Program*, and the NA-LA Safety System Oversight Qualification Standard. The FR qualification program is adequately guided by NA-LA MP 02.04 and MP 06-05, *Facility Representative Training and Qualification*. Based on interviews, Federal oversight personnel currently assigned to TA-55 are very knowledgeable of safety systems and current system status.

Federal Oversight and Assessments

NA-LA has established and implements oversight processes using MP 00.08, *Implementation of NA-LA Line Oversight*, which provides suitable direction for implementing the DOE oversight and quality assurance requirements of DOE Orders 226.1B and 414.1D, *Quality Assurance*, with one exception discussed below. MP 00.08 appropriately outlines two categories of oversight: system level and transactional. System-level oversight activities use existing contractor assurance system results to assess corrective actions, evaluate the rigor of contractor assessments, and verify the reliability of data tracked in performance measures. Transactional oversight refers to assessments and surveillances conducted by the field office to monitor high-risk operations.

The Federal oversight program as currently implemented by NA-LA is not adequately aligned with MP 00.08 and other supporting procedures, and therefore, contrary to DOE Order 226.1B, NA-LA oversight programs are not designed and conducted commensurate with the level of risk of the activities. (See **Deficiency D-NA-LA-1**.) MP 00.08 states that oversight activities are to be scheduled according to MP 00.08 and are prioritized based on emergent risks and information received from oversight using MP 00.13, *Risk Informed Oversight Planning*. MP 00.08 also states that the master assessment schedule is to be prepared in accordance with work instruction (WI) WI 00.13, *Assessment Planning*. However, a document action request form dated February 4, 2020, approved the cancellation of both MP 00.13 and WI 00.13, which created an action item to cancel the requirements listed in these documents and transition them into a new guidance document. This cancellation also required the revision of MP 00.08 to eliminate the programmatic requirements of MP 00.13 and WI 00.13; however, MP 00.08 has not yet been revised.

EA identified other MPs supporting MP 00.08, namely MP 00.10, *NA-LA Issues Management Process*; MP 00.12, *Independent Assessment Process*; and MP 00.15, *Management Assessments for Federal*

Operations, that do not reflect current practices and expectations for selection, scheduling, performance, and documentation of oversight activities.

NA-LA is not adequately conducting oversight activities as planned. EA selected a sample of 14 planned assessment activities from the NA-LA consolidated site integrated assessment plan (SIAP) for fiscal years 2020, 2021, and 2022, focusing on oversight activities associated with TA-55 fire water pump safety system performance. Of the 14 planned assessment activities, five are scheduled to be performed later this year, and five reports from completed assessment activities were available for review, none of which directly evaluated the effectiveness of safety system management for the TA-55 fire water pumps. The remaining four planned assessment activities out of the sample of 14 were not completed because those activities had been cancelled. Interviewed staff stated that most of these assessment activities were to be performed as shadow assessments and that some were canceled by Triad, while others were canceled by NA-LA or not performed at all. The reviewed SIAP documents contained no explanation or justification as to why these assessments were canceled.

Issues identified by EA during this assessment were previously identified by NNSA, most recently in its 2020 Chief of Defense Nuclear Safety (CDNS) biennial review of NA-LA. NA-LA screened all findings and weaknesses documented in the 2020 CDNS report as category 3 (low risk) in accordance with MP 00.10. NA-LA developed corrective actions for these issues, which are documented in the *NA-LA Corrective Action Plan* [CAP] *for CDNS Biennial Review of Nuclear Safety Performance 2020*, dated March 24, 2021. The CAP states that the various corrective actions were scheduled for completion by the end of calendar year 2021; however, the status of some corrective actions is difficult to ascertain. (See **OFI-NA-LA-1**.) For example, according to the CAP, actions such as revisions to oversight procedures and associated training have been assigned completion dates that have passed, with no documented due date extensions. Additionally, EA identified in this assessment that corrective actions to revise MP 00.08, MP 00.13, and WI 00.13 have not yet commenced. NA-LA managers stated during interviews that they will focus on updating the oversight procedures and training staff on the updated procedures.

Federal Oversight Conclusions

Federal oversight personnel currently assigned to TA-55 are very knowledgeable of safety systems and current system status. NA-LA has established and implements oversight processes that satisfy the DOE oversight and quality assurance requirements of DOE Orders 226.1B and 414.1D, with one exception. NA-LA's oversight program does not comply with requirements for developing and implementing an effective program commensurate with the level of risk of the activities. EA also identified weaknesses associated with oversight procedures not being updated, oversight activities not being completed as planned, and corrective actions not being completed in a timely manner.

4.0 BEST PRACTICES

Best practices are safety-related practices, techniques, processes, or program attributes observed during an assessment that may merit consideration by other DOE and contractor organizations for implementation. The following best practice was identified as part of this assessment.

CSE development and maintenance of SHRs, updated quarterly, and use of the "Path to Green" approach to drive system performance improvement in support of Operations and Maintenance, in aggregate, are considered a best practice.

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

Triad National Security, LLC

Finding F-Triad-1: Design documents exhibited incorrect results due to inadequacies in using sound engineering principles, such as establishing conservative design margins, and contained inaccuracies caused by missing or outdated design inputs. (10 CFR 830.122, criterion 6)

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 IM processes for resolution.

Triad National Security, LLC

Deficiency D-Triad-1: Triad does not ensure that all P&IDs for the FPW and FDG systems are free of errors and omissions. (STD-342-100 Attachment 1 and D-6025IC1)

Deficiency D-Triad-2: Triad does not ensure that all design products (i.e., calculations, DCFs, and drawings) conform to governing procedural requirements. (P341, AP-341-517, and AP-341-605)

Deficiency D-Triad-3: Triad installed modification DCF-19-55-0011-2724 without approved design documents. (10 CFR 830.122, criterion 6, and AP-341-517)

Deficiency D-Triad-4: The STP annual test for the electric fire pumps did not include verifying that the pump can perform at peak horsepower load with an alternative power source for a minimum of two minutes. (NFPA 25, section 8.3.3.9 (3))

Deficiency D-Triad-5: Triad does not ensure that attributes for spare parts are properly identified on the critical spare parts list. (AP-341-521)

Deficiency D-Triad-6: Triad is not capturing equipment failures, or respective codes detailing the cause of failure, in CMMS. (P950, criterion 723)

Deficiency D-Triad-7: TA55-STP-301 and -302 do not include all required acceptance criteria. (NFPA 25, section 8.2.2 (c and d))

Deficiency D-Triad-8: Procedure P322-3 does not comply with the requirements for causal analysis of all ORPS-reportable events. (DOE Order 232.2A, attachment 1, section 4.b)

Deficiency D-Triad-9: TA-55 Engineering and Maintenance organizations have not implemented a continuing training program. (DOE Order 426.2, attachment 1, section 7, and P343, section 6.9)

NNSA Los Alamos Field Office

Deficiency D-NA-LA-1: NA-LA's oversight program does not comply with requirements for developing and implementing an effective program commensurate with the level of risk of the activities. (DOE Order 226.1B, section 4.a.(1))

7.0 OPPORTUNITIES FOR IMPROVEMENT

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

Triad National Security, LLC

OFI-Triad-1: Consider updating the affected procedures and program documents to require evaluation of Documented Safety Analysis impacts for large projects prior to issuance of the design change package.

OFI-Triad-2: Consider revising P950 and PA-AP-01034 to provide a reference and content consistent with the 2016 version of DOE-STD-1073 implemented by program description PD340 and process manual P341.

OFI-Triad-3: Consider revising requirements in P322-4 to encourage issue identification at the working level and senior management independent oversight of RLM implementation of the IM process.

OFI-Triad-4: Consider enhancing the potential for positive impacts from OPEX reports by increasing the focus on use of human performance tools to identify and prevent problems and including discussions on how problems might have been avoided.

NNSA Los Alamos Field Office

OFI-NA-LA-1: Consider revising the *NA-LA Corrective Action Plan for CDNS Biennial Review of Nuclear Safety Performance 2020* to reflect the current status of the corrective actions initiated by NA-LA.

Appendix A
Supplemental Information

Dates of Assessment

Onsite Assessment: February 14-17 and March 7-10, 2022

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
Kevin M. Witt, Director, Office of Nuclear Safety and Environmental Assessments
Charles C. Kreager, Director, Office of Worker Safety and Health Assessments
Jack E. Winston, Director, Office of Emergency Management Assessments
Joseph J. Waring, Director, Office of Nuclear Engineering and Safety Basis Assessments

Quality Review Board

William F. West, Advisor
Kevin G. Kilp, Chair
Robert J. Hailstone
Thomas C. Messer
Michael A. Kilpatrick

EA Site Lead for NA-LA

Laura H. Micewski

EA Assessors

Laura H. Micewski, Team Lead
Jonathan Ortega-Luciano
Charles Allen
Kenneth Johnson
Jeffrey L. Robinson
Michael Shlyamberg