Independent Assessment of Safety System Management at the Nevada National Security Sites Device Assembly Facility

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Office of Enterprise Assessments
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Acronyms

BDI	Blast Door Interlock
caWeb	Electronic Issues Management Tool
CFR	Code of Federal Regulations
CGD	Commercial Grade Dedication
CM	Configuration Management
CRAD	Criteria and Review Approach Document
CSE	Cognizant System Engineer
DAF	Device Assembly Facility
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
EA	Office of Enterprise Assessments
HE	High Explosives
HEPA	High Efficiency Particulate Air
HEVR	High Explosive Violent Reaction
LCO	Limiting Condition for Operation
MEL	Master Equipment List
MSL	Master Supplier List
MSTS	Mission Support and Test Services, LLC
NFO	Nevada Field Office
NMMP	Nuclear Maintenance Management Program
NNSS	Nevada National Security Sites
NQA	Nuclear Quality Assurance
OFI	Opportunity for Improvement
PM	Preventive Maintenance
QA	Quality Assurance
QAP	Quality Assurance Program
QG	Quality Grade
SC	Safety Class
SDD	System Design Description
SSCs	Structures, Systems, and Components
SSM	Safety System Management
SSO	Safety System Oversight
TSR	Technical Safety Requirement
USQ	Unreviewed Safety Question

INDEPENDENT ASSESSMENT OF SAFETY SYSTEM MANAGEMENT AT THE NEVADA NATIONAL SECURITY SITES DEVICE ASSEMBLY FACILITY

Executive Summary

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted an independent assessment of safety system management (SSM) at the Nevada National Security Sites (NNSS) Device Assembly Facility (DAF) from November 2023 to March 2024. Mission Support and Test Services, LLC (MSTS) manages the DAF under the direction and oversight of the National Nuclear Security Administration Nevada Field Office (NFO). This assessment was performed within the broader context of targeted SSM assessments at selected high risk (i.e., hazard category 1 and 2) nuclear facilities across the DOE complex. The purpose of the assessment was to evaluate whether the safety class blast door interlocks and fire dampers were appropriately functionally classified and are operated and maintained in a manner to ensure that they can reliably perform their intended function of protecting workers and the public from analyzed hazards.

EA identified the following strengths:

- The cognizant system engineers demonstrated strong ownership and knowledge of their systems.
- The documented safety analysis conservatively identifies safety class controls, based on material configurations that are infrequently needed, to support mission flexibility.
- The DAF technical baseline is comprehensively documented.
- NFO completed comprehensive formal assessments for several DAF active safety systems.

EA also identified several weaknesses, as summarized below:

- The documented safety analysis descriptions or evaluations of the safety class blast door interlocks and fire dampers are not adequate to justify that their safety functions will be reliably met.
- MSTS did not fully document the most recent four-year technical safety requirement surveillance for one fire damper, resulting in indeterminate operability status.
- MSTS did not complete two blast door interlock change package travelers upon completion of work.
- The MSTS procurement process is not fully integrated with maintenance procedures to ensure the availability of parts, materials, and services for maintenance activities.
- The technical safety requirement surveillance job plan for the safety class fire dampers does not identify potential impacts to the safety significant high efficiency particulate air (HEPA)-filtered ventilation system confinement boundary due to removal and reinstallation of fire damper access panels in the ventilation ducts.
- MSTS did not establish or identify material storage levels for procurement of all reviewed quality grade 1 and 2 components and did not establish formal means to document storage levels to preclude damage by placement in inadequate storage locations.
- MSTS did not enter four findings from two management assessments into the tracking database as required by company directive, which did not allow for the issues to be trended or ensure corrective actions were assigned to prevent recurrence.

In summary, MSTS has established generally adequate SSM programs that ensure the operability of safety systems and complies with applicable DOE requirements. EA identified specific program weaknesses associated with documented safety analysis development and several programs necessary for SSM implementation. Resolution of the issues identified in this assessment will support a more robust safety basis and strengthen the maintenance and quality programs.

INDEPENDENT ASSESSMENT OF SAFETY SYSTEM MANAGEMENT AT THE NEVADA NATIONAL SECURITY SITES DEVICE ASSEMBLY FACILITY

1.0 INTRODUCTION

The U.S. Department of Energy (DOE) Office of Nuclear Engineering and Safety Basis Assessments, within the independent Office of Enterprise Assessments (EA), assessed the effectiveness of safety system management (SSM) at the Nevada National Security Sites (NNSS) Device Assembly Facility (DAF). This assessment was performed within the broader context of SSM assessments at selected high risk (i.e., hazard category 1 and 2) nuclear facilities across the DOE complex in accordance with the *Plan for the Independent Assessment of Safety System Management Across the DOE Complex Fiscal Year 2024*. The assessment was conducted from November 2023 to March 2024.

The primary purpose of the assessment was to evaluate whether selected active safety system controls were appropriately developed into technical safety requirements (TSRs) and are operated and maintained in a manner that ensures that the structures, systems, and components (SSCs) can reliably perform the intended function of protecting workers and the public from analyzed hazards. Programs within the scope of the assessment that support safety system operability and reliability are safety basis, TSR surveillance, engineering design, the cognizant system engineer (CSE) program, configuration management (CM), maintenance, operations, quality assurance (QA), feedback and improvement, and Federal oversight. The assessment focused on DOE and contractor line management effectiveness in managing and implementing safety system requirements.

Mission Support and Test Services, LLC (MSTS) manages the DAF under the direction and oversight of the National Nuclear Security Administration (NNSA) Nevada Field Office (NFO). The DAF is a hazard category 2 nuclear facility that supports the NNSA stockpile stewardship program by conducting subcritical and other physics experiments and maintaining nuclear test readiness. The DAF is an earth covered, heavily reinforced, concrete multi-structure complex consisting of a group of individual buildings connected by a common corridor located in the central portion of NNSS.

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 from EA CRAD 30-11, Revision 1, *Safety Systems Management Review*, in assessing the adequacy of selected programs related to SSM at the DAF. The assessment was conducted using a sampling of data and is not intended to represent a full programmatic assessment of all SSM-relevant programs.

EA selected two safety class (SC) systems for evaluation associated with the following TSR limiting conditions for operation (LCOs):

- TSR LCO 3.2, *Special Door Interlocks*
- TSR LCO 3.9, *Fire Dampers*.

Although there are both SC and safety significant special door interlocks and fire dampers, this assessment focused on the SSCs functionally classified as SC. The SC special door interlocks are commonly referred to as blast door interlocks (BDIs).

EA used a written comment and response process to address salient issues identified before the onsite portion of the review. Follow-on discussions were conducted with NFO and MSTS personnel to clarify and resolve comments. Additional issues were identified during the onsite portion of the assessment.

EA examined the development of selected controls as TSRs based on the hazard and accident analyses, and the implementation of safety basis requirements into technical baseline documents. Key documents were reviewed, including the documented safety analysis (DSA), the TSR document and TSR surveillance records, selected program plans, system design documents, procedures, and training and qualification records. EA interviewed personnel responsible for developing and executing the assessed programs; observed daily activities related to operations, maintenance, and surveillance; observed tabletop demonstrations of procedures; and performed onsite inspections of the selected systems. EA also conducted interviews and reviewed oversight records to determine whether the Federal oversight program ensures an adequate contractor CSE program and the operability of associated safety systems. The members of the assessment team, the Quality Review Board, and the management responsible for the assessment are listed in appendix A.

A previous independent assessment of SSM at the DAF was conducted in 2013, as documented in EA-predecessor report *Independent Oversight Targeted Review of the Safety Significant Blast Door and Special Door Interlock Systems and Review of Federal Assurance Capability at the Nevada National Security Site, December 2013*. This current EA assessment examined the completion and effectiveness of corrective actions for the findings described in the previous assessment report. Results of the corrective action verification are included in section 3.11 of this report.

3.0 RESULTS

3.1 Safety Basis

This portion of the assessment evaluated the DAF safety basis, including control derivation and description, safety control functional classification, and TSR development, for the SC BDIs and fire dampers to determine whether they can fulfill their required safety functions under operating and accident conditions and to ensure compliance with DOE-STD-3009-94, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*.

Control Derivation and Description

The DAF SC BDIs are appropriately credited for protection of the public and workers from radiological consequences due to a high explosive violent reaction (HEVR) involving high explosives (HE) collocated with plutonium. The BDIs ensure that at least one blast door is always closed during operations when HE is in a building or the corridor, both to confine (mitigate) a release from an explosion and to prevent a sympathetic HEVR in neighboring buildings. Additionally, the SC blast doors prevent fire propagation between buildings.

The DAF SC fire dampers are appropriately credited as integral components of the facility fire barriers to prevent fire propagation between buildings and from external fires to prevent an HEVR initiated by fire. The normally open dampers are in the high efficiency particulate air (HEPA)-filtered ventilation system ducting where it penetrates fire barriers. They close when the fusible link melts at 165°F.

The facility is designed and constructed to meet design basis natural phenomena loads. Because one of the two blast doors is expected to be closed at the time of an earthquake when HE is collocated with plutonium, adequate protection would be provided from a seismically induced HEVR. Although the BDIs are credited in a seismic event to ensure that one door is closed at the time of the earthquake, the interlock may not be operational following a seismic event; however, the DSA does not require BDIs to be operable after such an event, and the fire dampers are not relied upon for the event.

The DSA, chapter 4, appropriately provides the safety function, system description, and functional requirements for the BDIs. The system description includes a discussion of system components and adequately describes why support SSCs (i.e., compressed air for the pneumatically operated doors and electrical power) are not required to be safety systems (i.e., doors fail in an "as found set position") to ensure the operability of the interlock's safety function. The fire dampers are addressed in chapter 4 of the DSA as part of the facility structure (i.e., integral to the fire barriers), and a performance criterion of damper closing at 165°F is provided consistent with National Fire Protection Association standard NFPA-90A, *Standard for the Installation of Air-Conditioning and Ventilation Systems*. There is an adequate qualitative discussion addressing the vulnerability related to the inability to test 14 inaccessible dampers. However, contrary to DOE-STD-3009-94, sections 4.3.X.2 and 4.3.X.4, the DSA does not adequately describe or evaluate the assessed systems. (See **Deficiency D-MSTS-1**.) Specifically:

- The description of the BDIs does not include a discussion of the system boundary – i.e., components that are required to be SC for electrical or pneumatic interlock operation.
- There is no listing of all SC fire dampers, no description of their operation, and no evaluation of their ability to meet their safety functions or performance criteria.

Inadequate system descriptions and evaluations of a system's ability to meet performance criteria could result in conducting unreviewed safety question (USQ) evaluations based on incomplete information, potentially resulting in system changes that could impact the safety function.

Safety Control Functional Classification

BDIs and fire dampers are appropriately functionally classified in the accident analysis as SC for buildings where HE could be collocated with plutonium. Each accident is appropriately analyzed for potential consequences to the public by comparing the calculated radiological dose to the Evaluation Guideline of 25 rem specified in DOE-STD-3009-94. HEVRs challenge the Evaluation Guideline; therefore, SC controls are identified to prevent and/or mitigate these events. The DSA conservatively identifies SC controls, based on material configurations that are infrequently needed, to support mission flexibility.

Technical Safety Requirement Development

The information provided in chapters 4 and 5 of the DSA is sufficient to derive the TSR LCOs for each of the evaluated systems. The performance criteria developed for the SC SSCs are adequate to ensure that the required safety functions will be provided and are appropriately reflected in the corresponding TSR operability and surveillance requirements. The TSR bases provide the linkage to the DSA and adequately describe the reasons for the operating limits and surveillance requirements.

Safety Basis Conclusions

The safety basis for the SC BDIs and fire dampers is appropriately developed, and the safety functions and functional requirements are adequately provided. The fire dampers and BDIs are appropriately classified as SC, and the TSRs are properly derived from the DSA. The facility is designed and constructed to meet design basis natural phenomena loads; the SC BDIs and fire dampers are not credited to survive the design basis earthquake. However, the chapter 4 system descriptions and evaluations for the SC BDIs and fire dampers are not adequate to demonstrate that the safety functions will be reliably met.

3.2 TSR Surveillance

This portion of the assessment evaluated the DAF TSR surveillance processes for the SC BDIs and fire dampers to determine compliance with the TSR document.

The TSR surveillance procedures and job plan and their implementation are adequate to ensure that the SC BDIs and fire dampers can accomplish their safety functions. The surveillance procedures and job plan appropriately identify system and test conditions and include clear performance steps. The procedures and job plan were appropriately developed, reviewed, and approved. In general, MSTS schedules, tracks, and documents surveillances effectively to ensure compliance with the TSR-required frequencies, considering allowable extensions of surveillance requirements (i.e., TSR-defined grace periods). The available records show no surveillances have been missed for the reviewed LCOs and associated surveillance requirements. However, contrary to DOE Order 422.1, *Conduct of Operations*, attachment 2, section 2.h.(4), the most recent four-year surveillance for fire damper FD-353-3 was inadequately documented; all building 353 dampers were documented as meeting all acceptance criteria, even though there is no documentation indicating whether FD-353-3 was surveilled. (See **Deficiency D-MSTS-2**.) Inadequate documentation of TSR surveillances may result in indeterminate system operability status.

There are no calibration requirements associated with the reviewed surveillances. Except for the issue identified above, tabletop demonstrations and interviews confirmed surveillances are appropriately performed and documented.

Training for personnel performing the BDI surveillances is sufficiently comprehensive and covers the areas fundamental to the assigned tasks to ensure personnel are capable of safely performing the surveillance. Appropriately, given the relative simplicity of performing the fire dampers' four-year surveillance, there are no training requirements for this activity.

TSR Surveillance Conclusions

MSTS's performance of required surveillances is generally adequate to ensure the operability of the SC BDIs and fire dampers. The surveillance procedures and job plan are effective. Personnel are adequately trained to perform the BDI surveillances. However, MSTS did not adequately document the most recent four-year surveillance for fire damper FD-353-3.

3.3 Engineering Design Process

This portion of the assessment evaluated the DAF engineering design process for the SC BDIs and fire dampers to determine whether they incorporate applicable safety basis requirements and comply with 10 CFR 830.122, *Quality Assurance Criteria*, and appropriate consensus standards, including American Society of Mechanical Engineers Nuclear Quality Assurance (NQA)-1-2015, *Quality Assurance Requirements for Nuclear Facility Applications* (NQA-1).

Operating procedure OP-0000.009, *Engineering Design Process*, meets the requirements of 10 CFR 830.122, criterion 6 for design performance. This procedure provides an adequate process for developing and controlling engineering design criteria, performing calculations, developing drawings, conducting technical reviews, and managing design changes for the SC BDIs and fire dampers. ENGR-PLN-003, *Design Engineering Technical Interface Plan*, adequately describes the processes and procedures for controlling and documenting technical interfaces used in design engineering tasks.

The reviewed design documents for the SC BDIs and fire dampers were adequately developed and approved in accordance with MSTS procedures. The reviewed calculations and drawings were independently checked and include sufficient detail to allow a qualified individual to understand the design requirements. Design products appropriately defined design criteria based on the DSA performance criteria and national consensus standards. The reviewed engineering change packages demonstrated design changes received proper engineering review and approval of proposed changes, and the identified affected documents were appropriately updated.

Engineering Design Process Conclusions

Engineering procedures provide an adequate process for performing calculations, developing drawings, and managing design changes. The reviewed calculations and drawings were appropriately checked by independent engineers and incorporated applicable requirements from the facility safety design basis and consensus standards.

3.4 Cognizant System Engineer Program

This portion of the assessment evaluated the implementation of the CSE program to determine its effectiveness in ensuring the SC BDIs and fire dampers can reliably perform as intended and to determine compliance with DOE Order 420.1C, *Facility Safety*.

MSTS has adequately established and implemented OP-SENG.001, *Cognizant Engineer Program*, for the SC BDIs and fire dampers, and a qualified CSE is assigned to each system in accordance with DOE Order 420.1C. CSEs are adequately trained and qualified, as demonstrated by the reviewed qualification cards.

Interviews with CSEs demonstrated adequate knowledge of the reliability, operational readiness, and SSC required configurations. The reviewed annual system health reports were comprehensive and demonstrated appropriate CSE review of SSC configurations, reliability, maintainability, availability, aging, CM, system design description (SDD) updates/revisions, master equipment list (MEL) changes, functional classification document updates, trending issues, and the replacement of critical spare parts.

CSEs appropriately monitor the physical configuration of their assigned systems by performing system assessments to validate the adequacy of CM. They monitor trends that may affect performance or condition to improve their reliability, maintainability, and availability through early detection. System assessment walkdowns were documented in the reviewed system notebooks and appropriately identified physical or documentation issues and their resolutions.

The CSEs for the SC BDIs and fire dampers are the design authorities; they review and approve modification work packages before configuration modifications or changes are made in the field. CSEs demonstrated strong ownership of their assigned systems. They are the focal point for system documentation and have lead roles in the procurement and replacement of spare parts, preventive and corrective maintenance, and CM.

Cognizant System Engineer Program Conclusions

The CSE program is adequately implemented in accordance with DOE Order 420.1C for the SC BDIs and fire dampers, and CSEs manage their systems effectively. CSEs demonstrated adequate knowledge of the reliability, operational readiness, and required configurations for the SC BDIs and fire dampers. The reviewed annual system health reports were comprehensive and provided appropriate summaries of current system health. The reviewed system notebooks were appropriately maintained. CSEs perform appropriate assessments of their assigned systems to validate the adequacy of CM.

3.5 Configuration Management

This portion of the assessment evaluated CM processes, technical baseline documents, change control, work control, document control, and assessments to ensure that changes are properly controlled, such that the SC BDIs and fire dampers continue to meet their safety functions, in accordance with DOE Order 420.1C and DOE-STD-1073-2016, *Configuration Management*.

Configuration Management Processes

The MSTS CM processes are adequate to maintain consistency among system requirements, physical configuration, and implementing documents. DAF-PLN-MG-10, *Configuration Management Plan (CMP) for the DAF*, effectively implements the CM program by establishing requirements for technical baseline documents, change control, work control, document control, and assessments.

Technical Baseline Documents

The reviewed technical baseline documents (i.e., DSA, TSRs, SDDs, functional classification documents, drawings, calculations, specifications, MEL) were adequately identified, developed, and kept current to support facility safety basis implementation. The SDDs for the SC BDIs and fire dampers appropriately identify system requirements, provide their bases, and describe the system design features required to meet them. The functional classification documents for the SC BDIs and fire dampers provide their required functions, attributes or performance criteria, and functional classification boundaries. SC BDI and fire damper drawings were appropriately reviewed, updated, and validated by CSEs during walkdowns. Configuration identification documents were used effectively to document these walkdowns. Discrepancy records were adequately resolved, and drawings were revised as necessary.

Change Control

Company directive CD-NENG.019, *Unreviewed Safety Question Process*, implements an adequate USQ process as required by 10 CFR 830.203, *Unreviewed Safety Question Process*. The USQ process is appropriately applied within the engineering change process. The reviewed USQ determinations demonstrated proper review of proposed changes to the SC BDIs and fire dampers.

Company directive CD-5400.002, *Configuration Management for Facilities and Infrastructure*, includes an adequate change control process to ensure proper engineering review and approval of proposed changes (including field changes) and the identification of all affected documents. Proposed facility changes that may impact the technical baseline are processed using field change requests and change package travelers. The reviewed change package travelers generally demonstrated technical and management reviews of changes through completed installation.

However, contrary to DOE-STD-1073-2016, section 4.9, and CD-5400.002, sections 4.7.9, 4.7.10, and 4.7.11, two of 20 change package travelers (CT-1976 Rev.1, *DAF Interlock Air System Replacement/Repair for Air Reservoir Tanks*, and CT-2035 Rev.1, *Installation of Pressure Relief Valves and Drain Valves on Air Reservoir Tanks for SDI/BDI*) were not completed and signed upon completion of the work. (See **Deficiency D-MSTS-3**.) Deficient CM could result in the degradation of SC SSCs.

Work Control

The work control process adequately integrates CM elements, including configuration verification and documentation of work. CSEs appropriately use the MEL to confirm to which asset the work applies and verify that the physical asset configuration matches the latest drawing revisions. MSTS uses the Maximo® Computerized Maintenance Management System effectively as a comprehensive integrated work control/documentation system and tracking database to automate its management of maintenance, modifications, system configurations, and assets. The reviewed work packages managed in accordance with company directives CD-1200.001, *Integrated Work Control Process*, and CD-1200.005, *Work Package Process*, demonstrated adequate control of field modifications that were implemented as designed and tested as required.

Document Control

Documents subject to configuration management, including technical baseline documents, are appropriately controlled using a database document control system in accordance with company directive CD-0002.002, *Records Management Program*.

Assessments

The reviewed MSTS management assessments were appropriately conducted to evaluate CM implementation for the DAF. The scope of these assessments included review of field change requests, change package travelers, modification work packages, MEL process implementation, CSE knowledge and qualifications, and implementation of DOE-STD-1073-2016 by the CM program.

Configuration Management Conclusions

MSTS implements an adequate CM program that meets the requirements of DOE Order 420.1C and DOE-STD-1073-2016. The reviewed technical baseline documents were maintained current. The change control process, including USQ reviews, is generally adequate, and the work control process adequately incorporates CM elements. The reviewed system configuration documents for the SC BDIs and fire dampers were appropriately controlled using a database document control system. Management assessments were appropriately conducted to evaluate CM implementation. However, two change package travelers were not completed and signed upon completion of the work.

3.6 Maintenance

This portion of the assessment evaluated the DAF maintenance program and processes and control of maintenance, repairs, and modifications to determine whether maintenance of the SC BDIs and fire dampers is properly planned, scheduled, and performed in accordance with DOE Order 433.1B, *Maintenance Management Program for DOE Nuclear Facilities*, to ensure those items can perform their intended safety functions.

Maintenance Program

The approved sitewide nuclear maintenance management program (NMMP) and the DAF maintenance program provide adequate requirements for the safe conduct of maintenance for the SC BDIs and fire dampers to ensure that they can reliably perform their intended safety functions. Program description PD-8128.001, *Nuclear Maintenance Management Program (NMMP)*, adequately addresses all 17 elements of DOE Order 433.1B.

Maintenance Processes

The MSTS maintenance processes for the SC BDIs and fire dampers are adequate to conduct maintenance and manage the backlog consistent with their SC classification. The DAF maintenance organization adequately coordinates maintenance planning and scheduling with facility management and uses a graded approach in prioritizing the maintenance of safety SSCs. Prioritization of preventive maintenance (PM) and corrective maintenance work requests considers impacts to the site mission, safety, property, environment, and security, placing a high priority on safety-related emergent work. MSTS implements adequate maintenance performance processes in company directives CD-8128.003, *Preventive Maintenance/Predictive Maintenance*, and CD-1200.005, *Work Package Process*, to properly maintain SC SSCs.

MSTS appropriately performs PM and corrective maintenance on SC BDIs and fire dampers to ensure their safe, efficient, and reliable operation, and uses key performance indicators effectively to monitor maintenance backlog. MSTS effectively performs operational checks on SC BDIs prior to operations involving HE collocated with plutonium, and PM to inspect and functionally test them. MSTS adequately performs additional PM and corrective maintenance as needed to manage vulnerabilities in the aging BDI systems. DAF maintenance backlog metrics for the past year demonstrate that MSTS appropriately prioritized and completed maintenance in a timely manner.

While MSTS maintenance processes are adequate, the MSTS procurement process is not fully integrated with MSTS maintenance procedures, contrary to DOE Order 433.1B, attachment 2, section 2.i, and PD-8128.001, section 5.2.9, which require the appropriate integration of the procurement process with maintenance procedures to ensure the availability of parts, materials, and services for maintenance activities. (See **Deficiency D-MSTS-4**.) Inadequate integration of the procurement process with the NMMP requirements could result in misapplication of requirements and standards for safe maintenance. Specifically, company directive CD-0610.001, *Acquisition Process*, does not refer back to PD-8128.001 to ensure that the requirements and standards for maintenance of nuclear facilities are incorporated into contracts and subcontracts (including support services) and does specify the requirements and standards. CD-0610.001 does not reference or cite company directive CD-8128.005, *Maintenance Material Procurement, Receipt, Inspection, Handling, and Issuance*. Additionally, CD-8128.005 includes requirements for maintenance-related parts and materials but not contracted maintenance support services.

Control of Maintenance, Repairs, and Modifications

MSTS has an adequate process for planning, scheduling, controlling, and overseeing maintenance as described in the work control process, which appropriately implements approved modifications, PM, corrective maintenance, and QA hold points. The reviewed maintenance, repair, and modification work packages for the SC BDIs and fire dampers included adequate formal controls to ensure that operability is not compromised. The observed MSTS performance of annual PM and post-maintenance testing (PMT) on a blast door, as well as the reviewed completed work packages, demonstrated adequate performance and control of maintenance. The work package for the observed maintenance documented pre-job and post-job briefings; measurement equipment calibrations; work steps in sequence; proper use of QA hold-

point inspections; PMT acceptance criteria; and review of test results by quality control personnel for return to operability. The reviewed completed maintenance work packages for blast doors and fire dampers demonstrated consistent adherence to maintenance program requirements. These work packages adequately enabled the worker to conduct the work safely and completely and demonstrated effective planning and coordination with facility management.

Maintenance Conclusions

The DAF maintenance program is adequate to conduct maintenance for the SC BDIs and fire dampers. Maintenance is properly planned, scheduled, and performed to ensure that SC BDIs and fire dampers can reliably perform their intended safety functions. MSTS has adequate maintenance processes in place for the SC BDIs and fire dampers, appropriately performs PM and corrective maintenance, and manages the maintenance backlog effectively. MSTS has adequate formal controls for maintenance, repairs, and modifications for the SC BDIs and fire dampers. However, the procurement process is not fully integrated with MSTS maintenance procedures.

3.7 Operations

This portion of the assessment evaluated DAF operating practices and procedures and operator training to determine whether DAF operations are conducted in a manner that ensures that SC BDIs and fire dampers can perform their intended safety functions.

Operating Practices and Procedures

DAF administrative and operating procedures are generally adequate to ensure that shift operators operate equipment properly. Procedures for administering timely orders and instructions, identifying systems requiring independent verification, log keeping, and controlling equipment and system status are appropriately formalized based on the requirements in company directive CD-0006.001, *Conduct of Operations Implementing Requirements*. The DAF *Conduct of Operations Applicability Matrix* provides a crosswalk between conduct of operations requirements and DAF operating procedures. The reviewed log sheets, shift turnover sheets, building and facility status control, TSR surveillances, and facility pre-operational checks were adequate.

Observations, tabletop reviews, and walkdowns of status control, TSR surveillances, daily facility checks, and facility pre-operational checks demonstrated adequate performance and operator knowledge of the SC BDIs and fire dampers. DAF management and operating personnel responsible for DAF TSR implementation and compliance were knowledgeable and experienced, as demonstrated by interviews and observations.

While procedures are generally adequate, the surveillance job plan for the SC fire dampers does not identify potential impacts to the safety significant HEPA-filtered ventilation system confinement boundary due to removal and reinstallation of fire damper access panels in the ventilation ducts, contrary to DOE Order 422.1, attachment 2, section 2.m. (See **Deficiency D-MSTS-5**.) Inadequate identification of all interrelated safety systems and TSRs during maintenance and surveillance could result in degraded safety systems. Although a post-maintenance smoke test is used to verify duct integrity following re-installation of the fire damper access panel, this test is not identified as TSR-related.

Operator Training

DAF operations technician (OT) qualifications appropriately include classroom training and performance demonstrations for applicable LCO requirements. Classroom training appropriately includes safety basis

fundamentals and TSR training. The DAF TSR training is consistent with the DAF TSRs. DAF OTs are provided system-specific training on BDIs via a performance demonstration requirement in the OT program development plan. The OT qualification cards document completion of required training activities. Personnel interviews, review of procedures and a job plan, walkthroughs, and observation of a shift turnover demonstrated that operators are knowledgeable of their assigned tasks.

Operations Conclusions

Generally, operations at the DAF are conducted in a manner that ensures operability of the SC BDIs and fire dampers. The reviewed operating procedures for TSR surveillances, daily facility checks, and facility pre-operational checks were adequately developed and implemented. Operator training is sufficient to achieve safe and effective DAF operations. However, the SC fire damper surveillance job plan does not identify impacts to all affected safety systems.

3.8 Quality Assurance

This portion of the assessment evaluated the DAF QA program (QAP) and procurement verification to determine whether they are implemented in a manner that ensures SC BDIs and fire dampers will conform to required standards and perform as designed consistent with DOE Order 414.1D, *Quality Assurance*.

Quality Assurance Program Implementation

Activities that may affect the safety of the DAF are conducted in accordance with MSTS's NFO-approved QAP, PD-0001.002, *Quality Assurance Program*, which meets the QA criteria specified in DOE Order 414.1D and adequately implements NQA-1. The QAP describes a graded approach, applying increased quality control of work and equipment associated with SC SSCs. MSTS reviews the QAP annually, updates it as needed, and obtains appropriate NFO approvals. The QAP appropriately requires the flowdown of DOE QA requirements to suppliers. As demonstrated by reviewed training records, QA personnel are appropriately trained and qualified as required by NQA-1.

Procurement Verification

Requirements are appropriately established for procurement and verification of items and services in accordance with 10 CFR 830.122, criterion 7. DAF SC SSCs are procured using appropriately qualified suppliers or commercial grade dedication (CGD) processes. When possible, SC SSCs are procured with the highest level of controls and processes as quality grade (QG) 1. Approved QG 1 suppliers are listed on a master supplier list (MSL) per the requirements of the QAP, which also details the methods for evaluating and qualifying suppliers. MSTS performs periodic evaluations of the suppliers' quality processes, often using third party assessments, such as those performed by the Nuclear Industry Assessment Committee, to support its supplier audit program. Six qualified suppliers are included on the MSL related to SC BDIs, but there are currently no approved suppliers related to the SC fire dampers.

When an approved supplier is not available, CGD is used to dedicate items as QG 2. Critical characteristics and appropriate methods for verifying them are identified in the CGD package. Personnel performing the CGD activities are appropriately trained and qualified. The approach to CGD provides reasonable assurance that SC SSCs will perform their intended safety functions.

The reviewed purchase orders for the SC BDIs and fire dampers contained appropriate technical specifications based on functional requirements of the procured components. MSTS reviewed the QG 1 and QG 2 purchase orders before they were released to a supplier to ensure that critical QA requirements

were included in the procurement package. However, contrary to NQA-1, part 1, requirement 13, section 100, and CD-0610.001, material storage level requirements were not established, and no formal means have been established to document storage levels. (See **Deficiency D-MSTS-6**.) If storage levels are not established, QG 1 and QG 2 items could be damaged by placement in inadequate storage locations, and none of the 13 reviewed procurement packages identified storage levels. Although the documentation for storage was incomplete, all observed procured components were stored appropriately for their safety classification.

Quality Assurance Conclusions

The MSTS QAP adequately implements the requirements of NQA-1. Approved suppliers for QG 1 components are appropriately evaluated and listed on an MSL. CGD is appropriately used to dedicate safety-related components when approved suppliers are not available. The sampled procurement documents are generally consistent with established MSTS procurement controls, although storage levels have not been adequately identified in procurement and related acceptance documents for QG 1 and QG 2 components.

3.9 Feedback and Improvement

This portion of the assessment evaluated MSTS's feedback and improvement processes, including issues management processes and performance assurance, to determine whether they comply with DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*.

Issues Management Processes

MSTS company directive CD-1000.200, *Issue Resolution and Improvement System*, sets forth adequate processes to identify the causes of issues, correct the issues, and identify actions to prevent recurrence. Conditions adverse to quality, safety, and operability are managed and tracked using caWeb, an electronic issues management tool. Corrective maintenance work for SC SSCs that does not meet the threshold for entry into caWeb is managed separately using the Maximo maintenance management tool.

CD-1000.200 adequately defines priority levels to implement issues management requirements per the commitments and graded approach in the MSTS QAP. Issues are categorized as significant, adverse, track until fixed, and trend only. For significant and adverse issues, CD-1000.200 appropriately specifies increased rigor, including causal analyses, extent-of-condition reviews, validation of corrective action completion, and effectiveness reviews. These priority levels align with significant conditions adverse to quality and conditions adverse to quality per NQA-1.

A Risks and Issues Board (RIB) is used effectively to screen issues in caWeb and assign them priority. When issues are identified as significant or adverse, the RIB ensures that appropriate corrective action plans are developed and provides closure authorization. No adverse or significant issues for SC BDIs and fire dampers have been entered in the last three years. Some of the reviewed issues could have been categorized as adverse or significant, but because the issues occurred on a BDI in a building not in operation, they were classified as "track until fixed" since they did not represent an operational upset. Consequently, these issues were not subject to causal analysis, effectiveness reviews, and objective evidence for closure.

While issues management processes are adequate, MSTS did not enter four findings identified in two management assessments (MA-23-1403-001, *QG1 Storage Compliance*, and MA-23-14M5-001, *Quality Management Tracking System Database Assessment*) into caWeb, although the findings were addressed informally. (See **Deficiency D-MSTS-7**.) Not entering these findings into caWeb was contrary to NQA-

1, part 1, requirement 18, section 600 (which requires management to investigate findings, perform corrective actions, and notify the auditing organization of actions taken) and CD-1000.204, *Management Assessment Program* (which requires findings to be tracked using caWeb). Findings that are not entered into the issues management tracking system may not be fully addressed, do not support performance trending, and could result in recurrence of the same or similar issues.

Performance Assurance

MSTS assesses and evaluates work to ensure that its performance meets applicable requirements for environment, safety, and health, including QA and integrated safety management. MSTS assessment programs are risk-informed and formally documented. Program description PD-0001.006, *Continuous Improvement Program*, adequately describes the assessment program and is effectively implemented through several company directives. Management and independent assessments are tracked on a joint assessment schedule. The MSTS fiscal year 2024 schedule appropriately includes 9 planned management assessments and 13 planned independent assessments that involve the DAF.

Feedback and Improvement Conclusions

MSTS has established an appropriate program to identify the causes of issues to correct these issues and prevent recurrence. Conditions adverse to quality, safety, and operability are generally adequately managed and tracked using caWeb. Assurance systems are in place to provide feedback and improvement processes that address safety system issues. However, MSTS did not enter four findings identified in two management assessments into caWeb.

3.10 Federal Oversight

This portion of the assessment evaluated NFO oversight to determine whether it is effective in ensuring that SC BDIs and fire dampers reliably perform their safety functions.

The NFO safety system oversight (SSO) program is generally implemented consistent with DOE Order 426.1B, *Department of Energy Federal Technical Capabilities*. SSO personnel are responsible for overseeing assigned safety systems to ensure that the systems will perform as required. NFO implements its SSO program using NFO Order 426.X, *Safety System Oversight Program*, which establishes a generally adequate program. However, DOE Order 426.1B requires an evaluated facility walkthrough for final SSO qualification, but NFO Order 426.X allows an evaluated facility walkthrough, oral board, written test, or combination of these options for qualification. (See **OFI-NFO-1**.) Despite this omission in the NFO order, the SSO responsible for the DAF SC BDIs performed an evaluated facility walkthrough for his final qualification and is adequately trained and qualified.

SSO personnel conduct a variety of independent oversight activities appropriately, both in terms of documented operational awareness and formal assessment activities based on an approved assessment plan. MSTS personnel inform NFO management of pending assessments to allow them the opportunity to shadow the assessors.

NFO appropriately self-identified several non-compliances with NFO Order 426.X in MSA-24-AMOS-001, *Management Self-Assessment Final Report*, in February 2024. These non-compliances include NFO not performing: (1) a five-year SSO program assessment since 2017, (2) monthly operational awareness activities for every safety SSC, and (3) formal assessments for equipment important to safety, defense in depth, and design features (e.g., fire dampers) every five years. During interviews, NFO management described how these non-compliances will be addressed through a combination of new practices and revisions of NFO Order 426.X.

Currently, an SSO specialist is appropriately assigned to the SC BDIs, but not to the SC fire dampers due to staffing shortages. NFO plans to assign current staff to vacancies in coverage for all passive SSCs. The cognizant DAF SSO specialist completed formal assessment activities examining DAF SSCs, such as the blast doors and interlocks/special doors and interlocks (2023), cranes and hoists (2021), and the glovebox oxygen analyzer system (2021). The reviewed assessment reports for these efforts were comprehensive. In addition to these formal efforts, the cognizant DAF SSO specialist produces both monthly and topical operational awareness reports covering DAF SSC operability, as well as aspects of the DAF CSE program.

Federal Oversight Conclusions

Overall, NFO implements an adequate SSO program for oversight of the SC BDIs; however, NFO self-identified that no SSO oversight is being performed on the SC fire dampers. The NFO qualification program generally ensures that SSO personnel can perform their assigned duties, with one noted issue pertaining to the final qualification process. The oversight by the DAF SSO specialist is effective and appropriately documented.

3.11 Follow-up on Previous EA Findings

This portion of the assessment evaluated the completion and effectiveness of corrective actions for two findings from EA-predecessor report *Independent Oversight Targeted Review of the Safety Significant Blast Door and Special Door Interlock Systems and Review of Federal Assurance Capability at the Nevada National Security Site, December 2013*. These previous EA findings were addressed and closed by a predecessor to MSTS.

Finding NSTec-Maint-1 identified PM work package instructions on BDIs that could not be performed as written. The activity was performed multiple times with incorrect information, resulting in workers compensating by performing unauthorized steps. Corrective actions included training that emphasized a questioning attitude and the importance of procedure adherence. In addition, the procedure was revised to ensure that steps could be appropriately followed verbatim. Observation of the PM during this assessment confirmed that the finding was adequately resolved.

Finding NSTec-OPS-1 identified that the NFO-approved DAF *Conduct of Operations Applicability Matrix* did not specifically address required elements of DOE Order 422.1 for the control of interrelated processes. Corrective actions included conduct-of-operations training provided by the DOE National Training Center for the two conduct-of-operations program specialists, briefing facility personnel on control of interrelated processes, and revising the applicability matrix to include the DOE Order 422.1 elements on control of interrelated processes. Briefings, personnel attendance rosters, and training certificates for the two conduct-of-operations specialists adequately demonstrate closure of the first two actions. The applicability matrix identifies several procedures to implement control of interrelated processes. This finding was adequately resolved.

Follow-up on Previous EA Findings Conclusions

The two findings from the 2013 EA report were adequately addressed and closed by the previous NNSS contractor.

4.0 BEST PRACTICES

No best practices were identified during this assessment.

5.0 FINDINGS

No findings were identified during this assessment.

6.0 DEFICIENCIES

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

Mission Support and Test Services, LLC

Deficiency D-MSTS-1: The DSA descriptions or evaluations of the SC BDIs and fire dampers are not adequate to justify their safety functions will be reliably met. (DOE-STD-3009-94, secs. 4.3.X.2 and 4.3.X.4)

Deficiency D-MSTS-2: MSTS did not fully document the most recent four-year surveillance for fire damper FD-353-3, resulting in indeterminate operability status. (DOE Order 422.1, att. 2, sec. 2.h.(4))

Deficiency D-MSTS-3: MSTS did not complete two design change package travelers upon completion of the work. (DOE-STD-1073-2016, sec. 4.9, and CD-5400.002, secs. 4.7.9, 4.7.10, and 4.7.11)

Deficiency D-MSTS-4: The MSTS procurement process is not fully integrated with MSTS maintenance procedures. (DOE Order 433.1B, att. 2, sec. 2.i, and PD-8128.001, sec. 5.2.9)

Deficiency D-MSTS-5: The MSTS surveillance job plan for the SC fire dampers does not identify potential impacts to the safety significant HEPA-filtered ventilation system confinement boundary due to removal and reinstallation of fire damper access panels in the ventilation ducts. (DOE Order 422.1, att. 2, sec. 2.m)

Deficiency D-MSTS-6: MSTS did not establish material storage level requirements for procurement of QG 1 and QG 2 components and did not establish formal means to document storage levels. (NQA-1, part 1, req. 13, sec. 100, and CD-0610.001)

Deficiency D-MSTS-7: MSTS did not enter four findings from two management assessments into its issues management tracking database. (NQA-1, part 1, req. 18, sec. 600, and CD-1000.204)

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.

Nevada Field Office

OFI-NFO-1: Consider revising NFO 426.X to require an evaluated facility walkthrough for final SSO qualification.

Appendix A
Supplemental Information

Dates of Assessment

November 13, 2023 – March 7, 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

Quality Review Board

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Kevin G. Kilp, Chair
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