



Independent Assessment of the Management of Safety Issues at the Lawrence Livermore National Laboratory

April 2023

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Acronyms

ACFD	Alameda County Fire Department
ANSI	American National Standards Institute
ASQ	American Society for Quality
BNA	Baseline Needs Assessment
CA	Corrective Action
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
EA	Office of Enterprise Assessments
EOC	Extent of Condition
ES&H	Environment, Safety and Health
FLOSS	Field/Laboratory Observation System Sampling
FPA	Fire Protection Assessment
FPE	Fire Protection Engineer/Engineering
ISO	International Organization for Standardization
ITS	Issues Tracking System
LFO	Livermore Field Office
LLNL	Lawrence Livermore National Laboratory
LLNS	Lawrence Livermore National Security, LLC
LOTO	Lockout/Tagout
NFPA	National Fire Protection Association
NIF	National Ignition Facility
NNSA	National Nuclear Security Administration
NQA	Nuclear Quality Assurance
OFI	Opportunity for Improvement
ORPS	Occurrence Reporting and Processing System
QAP	Quality Assurance Plan
SSCs	Structures, Systems, and Components

INDEPENDENT ASSESSMENT OF THE MANAGEMENT OF SAFETY ISSUES AT THE LAWRENCE LIVERMORE NATIONAL LABORATORY

Executive Summary

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted an independent assessment of the management of safety issues at Lawrence Livermore National Laboratory (LLNL) from September to December 2022. This assessment evaluated the Lawrence Livermore National Security, LLC's (LLNS) management of issues associated with nuclear engineering (including safety bases and criticality safety), fire protection, and hazardous energy control open after October 1, 2020.

EA identified the following strengths, including one best practice:

- LLNS categorized the significance of nearly all reviewed issues to appropriately grade the rigor and resources used to resolve them. This is attributed to LLNS's monitoring of significance levels of issues categorized in the LLNL Issue Tracking System each quarter, periodic assessments of the implementation of its categorization process, and response to emerging trends (e.g., developing formal screener training). (Best Practice)
- LLNS developed actions to resolve most issues reviewed by EA. Most actions were completed as scheduled and were adequately documented.

EA also identified significant weaknesses, including five findings, that allow safety issues to persist longer than necessary, as summarized below:

- Since 2011, LLNS has not adequately invoked nearly all of the elements for quality assurance programs required by DOE to ensure nuclear safety and the timely identification and resolution of nuclear safety issues. (Finding)
- LLNS has not fully evaluated the impact to nuclear safety and ongoing operations from these significant, longstanding noncompliances with DOE quality assurance requirements, identified over the past year. (Finding)
- LLNS has not instituted adequate training on its issues management processes. Consequently, most LLNS employees and management have received little or no training, which can significantly impede identification of issues, including precursors of more significant, self-revealing events. (Finding)
- Several LLNS organizations manage issues in alternative, unapproved systems, which degrades the identification of safety issue trends. (Finding)
- LLNS did not resolve approximately 14% of the issues reviewed in a timely manner. (Finding)
- LLNS did not identify a few adverse trends identified by EA.
- The LLNS quality assurance program does not adequately describe its graded approach for applying quality assurance requirements, and several LLNS implementing procedures are inconsistent with the quality assurance program.
- LLNS developed inadequate corrective actions for approximately 6% of the issues reviewed.
- LLNS procedures do not adequately describe documentation needed to close issues, and 10% of the issues reviewed were inadequately documented.

In summary, LLNS adequately resolves most of its issues but allows unnecessary delays in the resolution of many of them. Furthermore, LLNS has not fully confirmed the safety of ongoing operations in nuclear facilities considering the significant, longstanding noncompliances with DOE quality assurance

requirements. Until the concerns identified in this report are addressed and effective mitigations are put in place, safety issues will not consistently be resolved in a timely manner and significant uncertainties will exist regarding the impacts of quality assurance weaknesses on the safety of ongoing operations of LLNL nuclear facilities.

Recommendation: LLNS, in coordination with the National Nuclear Security Administration Livermore Field Office and Chief of Defense Nuclear Safety, should confirm, with the assistance of third-party nuclear quality assurance experts, the reliability of safety functions supporting operations in LLNL nuclear facilities.

INDEPENDENT ASSESSMENT OF THE MANAGEMENT OF SAFETY ISSUES AT THE LAWRENCE LIVERMORE NATIONAL LABORATORY

1.0 INTRODUCTION

The U.S. Department of Energy (DOE) Office of Environment, Safety and Health Assessments, within the independent Office of Enterprise Assessments (EA), assessed the Lawrence Livermore National Security, LLC's (LLNS) management of safety issues associated with nuclear engineering (including safety bases and criticality safety), fire protection, and hazardous energy control (principally electrical lockout/tagout, or LOTO) at the Lawrence Livermore National Laboratory (LLNL). This assessment was conducted from September to December 2022 and included significant remote data collection and analysis. The onsite portion of this assessment, which was conducted October 17-20, 2022, and November 14-17, 2022, consisted of interviews and data collection.

In accordance with the *Plan for the Independent Assessment of Safety Issues Management at the Lawrence Livermore National Laboratory, September 2022*, this assessment evaluated LLNS's management of issues associated with the topical areas noted above that were open after October 1, 2020.

The National Nuclear Security Administration (NNSA) Livermore Field Office (LFO) oversees LLNS's management and operations at LLNL, including its management of safety issues.

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, opportunities for improvement (OFIs), and recommendations" as defined in the order.

EA used the criteria from objective 3 of EA Criteria and Review Approach Document 30-01, Revision 1, *Contractor Assurance System* (February 15, 2018), to assess the flow down and implementation of issues management requirements from DOE directives and invoked consensus standards.

EA examined key documents, such as procedures, quality assurance program descriptions, internal and external assessments, and 312 issue reports in the LLNS Issues Tracking System (ITS) including associated extent-of-condition reviews, causal analyses, corrective action plans, and effectiveness reviews. The reviewed issues included: (1) those LLNS identified that could have a significant impact on safety, (2) a sample of issues LLNS identified as having less significant impact on safety, (3) less serious conditions, observations, and OFIs that LLNS personnel identified for consideration or trending, and (4) entries tracked in systems other than ITS. These reviews enabled EA to determine whether issues impacting safety are adequately identified and corrected in a timely manner, using a graded approach, to prevent recurrence.

EA also interviewed LLNS personnel responsible for individual issues and for implementation of the issues management processes, as well as LFO managers and subject matter experts responsible for overseeing LLNS's issues management and nuclear engineering, safety bases, criticality safety, hazardous energy control, facility engineering and maintenance, emergency management, and fire protection

programs. In addition, EA assessment team members attended teleconferences during which LLNS team members categorized the significance of issues and reviewed presentations on issues management performance, including the health of and trends in nuclear safety and the conduct of operations.

The members of the assessment team, the Quality Review Board, and the management responsible for this assessment are listed in appendix A. EA's comments on individual issue reports are in appendix B.

This assessment also followed up on corrective actions for two findings documented in EA's *Assessment of Occupational Injury and Illness Recordkeeping and Reporting at the Lawrence Livermore National Laboratory* (June 2018) and the *Independent Follow-up Assessment of Fire Protection at the Lawrence Livermore National Laboratory* (September 2021).

3.0 RESULTS

In this section, results are grouped into the following functions for issues management: the flow down of issues management requirements; issue identification and categorization; issue resolution, including evaluations of the effectiveness of actions; and the timeliness of actions and closure of issues. Additionally, this section includes an evaluation of corrective actions taken by LLNS in response to findings documented in two previous EA assessment reports from 2018 and 2021.

3.1 Flow Down of Issues Management Requirements

This portion of the assessment examined whether LLNS has adequately invoked requirements in applicable consensus standards and DOE directives per the LLNS contract with NNSA and the NNSA-approved LLNS quality assurance program.

Background

Title 10, Code of Federal Regulations, Part 830, *Nuclear Safety Management*, (10 CFR 830), establishes nuclear safety and quality assurance requirements for DOE nuclear facilities. DOE establishes additional quality assurance requirements via DOE Order 414.1D, *Quality Assurance*. DOE Order 414.1D was issued on April 25, 2011. At that time, the LLNS quality assurance plan (QAP) in the Environment, Safety and Health (ES&H) Manual, Part 41, Revision 11, invoked American Society for Quality/International Organization for Standardization (ASQ/ISO) 9001:2000, *Quality Management Systems-Requirements*. Per DOE Order 414.1D, att. 1, par. 1.c.(1)(a), LLNS could "continue to use the consensus standard cited in the [DOE/NNSA-approved] QAP," which was ASQ/ISO 9001:2000, for nuclear facilities.

In September 2011, LLNS revised its QAP to reflect that DOE Order 414.1D had been invoked in the LLNS contract and to invoke the American National Standards Institute (ANSI)/ASQ Z1-13-1999, *Quality Guidelines for Research*, as their consensus standard across LLNL. Changing from ASQ/ISO 9001:2000 to ANSI/ASQ Z1-13-1999 meant that LLNS was no longer continuing to use the consensus standard cited in the NNSA-approved QAP when DOE Order 414.1D was issued. Changes to approved QAPs must be performed in accordance with DOE O 414.1D. Specifically, DOE Order 414.1D, att. 1, par. 1.c.(1)(c) states "The QAP must document how [for nuclear facilities] this consensus standard [(in this instance ANSI/ASQ Z1-13-1999)] is ... equivalent to the consensus standard listed in 1.c.(1)(b)," i.e., the American Society of Mechanical Engineers consensus standard Nuclear Quality Assurance (NQA)-1-2008, *Quality Assurance Requirements for Nuclear Facility Applications*, with the NQA-1a-2009 addenda (hereafter referred to as NQA-1). However, LLNS did not document equivalency with NQA-1 in the QAP. In 2013 and 2017, the LLNS QAP was further revised to invoke ISO 9001:2008 and ISO

9001:2015, respectively, again without documenting equivalency with NQA-1 as required by DOE Order 414.1D for nuclear facilities. In 2015 the LLNS QAP was retitled from the ES&H Manual to DES-0115, *LLNL Quality Assurance Program*. As the LLNL QAP matured through these revisions, it included a selection of multiple consensus standards (e.g., ANSI/ASQ Z1-13-1999 and ISO 9001:2015) in the same QAP.

In a correspondence document, NNSA-2021-005188-AMB-01, *Contract DE-AC52-07NA27344: Submission of Revised Lawrence Livermore National Security, LLC Quality Assurance Program, DES-0115r12* (dated January 4, 2022), LFO withheld approval of the LLNS-proposed revision 12 to DES-0115 because it was constructed as a “description document without requirements” and because LLNS did not document how the consensus standards in the proposed QAP (i.e., ANSI/ASQ Z1-13-1999 and/or ISO 9001:2015) are equivalent to NQA-1.

Current Status

Revision 11 of DES-0115, the version in effect at the time of this assessment, lacks quality assurance requirements equivalent to those in NQA-1. For example, DES-0115 does not flow down requirements (i.e., Requirement 16, *Corrective Action* of NQA-1) that conditions adverse to quality “be identified promptly and corrected as soon as practicable.” Sections 3.2 through 3.4 of this report further discuss the implications of not invoking quality assurance requirements equivalent to those in NQA-1 on LLNS’s management of nuclear safety issues.

The LLNS response to NNSA-2021-005188-AMB-01 is documented in PCMO-TJ-FY23-003, *Contract DE-AC52-07NA27344; Clause H-4 Contractor Assurance System (Mod 388, 726, 785); Submission of the Revised LLNS Quality Assurance Program, DES-0115, Revision 13* (dated October 5, 2022). In its response, LLNS identified significant gaps in the quality assurance requirements invoked per the LLNS QAP for 17 of the 18 quality assurance program requirements in part 1 of NQA-1, and quality assurance requirements for computer software for nuclear facility applications in subpart 2.7 of NQA-1, contrary to DOE Order 414.1D, att. 1, par. 1.c.(1)(c). (See **Finding F-LLNS-1**.) Not incorporating the quality assurance requirements could have a negative impact on the reliability and functionality of items purchased (e.g., structures, systems, and components, or SSCs), services (e.g., inspections), and processes (e.g., work supporting the operation, modification, and maintenance of SSCs) important to the safety of nuclear facilities. Furthermore, LFO has the responsibility for reviewing and approving quality assurance program submittals by LLNS. Inadequate review and approval of previous versions of the LLNS quality assurance program containing these gaps by LFO has allowed these conditions to persist for over a decade. (See **OFI-LFO-1**.)

In PCMO-TJ-FY23-003, LLNS stated the implications of these gaps in its QAP, including the following:

- “No procedure or program document to address the general design control requirements”
- Inadequate controls invoked for controlling the configuration and interfaces of credited SSCs
- “Procedures [that] do not clearly incorporate requirements for items purchased”
- No LLNS procedure to certify that suppliers have a compliant NQA-1 quality assurance program
- Inadequate LLNS procedures for post-installation testing
- No LLNS process for confirming and maintaining credited functionality for commercial-grade items and services purchased for use in nuclear facilities at LLNL.

Despite discovering these significant, longstanding noncompliances in almost all elements of quality assurance programs required for nuclear safety, and contrary to 10 CFR 830.203(f), LLNS has not fully evaluated the impact of these noncompliances on nuclear safety to ensure the current functionality and

reliability of items (e.g., SSCs), services, and processes credited in the safety bases to support ongoing operations of nuclear facilities at LLNL. (See **Finding F-LLNS-2** and **Recommendation R-LLNS-1**.) As a result, significant uncertainties exist regarding the impacts of quality assurance weaknesses on the safety of ongoing operations of LLNL nuclear facilities. Further, contrary to DOE Order 414.1D, att. 1, par. 1.b, which states that the QAP must “Implement QA criteria as defined in Attachment 2, ... and describe how the criteria/requirements are met, using the documented graded approach,” DES-0115 does not contain this required information. (See **Deficiency D-LLNS-1**.) DES-0115 references several sub-tier procedures instead, such as PRO-0042, *Assessments, Issues, and Corrective Action Management*, and PRO-0091, *Graded Approach to Quality Program Controls*, that describe the graded approach used by LLNS. Consequently, these key requirements established in sub-tier procedures, rather than the QAP as required, are not approved by LFO.

Finally, EA identified a weakness associated with PRO-0082, *Reporting Occurrences to DOE*. Section 5.13 of PRO-0082 incorrectly states that “Performance degradation/actuation of credited safety SSCs in non-nuclear facilities that prevents satisfactory performance of its design function when it is required to be operable” are site reportable events and not reported to DOE. (See **Deficiency D-LLNS-2**.) This is contrary to DOE Order 232.2A, *Occurrence Reporting and Processing of Operations Information*, att. 2, group 4A(1), which requires the performance degradation of any SSC that impact a safety function credited in the safety basis of a nuclear facility to be reported to DOE. Although no instances of failure to report such an event were identified, this error in PRO-0082 could lead to degradations in credited SSCs not being reported as required.

Flow Down of Issues Management Requirements Conclusions

Since 2011, LLNS has not invoked the quality assurance requirements in NQA-1 required for nuclear safety or documented in its QAP equivalency via another consensus standard(s) as required by DOE Order 414.1D. Despite discovering significant, longstanding noncompliances in almost all elements of a quality assurance program required for nuclear safety, LLNS has not evaluated their impact on the functionality and reliability of items, services, and processes credited in the safety bases of nuclear facilities at LLNL. Additionally, the LLNS QAP does not adequately “describe how [quality assurance] criteria/requirements are met, using the graded approach.” Finally, PRO-0082 does not require occurrence reporting to DOE when performance degradation/actuation is detected in credited SSCs in non-nuclear facilities.

3.2 Issue Identification and Categorization

This portion of the assessment examined whether issues and trends are identified and properly categorized to meet the requirements for issues management as described in DES-0115 and PRO-0042.

Issue Identification

Based on data reported in the Mission Assurance FY22Q3 Quarterly Report, LLNS managed, on average, 670 issues each quarter over the past fiscal year, and entered in ITS, on average, 350 issues per quarter. Additionally, LLNS self-identified at least 79% of the issues and exceeded its goal of self-identifying 80% of the issues the other three quarters in the past year. These metrics demonstrate a willingness to identify issues. However, the percentage of issues identified by working-level personnel is minimal (less than 5% for the areas examined), while the great majority of entries originate from events and assessments.

EA identified the following conditions that likely inhibit the identification of issues by more LLNS personnel:

- Contrary to DOE Order 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*, att. 1, which states that managers, supervisors, and technical staff must be trained in quality assurance and quality control (which includes the corrective action process), most LLNS personnel receive little or no training in the issues management procedures. (See **Finding F-LLNS-3**.) This impedes issue identification and may contribute to the widespread use of alternative tracking systems described below.
 - With the exception of Level 3 Cognizant System Engineers, working-level engineers/technical staff receive no training on PRO-0042, ITS, or the overall issues management process at LLNL, beyond what is contained in the general employee training.
 - Managers and supervisors receive training only if they request it and are not required to read PRO-0042. Interviews with these personnel demonstrated a lack of clear understanding of the process.
- PRO-0042 does not provide means for personnel with infrequent computer access, such as craft workers, to identify issues.
- Several LLNS organizations have established alternative tracking systems specific to their organizations contrary to the DES-0115 requirement that “the LLNL repository for issues is the ITS database for issues from all Functional Areas and Line Organizations across the Laboratory.” (See **Finding F-LLNS-4**.) In the Mission Assurance FY22Q3 Quarterly Report, LLNS identified the “potential that lower-level issues are not consistently documented in ITS across all organizations which impacts the accuracy of data for trending.” During interviews and reviews of entries in other tracking systems used at LLNL, EA found that several LLNS organizations use other systems to track issues rather than using ITS. Not entering issues into ITS bypasses tools and functionality within ITS for managing issues as required; it also negatively impacts the ability to identify adverse trends using ITS. Specifically:
 - Some LLNS organizations identify issues in the Safety Absolute System, Field/Laboratory Observation System Sampling (FLOSS), Fire Inspection and Violations Tracking System, Work Planning and Control Observation Tool, Electrical Event List, and AT (Superblock) rather than ITS.
 - The National Ignition Facility (NIF) and Photon Science Directorate QAP states that, “The Issues Tracking System (ITS) is used to track deficiencies/issues resulting from assessments...B581 NIF Site uses local systems, i.e., Location Component and State Tracking System (LoCoS) for tracking deficiencies, and issues that are identified during routine activities.”

Additionally, section 3.1.3 of DES-0115 states “Implementation of the LLNL QAP relies upon the consistent and accurate flow down of QA requirements to all supporting documents used by the Laboratory to implement QA processes.” However, contrary to these requirements in DES-0115, PRO-0042, sec. 2.0 inappropriately allows exemptions for the use of alternative tracking systems. (See **Deficiency D-LLNS-3**.)

The evaluation of performance information for discernable trends is an important mechanism for identifying safety issues. LFO and LLNS subject matter experts present their independent assessments of the health (performance) of safety management programs together during quarterly meetings to identify trends. For example, LLNS identified and adequately analyzed a trend in reportable events associated with the inadequate control of hazardous energy (including weaknesses in the planning and implementation of LOTO activities) that occurred October 2017 through September 2020. However, the minimal identification of issues by working-level personnel and the use of alternative tracking systems can impede the early recognition of trends before they develop into issues or events warranting corrective

actions and reporting to DOE. Additionally, contrary to section 3.1.4 of DES-0115, LLNS has not issued a procedure to implement processes for trending issues as was committed to in sections 3.2.3.1 and 3.2.3.5 of DES-0115. Consequently, LLNS did not identify the following adverse trends in issues entered into ITS. (See **Deficiency D-LLNS-4**):

- Several issues related to tagging and labelling of nuclear facility SSCs (55244.15.03, 50162.01, 52503.49, 52149.01, and 57118.01) were noted. This is a potential recurring trend, as labelling was also identified as an issue in an EA assessment of Superblock heating, ventilation, and air conditioning in February 2015. No extent-of-condition review has been performed and no actions have been taken to prevent recurrence.
- Several issues related to training either not being performed as required, overdue, or inadequately planned (44697.01, 50255.11, 51452.03, 51725.01, 51958.10, and 51959.07) reflect a trend in noncompliance with training requirements.
- Eleven issues in calendar year 2022 entered into ITS associated with LOTO tags not being filled out correctly reflect an adverse trend. (See issue 50499.01 in appendix B.)

EA also noted several instances where issues should have been created/entered into ITS and were not:

- LLNS did not create an ITS entry as required by LFO in Letter No. NNSA-2021-001660-AMESH-01 (4/5/21) conditionally approving the current LLNL emergency services baseline needs assessment (BNA), as required by DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*, att. 1, sec. 2.b(3)(a). Specifically, LLNS did not enter the need for continued funding for Alameda County Fire Department (ACFD) pre-incident plans as an ITS issue as directed by LFO. (See **Deficiency D-LLNS-5**.) Not entering LFO conditions of approval for required fire protection program submittals into ITS may prevent adequate management attention and action to resolve identified commitments and improvement actions in a timely manner.
- Contrary to LLNL-AM-704480, *Fire Protection Program Manual*, and Fire Protection Engineering Standard 5.8, *FPE Facility Assessment Program*, requirements, LLNS did not enter completed fire hazard analyses or facility life safety review checklists into ITS. Furthermore, only 2 of 35 facility fire protection assessments (FPAs) reportedly completed since 2020 were entered in ITS. (See **Deficiency D-LLNS-6**.) Not entering records of completed fire hazard analyses, life safety review checklists, and FPAs and the resulting issues into ITS prevents verification that required fire protection program assessments have been performed, identified issues have been resolved as required, and impedes trending of fire protection issues.
- LLNS ASMT-52025, Management Self-Assessment Report – *FY 22 Consistent Application of Significance Level to Issues During Screening*, documents noncompliances which were not identified as issues. These noncompliances were associated with Mission Assurance personnel who did not have required training; inadequate documentation of the nature of the nonconformities being provided for screening; required reports not being attached and fields left blank; and “some corrective actions that did not address the issue.”

Issue Categorization

PRO-0042 defines the process for determining issue significance. Significance level 1 issues are those rated highest in both consequences and probability. Significance level 4 issues are those with the lowest impact. Significance level 5 is reserved for duplicate and/or invalid issues. Issue significance is initially assigned by a screener within the organization and subsequently reviewed/confirmed by an organization-level operations review board. The operations review board for the LLNS ES&H Directorate meets infrequently (i.e., monthly), which contributed to the delays associated with screening and categorization

of issue significance levels discussed in section 3.4 of this report. (See **OFI-LLNS-1**.)

PRO-0042 appropriately further defines the graded approach to be applied based on the significance level and the type of issue involved, establishing requirements for corrective action determination, causal analysis, extent-of-condition review, and effectiveness review.

Mission Assurance personnel monitor the significance level of issues categorized in ITS each quarter. LLNS also periodically assessed its categorization process “to verify that LLNL is consistent in applying significance levels to issues during the screening process as described in PRO-0042.” These periodic meetings also serve as an opportunity for training and indoctrination sessions. Since these training sessions had proven to be effective, LLNS committed to “develop formal screener training [by December 31, 2022] to include review of methodology for assigning significance levels to issues to ensure continued consistency of issue significance level application.” LLNS’s periodic monitoring of issue significance levels, periodic assessments of the implementation of its categorization process, and response to emerging trends (e.g., developing formal screener training) is cited as a **Best Practice** for consideration by other DOE contractors because it has helped LLNS detect changes in its significance categorization process.

LLNS adequately categorized nearly all the reviewed issues based on significance and risk as required by PRO-0042. Appendix B of this report notes a few issues that potentially warrant a higher significance level than assigned (see EA comments in appendix B for issues 50168.01, 47958.07, 63227.03, 48049.02, 52996.01, 52997.01, and 75078.01). These issues are a small portion of the overall population and do not warrant programmatic correction.

Issue Identification and Categorization Conclusions

LLNS enters approximately 350 issues per quarter into ITS, demonstrating a willingness to identify issues. However, working-level personnel identified less than 5% of the issues. Most LLNS personnel receive little or no training in the issues management procedures. For issues that are required to be entered into ITS per DES-0115, there are alternative tracking systems used by several organizations. As a result, there has been a reduction in the ability to identify adverse trends using ITS. Issues were identified that should have been entered into ITS but were not.

LLNS adequately categorized nearly all reviewed issues. This is attributed to LLNS’s periodic monitoring of issue significance levels, periodic assessments of the implementation of its categorization process, and response to emerging trends (e.g., developing formal screener training) and is cited as a **Best Practice**.

3.3 Issue Resolution

This portion of the assessment evaluated whether the Issues Management System includes structured processes using a graded approach based on risk for identifying the causes, extent, and corrective actions for issues, and for reviewing the effectiveness of actions taken to ensure that issues are resolved.

PRO-0042 adequately sets minimum requirements for analyzing and resolving an issue based on its risk-based significance level determination. PRO-0042 specifies more rigor for evaluating issues of greater significance and complexity and for validating the effectiveness of corrective actions. For example, root-cause analyses performed by an independent causal analysis specialist (i.e., a contracted specialist, rather than an LLNS causal analyst), extent-of-condition reviews, and effectiveness reviews are required for significance level 1 issues. PRO-0042 requires root-cause analyses, extent-of-condition reviews, and effectiveness reviews for significance level 2 issues and documented causal analyses or cause codes for most significance level 3 issues designated as deficiencies. PRO-0042, table 13 requires that corrective

action completion be verified for all significance level 1 and 2 issues and some significance level 3 issues.

Extent-of-Condition Reviews

Per the graded approach in PRO-0042, extent-of-condition reviews are required for significance level 1 and 2 issues and significance level 3 issues or noncompliances that are reported to DOE. Overall, the extent-of-condition reviews evaluated by EA were adequate. However, the extent of condition was not determined for several issues as required by PRO-0042, table 13, and several extent-of-condition reviews performed did not meet the requirements of PRO-0076, *Evaluating for Extent of Condition*, section 5.2, step 4 (see **Deficiency D-LLNS-7** and EA comments in appendix B for issues 51231.01, 50173.01, 51826.01, 57172.01, and 71277.01). Inadequately evaluating the extent of condition allows the issue (condition) to persist in other systems or facilities.

Causal Analysis

Per the graded approach in PRO-0042, causal analyses are required for significance level 1 and 2 issues and significance level 3 issues and noncompliances that are reported to DOE. The causal analyses evaluated by EA adequately supported development of corrective actions for most of the reviewed issues. However, several issues were identified for which a causal analysis was required by PRO-0042, table 13 but not documented. (See **Deficiency D-LLNS-8** and EA comments in appendix B for issues 48927.01, 46374.02, 50262.04, and 63357.02.) Not performing or adequately documenting causal analysis required for more significant issues raises the potential that corrective actions will both fail to address their underlying causes and prevent the recurrence of more significant issues.

Corrective Actions

LLNS took adequate corrective actions for nearly all reviewed issues once those issues were entered into ITS, screened, and a corrective action plan was approved. However, 6% (20 of 312) of the reviewed issues were identified as having corrective action plans that were inadequate to correct the problem identified, despite the requirements in PRO-0042, sec. 5.16 to enter corrective actions and verify their completion. (See **Deficiency D-LLNS-9**.) Ineffective corrective action plans allow safety issues to persist (e.g., issue 50173.01 was not effectively addressed and the problem recurred as documented in issue 51435.01). For example:

- Approximately 5% of reviewed fire protection program issues designated as deficiencies had no corrective actions identified (see 50214.06, 51749.01, 52006.01, 54109.02, 63227.01, and 73375.01 in appendix B).
- The single action identified in response to a roof fire documented in ITS 59599.01 was closed with no corrective action completed. Following three change requests, corrective action 59599.01.01 identified that two construction project management documents needed to be revised to incorporate requirements for the use, storage, and handling of combustible and flammable materials. The closure basis stated that one document partially met the corrective action through an existing administrative control to “remove combustible material, and flammables, from area when grinding or using hot welder.” Contrary to PRO-0042, table 13b corrective action verification requirements, no changes to any construction project management documents were made. The lack of clear and comprehensive controls for the use, storage, and handling of combustible and flammable roofing materials, controls for ignition sources, and periodic surveillance for roofing projects could result in a similar repeating fire event.

- See issues 50173.01, 50199.07, 50359.01, 51013.03, 51080.07, 51186.03, 51435.01, 51525.05, 55244.15, 59599.01, 67769.01, and 78751.02 in appendix B for additional examples of inadequate corrective action plans.

Effectiveness Reviews

Overall, LLNS performed reviews that adequately assessed the effectiveness of completed corrective actions taken for the issues reviewed by EA. However, the requirements for effectiveness reviews differ in DES-0115, DES-0600, *Contractor Assurance System Description*, and PRO-0042. Specifically, PRO-0042 requires effectiveness reviews for significance level 1 and 2 issues and for level 3 issues that are categorized as “High ORPS” while the high-tiered, LFO-approved requirements of DES-0115, section 3.2.3.4 and DES-0600, section 3.8.4 indicate that an effectiveness review needs to be performed for all completed corrective actions. (See **Deficiency D-LLNS-1**.)

Additionally, PRO-0042 also places effectiveness reviews as the last action before closing an issue and does not discuss the potential use of interim effectiveness reviews to ensure that actions taken earlier in a corrective action plan are appropriate. For example, interim effectiveness reviews may be appropriate for issues with actions that will take a long time to complete or are significantly delayed. (See **OFI-LLNS-2**.)

Issue Resolution Conclusions

Overall, LLNS is adequately implementing the graded, structured approach established in PRO-0042 for issue resolution and is taking adequate action to resolve most issues once those issues are identified in ITS, screened, and a corrective action plan approved. However, the graded approach for effectiveness reviews in PRO-0042 is not consistent with higher-tiered, LFO-approved documents. Furthermore, extent-of-condition reviews and causal analyses were not performed and adequately documented for a few significant issues as required by PRO-0042, and 6% of the issues reviewed had corrective action plans inadequate to correct the problem identified.

3.4 Timeliness and Closure

This portion of the assessment evaluated whether planned corrective actions are completed in a timely manner and that closure is adequately documented.

Overall, 14% (43 of 312) of the issues reviewed were not resolved in a timely manner due to allowances in PRO-0042, issue owners exceeding the timeliness requirements in PRO-0042, and unjustified schedules for corrective action completion.

Timeliness of Issue Creation and Corrective Action Development

DOE Order 226.1B and NQA-1, requirement 16, require that deficiencies (i.e., conditions adverse to quality) shall be identified and corrected in a timely manner. Neither DES-0115 nor PRO-0042 invoke these requirements. Instead, PRO-0042 and procedures for fire protection assessments permit the development of corrective actions to be delayed up to 180 days, or more for fire protection issues, following initial discovery. (See **Finding F-LLNS-5**.) For example:

- PRO-0042, table 5, allows issues identified in completed assessments to be entered into ITS up to 30 days after the report was approved.
- PRO-0042, tables 9 and 15, allow issues to be moved “to the Screen step within 30 days of date issue

created,” moved “out of the [Operational Review Board] Approval step within 30 days of the date the issue [is] moved to the Screen step,” causal analyses to be completed within 60 days of categorization, and corrective actions to be entered “30 days after Causal Analysis is completed.”

- Fire Protection Engineering Standard 5.8, section 6.3, allows deficiencies and findings resulting from fire protection assessments to be entered into ITS on a quarterly frequency. These delays entering issues into ITS are in addition to those allowed by PRO-0042 for issue entry, screening, and corrective action assignment for deficiencies resulting from these assessments.

Allowing up to 30 days, 60 days, or one quarter to accomplish each sequential step in this process significantly delays the resolution of issues. Further, despite the significant time allowed in this process, numerous issues were not created or screened, and corrective action plans were not developed within the timeliness requirements in PRO-0042, causing additional delays in issue resolution. For example:

- Issues concerning inappropriate criticality controls and controls for integrated control system devices (see issues 47571.01 and 50718.01) were entered into ITS 105 and 134 days after discovery, respectively.
- Over 30 (approximately 10%) of the issues reviewed were not screened within the 30-day period specified by PRO-0042 (examples include issues 51226.01 through 51226.08, 51733.01, 51991.02 through 51991.04, 51991.08, 54109.02, 51991.10, 53200.01 through 53200.07, 72655.02, and 74233.01 in appendix B).
- Entry of corrective action(s) for the following fire protection issues exceeded the 60-day requirement of PRO-0042: 47997.01, 51749.01, 52006.01, 54109.02, 63227.01, and 73375.01.

Timeliness of Issue Closure

Per the LLNS Mission Assurance FY22Q3 Quarterly Report, the percentage of overdue corrective actions exceeded the LLNS goal of 5% every quarter since FY19 Q4 and exceeded the LLNS threshold of 10% for taking mitigating actions in 9 of the past 12 quarters. LLNS analysis of the overdue corrective actions determined that “many of the overdue corrective actions do not require formal change control,” so the issue owners can extend the due dates. While extending due dates would reduce the number of overdue corrective actions, this does not ensure that issues are corrected in a timely manner as required by DOE Order 226.1B and NQA-1. (See **OFI-LLNS-3**.) The FY22Q3 Quarterly Report also indicates that the average age of open corrective actions has been above the LLNS goal of 180 days for 9 of the last 12 quarters, with the age of the action being “the number of days between its creation and the last day of the quarter.” Permitting excessive delays in developing and completing corrective actions results in issues not being closed in a timely manner. (See **OFI-LLNS-4**.)

DOE Order 226.1B and NQA-1 require that deficiencies (i.e., conditions adverse to quality) be corrected in a timely manner. EA identified corrective actions with unjustifiably long durations (see issues 47968.02 through 47968.04, 48037.01, 50849.01, 51064.01, and 53200.01 in appendix B). (See **Finding F-LLNS-5**.) Not resolving issues in a timely manner could result in increased risk to the safety of workers and the public.

Documentation of Issue Closure

DOE Order 226.1B, att. 1, provides requirements for contractor assurance systems, including a structured issues management system. Contrary to DOE Order 226.1B, att. 1, sec. 2.e, PRO-0042 does not contain requirements for documentation for closing issues such that this contractor assurance system data is “documented and readily available to DOE” to “facilitate appropriate oversight.” Although most

reviewed issues were closed with adequate documentation of corrective action completion, 10% (31 of 312) of the reviewed issues did not contain adequate documentation of actions taken to facilitate oversight as required. (See **Deficiency D-LLNS-10.**) Specifically:

- The following issues had corrective actions identified and closed, but lacked objective evidence to support closure: 47457.10, 48142.02, 48148.02, 50199.07, 50305.03, 50718.01, 51452.03, 51677.03, 51729.06, 51958.05, 51958.08, 51958.10, 51959.06, 51959.08, 51959.13, 51991.01, 51991.04, 60701.03, and 63227.03.
- Several reviewed issues were closed to the promise of a future action. For example, 47968.01, 48049.01, 49240.01, 51525.02, 51959.06, 51959.07, and 57068.01 were closed based on a plan to provide replacement items in fiscal year 2023. A corrective action for 60276.01 was closed with items “on order,” and remaining, open actions were under the responsibility of another organization. The corrective action for 73203.03 was closed on the basis of in-process efforts to dispose of excess chemicals and materials. Closure based on a plan, open work request, or action by another organization does not provide evidence that the required corrective action was accomplished. Closure to a promise is specifically prohibited by PRO-0042.
- Contrary to PRO-0042 sec. 5.17, issues 48057.01, 50922.02, and 63445.01 were cancelled with no explanation or justification in ITS.

Timeliness and Closure Conclusions

The LLNS issues management process does not provide for the identification or resolution of safety issues in a timely manner as required for compliance with DOE Order 226.1B, NQA-1 or equivalent NQA-1 requirements. Significant delays with issue entry in ITS, screening, and entry of corrective actions are permitted by PRO-0042. Untimely resolution of issues is also supported by ineffective implementation of established corrective action completion goals, as indicated by internal metrics. Evidence of actions taken to resolve issues and support closure was missing or inadequate in 10% of the reviewed issues, and some issues were closed to a promise of future action. These results indicate that the LLNS issues management process is not adequately providing timely identification of issues, timely closure of issues, and verification that corrective actions have been accomplished as planned.

3.5 Follow-up on Previous Findings

This portion of the assessment examined the completion and effectiveness of correction actions for findings documented in previous EA assessments of LLNL.

Finding F-LLNS-OII-1 was identified in EA Report *Assessment of Occupational Injury and Illness Recordkeeping and Reporting at the Lawrence Livermore National Laboratory* (June 2018). The finding stated that LLNS was not conducting quarterly quality checks to identify and document quality errors in occupational injury and illness (OII) records as required by 10 CFR 851.26(a)(2) and DOE Order 231.1B, att. 3, section 1.f.

The issues associated with the 2018 finding have been adequately resolved. LLNS conducted a causal analysis and updated procedures to establish the required quarterly reviews. These actions were followed by a joint effectiveness review conducted by LLNS and LFO. Subsequently, in December 2021, LFO and NNSA’s Office of the Chief of Defense Nuclear Safety (NA-511) conducted another assessment of the OII program, which resulted in further updates to the procedure and identified the need for additional administrative resources for the program. LLNS adopted the quarterly check format recommended by the DOE Office of Environment, Health, Safety and Security in an April 2022 Operating Experience communication. The most recent documented quarterly review reports were reviewed during this

assessment and show that injury and illness events are being reviewed quarterly and corrections are being made to records as intended by the requirements.

Finding F-LLNS-1 was identified in EA Report *Independent Follow-up Assessment of Fire Protection at the Lawrence Livermore National Laboratory* (September 2021) (documented internally by LLNS as ASMT-53200). That report examined fire protection for Building 332 (Superblock). Finding F-LLNS-1 identified that, contrary to 10 CFR 830.122, criterion 7, a replacement fusible plug installed in 2016 in the safety significant water spray fire protection system protecting the high-efficiency particulate air (HEPA) filtration system was not approved/listed by a nationally recognized testing laboratory (NRTL) for fire protection service as required by National Fire Protection Association (NFPA) 15, *Standard for Water Spray Fixed Systems for Fire Protection* (Issue 53200.01).

EA reviewed the corrective actions for this finding with the following results:

- CA-53200.01.01 proposes independent NRTL testing of the fusible plugs in the installed configuration to affirm adequate performance in support of their safety function (and provide a basis for equivalency to NFPA 15) by March 1, 2023. While this corrective action appears appropriate to resolve this finding, resolution of this corrective action and finding could not be verified at this time. EA will follow up on this issue at a later date.
- CA-53200.01.02 identified an appropriate LLNS procedure revision to address recurrence control. This issue was completed and closed with sufficient objective evidence in ITS on June 9, 2022. This corrective action is considered adequately resolved.

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:

- LLNS monitors issue significance levels quarterly and assesses the implementation of its categorization process approximately every two years. LLNS then appropriately responds to emerging trends to ensure that issues are appropriately categorized based on the significance of the issue. As a result, LLNS performance in this area exceeds that of other DOE facilities whose issues management programs have been recently assessed.

5.0 FINDINGS

Findings are deficiencies that warrant a high level of attention from management. If left uncorrected, findings could adversely affect the DOE mission, the environment, the safety or health of workers and the public, or national security. DOE line management and/or contractor organizations must develop and implement corrective action plans for findings. Cognizant DOE managers must use site- and program-specific issues management processes and systems developed in accordance with DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*, to manage the corrective actions and track them to completion.

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- Finding F-LLNS-1:** Since 2011, LLNS has not documented in its QAP how the consensus standards invoked for LLNL nuclear facilities are equivalent to NQA-1. (DOE Order 414.1D, att. 1, par. 1.c.(1)(c))
- Finding F-LLNS-2:** LLNS has not fully evaluated the impact of significant, longstanding noncompliances with almost all elements of the DOE directed quality assurance programs on the reliability of items, services, and processes credited in the safety bases of nuclear facilities at LLNL. (10 CFR 830.203(f))
- Finding F-LLNS-3:** LLNS personnel, assigned to nuclear facilities, are not adequately trained in the requirements and implementing procedures pertaining to issues management. (DOE Order 426.2, att. 1)
- Finding F-LLNS-4:** Several LLNS organizations manage issues in alternative, unapproved systems to track issues that are required by the LLNS QAP to be entered into ITS. (DES-0115, par. 3.2.3.2)
- Finding F-LLNS-5:** LLNS is not identifying issues (i.e., conditions adverse to quality) “promptly” or correcting them “as soon as practicable.” (DOE Order 226.1B, att. 1, sec. 2.b(3)(a) and NQA-1, requirement 16)

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.

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- Deficiency D-LLNS-1:** LLNS does not adequately describe in its QAP “how [QA] criteria/requirements are met, using the documented graded approach.” (DOE Order 414.1D, att. 1, par. 1.b)
- Deficiency D-LLNS-2:** LLNS procedure PRO-0082 does not require occurrence reporting to DOE when performance degradation/actuation is detected in credited SSCs in non-nuclear facilities. (DOE Order 232.2A, att. 2, group 4A(1))
- Deficiency D-LLNS-3:** LLNS procedure PRO-0042 is inconsistent with the quality assurance requirements approved in DES-0115. (DES-0115, sec. 3.1.3)
- Deficiency D-LLNS-4:** LLNS has not issued a process to trend issues and did not identify a few adverse trends in issues entered into ITS. (DES-0115, secs. 3.1.4, 3.2.3.1 and 3.2.3.5)
- Deficiency D-LLNS-5:** LLNS did not complete the LFO condition of approval for the LLNL BNA by entering the need for continued funding for ACFD pre-incident plans as an ITS issue. (DOE Order 226.1B, att. 1, sec. 2.b(3)(a); DOE Order 420.1C, ch. II, sec. 3.e(1)(c))

Deficiency D-LLNS-6: LLNS completed no ITS entries for completed fire hazard analyses or facility life safety review checklists, and just 2 of the 35 facility FPAs reportedly completed since 2020. (DOE Order 420.1C, ch. II, sec. 3.f(2); *Fire Protection Program Manual*, secs. 9.4 and 12.0; FPE Standard 5.8, sec. 6.3)

Deficiency D-LLNS-7: LLNS did not adequately determine the extent of condition for several significant issues. (PRO-0042, table 13 and PRO-0076, sec. 5.2, step 4)

Deficiency D-LLNS-8: LLNS did not document causal analyses required for several significant issues. (PRO-0042, table 13)

Deficiency D-LLNS-9: LLNS did not enter adequate corrective action plans in ITS for approximately 6% of the issues reviewed. (PRO-0042, sec. 5.16)

Deficiency D-LLNS-10: LLNS procedure PRO-0042 does not require that documentation supporting closure of issues is “readily available to DOE,” and approximately 10% of reviewed issues were inadequately documented. (DOE Order 226.1B, att. 1, sec. 2.e)

7.0 RECOMMENDATION

EA identified one recommendation for consideration by senior line management. Recommendations do not require formal resolution through a corrective action process and are not intended to be prescriptive or mandatory. Recommendations transcend the specifics associated with findings, deficiencies, or OFIs and are derived from the aggregate consideration of the results of the appraisal.

Lawrence Livermore National Security, LLC

Recommendation R-LLNS-1: LLNS, in coordination with LFO and the NNSA Chief of Defense Nuclear Safety, should confirm, with the assistance of third-party nuclear quality assurance experts, the reliability of safety functions supporting operations in LLNL nuclear facilities.

8.0 OPPORTUNITIES FOR IMPROVEMENT

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

Lawrence Livermore National Security, LLC

OFI-LLNS-1: Consider scheduling Operations Review Board meetings for screening issues at least weekly to categorize issues in a timelier manner.

OFI-LLNS-2: Consider revising PRO-0042 to require owners of significance level 1 and 2 issues to consider performing one or more interim effectiveness reviews when a subset of the

corrective actions will take a long time to implement or are significantly delayed.

OFI-LLNS-3: Consider revising PRO-0042 to require the issue owner's manager to approve corrective action due dates (including extensions) greater than an LLNS-established goal (e.g., 60 days beyond the discovery date) for corrective action completion.

OFI-LLNS-4: Consider monitoring the age of issues (i.e., the number of days between the discovery of the issue and the present or the day the issue was closed if it has been closed).

Livermore Field Office

OFI-LFO-1: Consider evaluating the current process for reviewing and approving quality assurance program submittals to ensure that they are in alignment with DOE expectations (e.g., DOE Guide 414.1-2, *Quality Assurance Program Guide*).

Appendix A Supplemental Information

Dates of Assessment

Remote Assessment: September – December 2022

Onsite Assessment: October 17-20 and November 14-17, 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

Kimberly G. Nelson, Director, Office of Worker Safety and Health Assessments

Jack E. Winston, Director, Office of Emergency Management Assessments

Vacant, Director, Office of Nuclear Engineering and Safety Basis Assessments

Quality Review Board

William F. West, Advisor

Kevin G. Kilp, Chair

Thomas C. Messer

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Appendix B Comments on Individual Issue Reports

An assessment team from the U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted a detailed review of 312 issue reports, including 110 nuclear engineering issue reports (which included safety basis and criticality safety issues), 100 fire protection issue reports, and 102 issue reports related to the lockout/tagout (LOTO) process and hazardous energy control. EA’s comments on individual issue reports are documented in this appendix. The significance level assigned by Lawrence Livermore National Security, LLC (LLNS) for each issue report is in parentheses and precedes the comment(s). The significance levels are 1 through 5, from level 1 for highly significant issues, to level 4 for issues with “negligible-to-minimal risk or consequence,” and level 5 reserved for invalid or duplicate issues.

Nuclear Engineering Issues	
Issue Report Number	Comment
46374.02	(Significance Level 3) This item documented that the Environment, Safety and Health (ES&H) manual does not contain appropriate requirements for criticality alarms, including incorrect material limits. This issue was DOE Livermore Field Office (LFO)-identified. DevonWay, the software program used for ITS, indicates that a causal analysis was required, but no causal analysis was documented.
47457.10	(Significance Level 3) This item documented that maintenance for S300 powered industrial trucks was not performed as required. The corrective action states that Integration Work Sheet 19534.01 was revised, but no closure documentation was attached.
47571.01	(Significance Level 3) This item documented that Standard Criticality Control Condition V6 was posted and used for workstations not allowed by the work control document. This is an example of the timeliness issues cited in this report. The issue was discovered 2/13/2019, but it was not entered into the Issues Tracking System (ITS) until 5/29/2019, 105 days later. Implementation of the corrective action was also untimely, as this item was not closed until 10/2020.
47997.01	(Significance Level 4) This item noted that there is no B332 procedure for accounting for special nuclear material loss/holdup, such as in the building HVAC system. This issue was LFO-identified. This is a timeliness issue, as screening was completed 1/4/2022, and it is still awaiting a corrective action plan over 10 months later.
48037.01	(Significance Level 4) This item noted that applicable building structure design codes and standards from original construction should be documented in the documented safety analysis (DSA) for B332 (Superblock). This issue was LFO-identified. This is a timeliness issue. The single corrective action was scheduled for 12/1/2022 but remained open as of 12/18/2022. It has already been extended a year. At the time this issue was evaluated EA noted that 26 months have passed since origination.
48142.02	(Significance Level 4) This item documented a lack of confirmation on mounting of existing pumps. This issue was closed with no closure documentation provided.
48148.02	(Significance Level 4) This item documented that the criticality safety engineer training plan is not tracked in Laboratory Training Records and Information Network (LTRAIN). This issue was closed with no closure documentation provided.

49240.01	(Significance Level 4) This item noted the potential risk that requirements associated with working with defense-in-depth equipment will not be met. It was closed on the basis that “LLNL is waiting for a letter of approval from LFO regarding the 2019 B332 DSA update...” It should have remained open pending DSA approval. Issues such as this are characterized as “closed to a promise.”
50162.01	(Significance Level 4) This item documented that component labels were missing on two safety class valves. This issue was LFO-identified.
50173.01	(Significance Level 3) This item documented that a misaligned crossflow ventilation system resulted in tank overflow being sucked into the facility exhaust system. The causal analysis was inadequate in that it did not result in actionable measures to prevent recurrence. The administrative controls put in place to prevent recurrence were labelled as temporary (in place until further notice). Based on the facts in this event, permanent controls were warranted. The failure modes and effects analysis (FMEA) recommended permanent measures to move the vents higher to prevent water intrusion. That recommendation was not implemented. There was no extent-of-condition review performed. In summary, the corrective actions taken for this event were inadequate. As a result, the same problem occurred again as documented in 51435.01.
50199.07	(Significance Level 4) This item documented that the lessons-learned website could benefit from redesign by a professional. Although this issue is minor, it was closed with no action taken other than to note that it could not be accomplished in fiscal year 2022. Other issues from this assessment were also closed without adequately addressing the original report issues. No closure documentation was provided on any issue arising from this assessment.
50214.06	(Significance Level 4) This item documented that some construction projects at the Superblock experienced multiple revisions to the 100% design. It is listed here as a timeliness issue. Screening was completed on this issue 4/5/2022, and it remains open with no corrective action plan seven months later. This issue was LFO-identified.
50255.11	(Significance Level 3) This item noted that not all project team members completed training. EA identified no issues in the processing of this issue. It is included because a minor trend was noted in issues related to training.
50262.04	(Significance Level 3) This item documented that the Safety Assessment Document for the Flash X-Ray accelerator requires revision. This issue remains in open status. It requires a documented causal analysis, but none is attached. However, the corrective action plan is already done and assigned.
50305.03	(Significance Level 4) This item documented that interim state hazards were considered in unreviewed safety question determinations (USQDs) but were not relevant. It is closed with no closure documentation provided.
50359.01	(Significance Level 3) This item documented that the change process was not adequate to keep system design descriptions (SDDs) and vital safety system drawings current to match the DSA and physical configuration. It documents a significant configuration management issue; however, no extent-of-condition review was performed. It was LFO-identified, and they concluded that there is no process in place to update drawings or SDDs following a facility modification. The corrective action was to make additions to a project closeout checklist. This is no substitute for a design change process that drives adequate configuration management. The corrective action for this issue is inadequate.

50718.01	(Significance Level 3) This item found that management did not prioritize engineered controls for verification of most Integrated Control System controlled and monitored devices. It was identified 5/18/2020 but not entered in ITS until 9/29/2020, 134 days later (timeliness issue). There is no closure documentation provided for any of the five corrective actions.
51013.03	(Significance Level 3) This item documented that the calibration lab was not on the evaluated supplier list. A causal analysis was documented. However, corrective action CA #1 was not completed as described. It states that, "Must be reassigned to individual programs cited." There is no evidence that that occurred. Therefore, this corrective action was not effective.
51186.03	(Significance Level 3) This item documented an external review that followed up on prior emergency plan issues, finding new issues and confirming that previously identified issues were not corrected. The planned corrective actions do not address all of the identified issues. The approved corrective action plan lists actions that were not implemented. In summary, the corrective action plan is not adequate.
51435.01	(Significance Level 4) This item documented a recurrence of a previous event where overflow from a rinse tank entered the building ventilation system. (See 50173.01.) Both events happened in the Superblock. This time, LLNS looked at all of the similar tanks and made temporary fixes. Corrective action CA #1 was closed to temporary fix. Three other actions were closed to an FMEA planned for the earlier event. However, the FMEA did not result in any documented actions. Therefore, the corrective actions for both this issue and the prior event are inadequate.
51452.03	(Significance Level 4) This item documented overdue training. It was entered in ITS 40 days after discovery, a timeliness issue. It was also closed with no documentation of any corrective actions or completed training.
51525.02	(Significance Level 3) This item documented that conceptual design review findings were not presented during the preliminary design review for that project. It was closed to a promise to present findings at a future meeting. This corrective action was inadequate to correct the condition identified.
51525.05	(Significance Level 3) This item documented that no document review record was created following a preliminary design review. The corrective action was to load the issue into a tracking system. This issue was closed to a promise of future action.
51650.04	(Significance Level 4) This item noted incorrect chemical hygiene or health hazard notifications on signage. This issue was identified 3/15/2022 but not entered into ITS until 5/18/2022, 64 days later, a timeliness issue.
51677.03	(Significance Level 3) This item documented that engineering safety note ME2673 refers to pressure relief device 1921, but it appears it has been deleted in the pressure test record system. No closure documentation was provided for this issue.
51826.01	(Significance Level 3) This item documented the degradation of safety class final high-efficiency particulate air (HEPA) filtration stages. An extent-of-condition (EOC) review was required but none is documented, other than a statement that other facilities were not affected. Since this issue was caused by the fire suppression system, and most other facilities have fire suppression systems, evidence of an EOC should have been provided to support this conclusionary statement that no other facilities are affected.

51958.05	(Significance Level 3) This item documented that the Engineering Directorate is not performing a required annual review of the program description document. No closure documentation was provided for this issue.
51958.08	(Significance Level 3) This item noted that there is no evidence two institutional training requirement courses managed by Engineering were created using appropriate principles. No closure documentation was provided for this issue.
51958.10	(Significance Level 4) This item documented that the Engineering Directorate training plan is outdated. No closure documentation was provided for this issue.
51959.06	(Significance Level 4) This item documented that the Engineering Directorate training plan should be reviewed and updated. No closure documentation was provided for this issue. It was closed to a plan for future action in the form of a training assessment.
51959.07	(Significance Level 4) This item documented that the Engineering Directorate should consider a plan for performing reviews of the training program. It was closed to a plan for future action in the form of a training assessment.
51959.08	(Significance Level 4) This item documented that some Engineering documents may no longer be needed. It states that a list was provided to management. The list was not attached, and there was no other closure documentation.
51959.13	(Significance Level 4) This item documented a lack of centralized management for Engineering Directorate documents. A memorandum was the only corrective action. There was no closure documentation attached.
52149.01	(Significance Level 3) This item documented multiple instances of waste drums with no criticality condition labeled. This issue is included here as another example of the minor trend noted in labelling issues.
52503.34	(Significance Level 3) This item documented a technical safety requirement (TSR)-related deficiency that was not resolved prior to implementation. This issue was created 63 days after it was identified, creating a timeliness issue.
52503.49	(Significance Level 3) This item documented labelling issues similar to those documented in 50162.01. It is included here as another example of the minor trend noted in tagging and labelling issues.
54841.01	(Significance Level 4) This item documented late air quality readings at four facilities, violating a state permit requirement. It was created 38 days after the issue was identified, another timeliness issue.
55244.03	(Significance Level 3) This item documented standalone fire suppression system inspection results. Some components in room 1377 are not labelled.
57118.01	(Significance Level 4) Piping and valves for two systems are not labelled.
57172.01	(Significance Level 3) This item documented a positive USQD – potential inadequacy in the safety analysis on a seismic collapse and fire scenario that should have been considered in the Waste Storage Facility (WSF) DSA and was not. The EOC performed was limited in scope to consideration of other potential events that might have to be considered in the WSF DSA. It did not look at whether other facilities might exist where event 25 (an event postulated for safety analysis consideration) should have been considered and was not.

60701.03	(Significance Level 3) This item documented that a waste determination was not performed on spent liquid resin to determine whether it was hazardous waste. The closure documentation for this issue was inadequate.
63357.02	(Significance Level 3) This item documented three instances where structures, systems, and components (SSCs) were not evaluated in the DSA, yet specific administrative controls rely on those SSCs. The causal analysis performed for this issue was inadequate, with a conclusion that could be paraphrased as “we missed it because we missed it.”
71277.01	(Significance Level 3) This item documented that the building 495 allowable content for waste containers was exceeded. An EOC review was performed but was not attached, and corrective action CA 71277.01.02 had no closure documentation.
75078.01	(Significance Level 3) This item documented that an errant calibration source led to all B332 criticality detectors being de-sensitized for three years. Significance level 3 is inappropriate for this issue. Every criticality alarm detector in B332 (Superblock) was affected for three years, resulting in a TSR violation and an ORPS “high” report. The fact that this was the result of a miscalibrated source provided by the ES&H organization was ignored. There was no investigation as to whether miscalibrated sources might have been provided to other facilities.
78751.02	(Significance Level 4) This item documented concerns with oxygen deficiency calculations. The Engineering Deputy Assurance Manager provided a summary of the concern to ES&H and closed the issue. This corrective action was not adequate to correct the problem identified.

Fire Protection Issues	
Issue Number	Comment
44697.01	(Significance Level 3) This item documented that Alameda County Fire Department (ACFD) firefighters did not complete required annual briefings and tours of emergency planning hazards assessment (EPHA) facilities. This issue was LFO-identified. A repeat of this issue was identified in February 2022. (See subsequent issue 51725.01.)
46211	(Management Self-Assessment) This item documented the completion of the current LLNL Emergency Services baseline needs assessment (BNA) and consists of LLNL-AR-814716 (requirements document) and LLNL-AR-814707 (compliance assessment). LFO conditionally approved the BNA via Letter No. (5485.1) NNSA-2021-001660-AMESH-01. LFO approval included a review comment on LLNL-AR-814707 with resolution to enter into ITS the section 6.9.5 observation for LLNL to continue funding for updated key plans supporting ACFD pre-incident plans (condition of approval). No, ITS entry was evident. The LFO approval letter was not included in ITS (e.g., “Attachments” tab, “LFO/NNSA Correspondence” folder).

46213	(Management Self-Assessment) This item documented the completion of the current LLNL Wildland Fire Management Plan, Revision 4.02, and consists of LLNL-AR-691997, with embedded/attached plans, procedures, and correspondence. This document set also includes UCRL-AR-154174-REV-16, UCRL-AR-154173-REV-16, and subordinate plans and procedures. LFO approved the plan via Letter No. (5485.1) NNSA-2020-001670-AMESH-01) without conditions of approval. The LFO approval letter was not included in ITS (e.g., "Attachments" tab, "LFO/NNSA Correspondence" folder).
47980.04	(Significance Level 3) This item documented that fire protection program authority having jurisdiction inspection records (e.g., deficiencies/violations with monthly portable fire extinguisher, exit signage/markings, emergency lighting, automated external defibrillators, fire suppression system, and means of egress/exits – see FP Procedure/Policy 440.00, <i>Violation Tracking System</i>) are not fully documented. Deficiencies/violations resulting from these inspections are not entered into ITS until repeated inaction to remedy is observed. The corrective action is to implement a web-based inspection program within the Enterprise Asset Management System (due 1/10/2023). Notably, FP Procedure/Policy 440.00 also documents and tracks violations with LLNS "hot-work permit" program overseen by the LLNS Fire Safety Division that also are not routinely entered into ITS.
51080.07	(Significance Level 3) This item documented a room with combustible materials co-located with an operable space heater. The corrective action to email/notify management did not confirm resolution of the safety concern or support issue closure.
51725.01	(Significance Level 3) This item documented that ACFD firefighters did not complete annual briefing/tours of EPHA facilities. This issue was LFO-identified. A corrective action plan was requested by LFO due to a similar previous 2018 issue (44697.01). A causal analysis report was completed, resulting in seven justifications of need (JONs)/corrective actions. The corrective action plan (pending approval) contains eight corrective actions. Although not required by PRO-0042, <i>Assessments, Issues, and Corrective Action Management</i> , an extent-of-condition review was also completed. This issue is included as an example of the trend in training issues.
51729.06	(Significance Level 3) This item documented a pump oil leak on a floor. This issue was closed with no objective evidence provided.
51749.01	(Significance Level 4) This item documented that some ACFD run cards are not being updated annually, as required by the BNA, sec. 6.11.3. This issue was LFO-identified. This is a timeliness issue, as issue entry was completed 8/23/2022. At the time this issue was evaluated, EA noted that three months have passed without corrective actions identified.
51868.01	(Significance Level 3) This item documented issues associated with facility personnel notifications during a protective action drill. One corrective action was completed/closed, with four other issues/actions entered into/as AT-2022-0012 (an alternative tracking system separate from ITS).
51991.01	(Significance Level 3) This item documented that a refrigerator was placed in front of a fire extinguisher and electrical panels. This issue was closed with no objective evidence that the refrigerator was relocated. The corrective action to remind workers not to block access to electrical panels was less than adequate.

51991.04	(Significance Level 4) This item documented excess equipment/housekeeping concerns. This issue was closed with no corrective actions identified, and no closure documentation was provided.
52006.01	(Significance Level 4) This item documented a blocked sprinkler system riser. This is a timeliness issue, as issue entry was completed 7/13/2021. At the time this issue was evaluated, EA noted that 16 months have passed without corrective actions identified.
53200.01	(Significance Level 4) 2021 EA Assessment Finding F-LLNS-1: This item documented that the replacement fusible plug installed in 2016 within a safety significant water spray fire protection system was not listed by an approved organization as suitable for the intended purpose, as required by National Fire Protection Association (NFPA) 15. Change Control CHRQ-2022-0254 (9/7/2022) for the corrective action to perform nationally recognized testing laboratory testing of the fusible plug in the installed configuration extended completion to March 2023 (OPEN). A second corrective action to update the like-in-kind procedure has been completed and closed. As an external assessment significance level 4 deficiency, PRO-0042, table 13a does not require EOC for this finding.
53200.04	(Significance Level 4) This item documented that LLNS does not adequately conduct visual inspections of nozzles for internal obstructions during annual testing of the water spray fire protection systems using N ₂ . This is a timeliness issue, as the corrective action to explore mechanisms to perform visual testing remained open as of the week of 11/14/2022 (due 10/1/2022). Interviews indicated that the evaluation was in-process.
54109.02	(Significance Level 4) This item documented poor housekeeping in two rooms. This is a timeliness issue, as issue entry was completed 11/9/2021. At the time this issue was evaluated EA noted that 12 months have passed without corrective actions identified.
55244.15	(Significance Level 4) This contractor readiness assessment item (SS-1) documented several improvements associated with the reliability of a glovebox stand-alone fire suppression system (SAFSS). The corrective action (.05) to add control panel surge protection device inspection to the semiannual SAFSS inspection, testing, and maintenance procedure only confirms “green LEDs” on the fire alarm control panel. This is an incomplete inspection per NFPA 72, <i>National Fire Alarm and Signaling Code</i> (2019), table 14.3.1.14, <i>Visual Inspections</i> , which requires semiannual verification of the location and condition of these devices.
57068.01	(Significance Level 3) This item documented that draining the fire sprinkler system riser during the five-year preventive maintenance (PM) overwhelmed the sump, causing flooding and creating a concern for radiological spill. The corrective action (.03) to consider installing a suitably sized sump pump to support five-year PM was improperly “closed to a future promise” based on a new sump pump being included in fiscal year 2023 upgrade plan.
59599.01	(Significance Level 3) This item documented a fire event (NA--LSO-LLNL-LLNL-2022-0007) and resulting investigative and improvement actions. The causal analysis report resulted in two JONs and one corrective action. The original corrective action was to evaluate subcontractor pre-analyzed task(s) (PATs) to ensure that proper controls for handling and storage of flammable chemicals <u>and</u> appropriate controls on chemical heating techniques are identified. Change request CA-59599.01.01-CHG01 clarified corrective action expectations. Change requests 59599.01.01-CHG02 and -CHG03 identified needed updates to construction project procedures PMO001 and PMO019 on the use, storage, and handling of combustible and flammable materials (CLOSED

	10/28/2022). The closure basis for the corrective action states in-part that PAT PMO019 v. 2.0.0 partially addresses the identified action with current administrative control to "...remove combustible material, and flammables, from area when grinding or using hot welder." This closure basis was less than adequate, as no changes were made to PAT PMO001 or PMO019; the closure discussion does not include a full evaluation of, or controls for, ignition sources for chemicals (e.g., portable electrical heaters); and no other improvement actions were identified (e.g., periodic surveillances of subcontractor activities) to prevent recurrence.
60276.01	(Significance Level 3) This item (condition report) documented that a worker was stuck in an elevator for three hours. A corrective action to review the response approach to personnel stuck in elevators was improperly closed to "promises of future actions": (a) Procure "elevator kits" for ACFD (on order); and (b) Remaining actions being the responsibility of Maintenance Management.
63227.01	(Significance Level 3) This item documented inadequate housekeeping affecting emergency egress. This is a timeliness issue, as issue entry was completed 4/6/2022. At the time this issue was evaluated EA noted that seven months have passed without corrective actions identified.
63227.03	(Significance Level 4) This item documented as an observation of the lack of emergency lighting in laboratory spaces. This issue was closed with no corrective actions entered and no objective evidence for closure. Per PRO-0042, table 13a, significance level 4 observations do not require corrective actions. However, a lack of emergency lighting in chemical laboratory work areas is an NFPA 45, <i>Standard for Fire Protection for Laboratories Using Chemicals</i> , sec. 5.5.5.1, noncompliance. Proper categorization as a significance level 4 deficiency or higher would have required development of corrective action(s) to address the lack of required emergency lighting prior to closure of the issue.
72665.02	(Significance Level 4) This item documented that the unexpected discharge of CO ₂ event (see 74233.01) was not categorized correctly per DOE Order 232.2A, <i>Occurrence Reporting and Processing of Operations Information</i> , att. 2. LLNS was expected to recategorize the event after completion of the causal analysis report (9/14/2022). Screening of the issue is beyond 30 days from entry/identification; the current ITS status states "Screen (DO Core Screening Team)."
73203.03	(Significance Level 3) This item documented as a Field/Laboratory Observation System Sampling (FLOSS) walkthrough that identified the improper storage of flammable liquids in storage cabinets. The basis for closure of the corrective action(s) improperly includes the "promise of a future action" to dispose of the excess materials no longer needed.
73375.01	(Significance Level 4) This item documented that an emergency light bulb needed a new battery. This is a timeliness issue, as issue entry was completed 6/14/2022. At the time this issue was evaluated EA noted that five months have passed without corrective actions identified.
74233.01	(Significance Level 2) This item documented an event associated with the unexpected discharge of CO ₂ while disconnecting a fire suppression cylinder (NA--LSO-LLNL-LLNL-2022-0030) and resulting in investigative and improvement actions. This issue was reviewed for Noncompliance Tracking System (NTS) reporting (REG-74233.01.01), resulting in NTS--NA-LFO-LLNL-LLNLBOP-2022-0010483. The causal analysis report contained seven JONs identified, resulting in corrective action

	plan CAP-74233 (at MAS Director for approval) with four corrective actions (last action due 3/30/2023). Two human performance reviews were completed (HPIR-74233.01-01 and HPIR-74233.01-02). An EOC was due 12/30/2022. An effectiveness review is required per PRO-0082/-0089. This issue is related to 72665.02 and is associated with the timeliness issue for screening of that issue. (See 78635.01 and 78751.)
78635.01	(Significance Level 3) This item documented an additional issue with the uncontrolled CO ₂ release event. The LLNS Assurance Manager Meeting on 10/26/2022 described the basis for new issue entry. This issue was subsequently cancelled with duplicate entry of ASMT-78751. (See 74233.01 and 78751.)
78751	(Significance Level N/A) Assessment ASMT-78751 was created 10/19/2022 and scheduled for the first quarter of fiscal year 2023 for follow-up of additional issues associated with this CO ₂ event. (See 74233.01 and 78635.01.)
79207.01	(Significance Level not assigned) This item documented LFO observation (operational awareness) of an LLNS facility fire protection assessment (FPA). The LLNS FPA checklist dated 9/7/2022 contains a deficiency for one room with sprinkler head orientation noncompliance. The EMD – FPE Worksheet dated 9/7/2022 contains four deficiencies: sprinkler/light fixture conflicts with sprinkler protection coverage and three areas lacking sprinkler protection. This issue was entered into ITS 10/26/2022 and CLOSED. Per LLNS FPE Standard 5.8, <i>Facility Assessment Program</i> , sec. 6.3, these FPA deficiencies should be entered into ITS within the next quarter by the Fire Safety Division. This issue is included as an example of delayed ITS entry.
51226.01 51226.02 51226.03 51226.04 51226.05 51226.06 51226.07 51226.08 51733.01 51991.02 51991.03 51991.04 51991.08 51991.10 52006.02 53200.01 53200.02 53200.03 53200.04 53200.05 53200.06 53200.07 54109.02 63610.01 72665.02 74233.01	(Significance Levels 2, 3, and 4) These 26 issues were screened greater than 30 days beyond entry/identification, contrary to PRO-0042, table 9 and sec. 5.11. 72665.01/74233.01 are post-causal analysis screening timeliness delinquencies.

47935.02.01 51226.01.01 51826.01.01 51826.01.02 51826.01.04 51867.38.01 51991.08.01 52300.02.01 53200.02.02 53588.06. 61891.01.04	(Significance Levels 3 and 4) These 11 corrective actions were closed in ITS greater than 30 days beyond the anticipated/scheduled completion date.
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Hazardous Energy Control & Lockout/Tagout Issues	
Issue Number	Comment
47968.01	(Significance Level 4) This item documented the need to perform a gap analysis for NFPA 70E 2015 compared to NFPA 70E 2021, then update ES&H Manual Document 16.1 to align with NFPA 70E 2021. The gap analysis and impact analysis were not saved to DevonWay although such is indicated in the record. The issue was closed to a promise of future action, updating a future revision of the safety manual. The corrective action is closed but the procedure revision remains open.
47968.02	(Significance Level 4) This item documented the need to update existing electrical hazard classes to align more closely to the DOE electrical safety handbook, in the ES&H manual. Corrective actions were not completed by the due date of 7/29/2022. The issue is currently pending action in holding tank status. Timeliness issue.
47968.03	(Significance Level 4) This item documented the need to revise the electrical safety program risk level determination documents to make them more user friendly after the electrical safety program documents were updated. Corrective actions were not completed by the due date of 7/29/2022. The issue is currently pending action in holding tank status. Timeliness issue.
47968.04	(Significance Level 4) This item documented the need to investigate opportunities for improving HS5211-W, <i>Electrical Contact Release Training</i> , by adding video content. Corrective actions were not completed by the due date 6/15/2022. The issue is currently pending action in holding tank status. Timeliness issue.
52482.01	(Significance Level 3) This item documented an electrical shock received by a subcontractor/vendor from a 120-volt power supply on 9/21/2021 during trouble shooting of equipment in building 131 Engineering Records Center. The vendor reported the shock to their LLNL point of contact, and the work was paused. The issue remained open for 412 days. Timeliness issue.
50168.01	(Significance Level 3) This item documented a review of occurrences and non-compliances that were reported by LLNL from fiscal year 2018 to the present, that revealed that LLNL has a programmatic/repetitive noncompliance of work related to LOTO or control of hazardous energy. An NTS report was created. Several other ITS items (e.g., 52994.01, 52996.01, 52997.01, 52998.01), which were screened as significance level 2, were subsequently cancelled, and incorporated into this ITS item, which has a lower significance categorization (i.e., level 3).

50499.01	(Significance Level 4) This item documented the results of a management self-assessment during which a couple of examples were observed of LOTO tags not being filled out or filled out improperly. The only corrective action was on-the-spot training. A search performed by EA for calendar year 2022 revealed 11 ITS issues associated with LOTO tags not being filled out correctly. This is indicative of an adverse trend that has not been identified or evaluated.
50849.01	(Significance Level 3) This item documented the failure of a technician to complete a work permit LOTO sheet prior to entering a secured beam port cubicle (DIM 90-315) at the National Ignition Facility (NIF). The issue was identified on 10/26/2020. Four corrective actions were developed, with only one corrective action remaining open (i.e., revise the LOTO sheet), which has been open for more than two years. Timeliness issue.
50850.01	(Significance Level 3) This item identified an incident in which a technician was injured while repairing SMPCC (acronym undefined). Corrective actions were developed, completed, and closed. However, there is no description of the event in the DevonWay record, and no attachments in DevonWay describing the causal factors that contributed to the event, the extent of injuries, etc. Therefore, there is no background or basis to assess the viability of some of the corrective actions. The identification/description of this event is inadequate.
50850.03	(Significance Level 3) Labeling tanks in B681. The concern is the lag time between the identification of this event (7/15/2020) and the three months required to enter the issue into DevonWay on 10/26/2020. Timeliness issue.
50997	(Significance Level N/A) This item documented a LOTO observation of a work activity conducted in B190 12/1/2020 by a LOTO coach with an observer (in training). This item does not appear to belong in ITS. The intent of this ITS item appears to track that a LOTO observation/walkdown had been conducted in B190 for work activity WCD#101720. However, the observation checklist included in ITS does not identify any nonconformances, the item was not screened, a significance level was not assigned, nor were any corrective actions identified. The item was closed on the date it was initiated.
51064.01	(Significance Level 3) This item documented an event at NIF in which a gate valve was locked out in the open position when it was intended/expected to be in LOTO closed position. The event occurred on 9/10/2020. The ITS issue has been placed in the holding tank, and is not expected to be closed until 5/30/2023, almost three years after the event was discovered. In the interim, the ITS record has no description of any compensatory actions taken or to be completed in the interim. Timeliness issue.
63616.01 through 63616.08	(Significance Level 4) Assessment 63616 is a roll-up of eight separate issues arising from the Amentum Senior Advisory Team's report (2020-TS-TR-0018) issued in late 2020. The Amentum team was tasked with performing an independent assessment of the LLNL hazardous energy control program and associated programmatic causal analysis report. The team's report contained 31 recommendations, and 8 good practices, but there is no correlation between these recommendations and good practices and the 8 issues in the ITS record.
47510.01	(Significance Level 3) This item (OR#19-18) documented the failure of a technician to apply a locking device to an inline air dryer when removed for maintenance (only a danger tag was hung). Four issues were identified. The first issue (47510.01) included four corrective actions, all of which have been completed. The first corrective action

	was to perform a causal analysis, and the second corrective action was to develop additional corrective actions. No additional corrective actions are identified. The effectiveness review was deferred to a later date and to be included with 50168.01 (closed to a future promise).
47835.03	(Significance Level 3) This item (the third issue in ITS for OR#19-27) noted that job planning did not consider the constrained working area, with several trades working simultaneously in the room. The only corrective action was to “evaluate job planning,” which was not closed in a timely manner (open 521 days).
47835.05	(Significance Level 3) This item (the fifth issue in ITS for OR#19-27) documented a failure to establish LOTO at either the circuit breaker or disconnect location. Two corrective actions were identified in ITS for this issue: (1) review operations for electrical activities to ensure that a proper hazards assessment had been completed for all steps of the operations, and (2) review operations for hazardous activities that should require step by step procedures. These two corrective actions were not closed in a timely manner (open 472 and 395 days, respectively).
47835.06	(Significance Level 3) This item (the sixth issue in ITS for OR#19-27) documented the lack of an effective pre-job walkdown of B298 work area that contributed to the lack of awareness by the worker to apply LOTO. The corrective action involved hiring planners. A planner/coordinator position was created and posted, and a planner was hired and started work on 1/11/2021, 15 months after the event occurred in September 2019. Timeliness issue.
47958.07	(Significance Level 4) A potential adverse trend related to the discovery of uncontrolled hazardous energy was identified. As legacy hazards are identified, some information is not consistently recorded in an institutional database, nor are the “as built” schematics consistently updated. The current system to maintain as built schematics is not effective for capturing some utilities, and, as a result, staff may be inadvertently exposed to previously known uncontrolled hazardous energy. The issue is significant and should be classified at least as a significance level 3 based on PRO-0042, figure 1.
47967.02	(Significance Level 3) This item documented that the biennial review of MAN-OPS-0004, <i>High-Voltage Distribution System Operations Manual</i> , has not been conducted and recorded as required by MAN-OPS-0004. The observation was closed November 3, 2022, and referenced the revised MAN-OPS-0004, which was signed in February 2022 and required a five-year line by line review. It is not clear why the issue was not closed sooner since the requirement predated the assessment.
48049.01	(Significance Level 3) This item documented that work control documents had inadequate LOTO definitions. The corrective action taken stated that “LOTO walkdowns have continued through January and are scheduled to continue for the foreseeable future as an interim corrective action. The formal process to add these steps to the DES-2401 LOTO program documents is exercised by the LOTO task force in collaboration with the work planning and control functional area manager and ES&H.” The issue was closed on the same day that it was entered on the promise of future action.
48049.02	(Significance Level 4) This item identified two issues revealed during an assessment with regard to LOTO. First, the full population of work orders did not consistently receive a LOTO walkdown by the work planner and responsible individual, and second, some work orders were executed as simple when they should have been classified as complex using the definition in DES 2401 LOTO Program. The significance level

	should have been 3 instead of 4, based on PRO-0042, figure 1. Executing a simple LOTO when a complex LOTO is required presents serious hazards to employees. Effective corrective action is required to ensure employee safety. This issue was closed on the same day it was entered on the promise of future action.
48057.01	(Significance Level 3) This item documented that since LOTO is performed throughout the directorate (especially B581) at a high rate, second person verifications should not only include visually monitoring the lock application but also physically checking the lock/device to ensure secure. The issue was identified on 10/15/2019, created on 6/30/2020, and cancelled 142 days later. No corrective action was documented. The issue was not addressed in a timely manner.
48685.02	(Significance Level 3) This item documented that in room B581 within the NIF an incorrect Velocity Interferometer System for Any Reflector (VISAR) LOTO application was discovered. The VISAR diagnostic instrument manipulator had been locked out in the open position. Upon discovery, the VISAR shutter was placed in a safe configuration. The corrective action was open for 149 days and not closed in a timely manner.
48685.03	(Significance Level 2) This item documented that LOTO locks were incorrectly applied/attached to the VISAR shutter LOTO point in NIF B581. The corrective action was open for 217 days and not closed in a timely manner.
48685.04	(Significance Level 3) This item documented inadequate training on applying LOTO to the VISAR shutter. The corrective action was open for 225 days and not closed in a timely manner.
48685.05	(Significance Level 3) This item documented that Operations relied on skills, knowledge, and abilities to perform the LOTO operation in NIF B581, which resulted in inconsistent and undocumented work practices. The corrective action was open for 225 days and not closed in a timely manner.
48685.06	(Significance Level 3) This item documented that the design of the LOTO device for the NIF VISAR shutter does not make it obvious when the guillotine is open. The corrective action was open for 225 days and not closed in a timely manner.
48685.07	(Significance Level 3) This item documented an inadequate LOTO setup and verification for the NIF VISAR guillotine in B581. The corrective action was open for 249 days and not closed in a timely manner.
48927.01	(Significance Level 2) This item documented a management observation in NIF B581 when a work team locked the VISAR interferometer guillotine in the open position instead of the required closed position. This issue, which was identified on 11/13/2019, was a management assessment to “track the lessons learned discovered during a management review of the B581 VISAR LOTO Issue” (48685), which occurred on 10/15/2019. It is not clear why this issue is classified as a significance level 2 when the issue itself (48685) was classified as a significance level 3. There is no evidence in ITS of a causal analysis required or being performed for this level 2 issue, although an effectiveness review was performed and included in ITS.
50892.01	(Significance Level 4) This item documented a LOTO observation by a facility manager during subcontractor (West Coast Cryogenics) work on the B391 LN Tank. The Facility Manager questioned whether the configuration of a bypass hose should have been performed under LOTO, which it was not. The ITS record identifies this issue as a

	<p>“Site Reportable Event,” but incorrectly classifies the significance level as 4 based on PRO-0042, table 1. Four corrective actions were identified.</p>
51231.01	<p>(Significance Level 3) This item documented work that was conducted without LOTO applied to all required isolation points. The LOTO was applied to only two of three required isolation points. The corrective action was to revoke the worker’s LOTO quals and retrain him, and then to have another independent person review the work package. The ITS item fails to explore whether this is a “one of a kind” issue or possibly a recurring condition. LLNS did not perform an EOC review.</p>
50922.02	<p>(Significance Level 3) This item identified an administrative LOTO missing on CRB-02 Bridge Crane disconnect in B874 room 105. The issue was later cancelled by ES&H, who had “determined that this is not an issue.” However, no explanation of the cancellation is provided in the ITS record.</p>
51733.08	<p>(Significance Level 4) This item identified that a series of LOTO tags in rooms 1053 and 1051C were filled out incorrectly; the information that is required to be written on the tag was either in the wrong place or completely missing. This nonconformance was identified during a periodic FLOSS checklist walkdown. EA identified that the FLOSS observation checklists, like the construction safety absolute checklist, are used frequently but nonconformances identified on the checklist are rarely entered into ITS. This is the only exception identified by EA. Nine issues were identified during this walkdown; two items are level 3, and the remainder are level 4.</p>
51991	<p>(Significance Level 3) This item identified a refrigerator that was placed directly in front of a fire extinguisher and electrical panel in 8041 R120 and blocked access required by section 2.0 of ES&H Manual 11.2. This is the same type of issue as 52154 and 52225 (blocked electrical panels), both of which are significance level 4; there is no clear guidance on the correct significance level for issue 51991.</p>
52950.01	<p>(Significance Level 4) This item identified that a LOTO logbook was not consistently updated for LOTO activities performed under WCD#:103144. The corrective actions were to correct the entries in the LOTO logbook. The issue was identified on 10/7/2021 and closed on 8/9/2022. This is a timeliness issue.</p>
52996.01	<p>(Significance Level 2) This item identified a concern that supervision for craft workers is not providing an adequate level of oversight to reinforce critical safety behaviors, which leads to work outside the bounds of work control documents or LOTOs. The issue was identified on 7/9/2020 and cancelled on 4/9/2022 as a result of being incorporated into the Programmatic LOTO Issue 50168. EA identified two concerns: (1) this ITS item is a significance level 2, whereas 50168 is a significance level 3; and (2) there is no reference in the cancelled ITS item as to where (i.e., which corrective action in 50168) this item is now located.</p>
52997.01	<p>(Significance Level 2) This item identified that the master equipment list for programmatic property and programmatic equipment is not accurate, which leads to ineffective LOTOs. The issue was identified on 7/9/2020 and later cancelled as a result of being incorporated into the programmatic LOTO issue 50168.01. Two concerns were identified by EA: (1) this cancelled ITS item is a significance level 2, whereas 50168, into which this issue was incorporated, is a significance level 3; and (2) there is no reference in the ITS item as to where (i.e., which corrective action in 50168) this item is now located.</p>

63445.01	(Significance Level 3) This item documents that a worker received a non-hazardous electrical shock while setting up cables for a high potential (hipot) test. One issue with four corrective actions. Two of the corrective actions were completed, and the remaining two were cancelled. All corrective actions have been completed or closed and yet the ITS status for 63445.01 is “enter corrective actions.” The parent ITS item 63445 indicates the status as “Pending Issue Resolution” with one open issue 63445.01, which ITS indicates is completed or cancelled.
67769.01	(Significance Level 4) This item documents an electrical shock event of an employee who was working on a high voltage device when they experienced a shock on their left thumb, resulting in a muscle spasm. The ITS item is classified as an injury-illness but has a lower significance level (4) than other electrical shock events reported in ITS, which are typically classified as significance level 3. High voltage electric shock events (e.g., 71935) should be a higher significance code. Although the four corrective actions in the ITS record appear appropriate, there are no immediate corrective actions as reported in other shock events, such as stopping work and having the individual receive medical attention. The basis for the lack of immediate corrective actions is unclear.
72384.08	(Significance Level 3) This item documents two blocked electrical panels, one by a miscellaneous lifting device and the other by a 55-gallon container. This is the same type of issue as in ITS items 52154 (blockage by a banding machine), 52225 (blocking with boxes and cart), and 77103.02 (breaker panel blocked by a box). However, these later issues are all significance level 4 items.