# Office of Enterprise Assessments Targeted Review of the Safety Significant Ventilation System and Interconnected Portions of the Associated Safety Class Confinement System, and Review of Federal Assurance Capability at the Los Alamos National Laboratory Technical Area 55 Plutonium Facility

**August 2015**

**Office of Nuclear Safety and Environmental Assessments**
**Office of Environment, Safety and Health Assessments**
**Office of Enterprise Assessments**
**U.S. Department of Energy**

## Table of Contents

## Acronyms

| | |
|---|---|
| AD | Associate Director |
| ADNHHO | Associate Directorate for Nuclear and High Hazard Operations |
| ADPSM | Associate Directorate for Plutonium Science and Manufacturing |
| AERI | Alarm and Emergency Response Instruction |
| AM | Assistant Manager |
| ASME | American Society of Mechanical Engineers |
| CAS | Contractor Assurance System |
| CDNS | Chief of Defense Nuclear Safety |
| CFR | Code of Federal Regulations |
| CM | Corrective Maintenance |
| CMMS | Computerized Maintenance Management System |
| CRAD | Criteria, Review and Approach Document |
| CSE | Cognizant System Engineer |
| DCF | Design Change Form |
| DOE | U.S. Department of Energy |
| DOP | Detailed Operating Procedure |
| DSA | Documented Safety Analysis |
| EA | Office of Enterprise Assessments |
| EMRB | Executive Management Review Board |
| EO | Equipment Operator |
| FCA | Facility Centered Assessment |
| FCR | Field Change Request |
| FCS | Facility Control System |
| FOD | Facility Operations Director |
| FR | Facility Representative |
| FTF | Filter Test Facility |
| FY | Fiscal Year |
| HEPA | High Efficiency Particulate Air |
| HPI | Human Performance Improvement |
| IAS | Integrated Assessment Schedule |
| ICAM | Issues and Corrective Action Management |
| IMC | Improvement Management Coordinator |
| IMRB | Institutional Management Review Board |
| IRM | Improvement Responsible Manager |
| ISI | In-Service Inspection |
| IWD | Integrated Work Document |
| LANL | Los Alamos National Laboratory |
| LANS | Los Alamos National Security, LLC |
| M&TE | Measurement and Test Equipment |
| MAS | Master Assessment Schedule |
| MEL | Master Equipment List |
| ML | Management Level |
| MOV | Management Observation and Verification |
| MP | Management Procedure |
| MRB | Management Review Board |
| MSS | Maintenance and Site Services |
| N/A | Not Applicable |
| NA-LA | Los Alamos Field Office |
| NFPA | National Fire Protection Association |

| | |
|---|---|
| NNSA | National Nuclear Security Administration |
| NMMP | Nuclear Maintenance Management Program |
| NQA | Nuclear Quality Assurance |
| OA | Operational Awareness |
| OE | Operating Experience |
| OFI | Opportunity for Improvement |
| ORPS | Occurrence Reporting and Processing System |
| PEP | Performance Evaluation Plan |
| PER | Performance Evaluation Report |
| PF-4 | Plutonium Facility |
| PFITS | Performance and Feedback Improvement and Tracking System |
| P&ID | Piping and Instrumentation Diagram |
| PIAT | Performance Improvement Action Tracker |
| PIC | Person in Charge |
| PLC | Programmable Logic Controller |
| PM | Preventive Maintenance |
| PSM | Plutonium Science and Manufacturing |
| QPA | Quality and Performance Assurance |
| S/CI | Suspect/Counterfeit Item |
| SC | Safety Class |
| SDD | System Design Description |
| SHR | System Health Report |
| SME | Subject Matter Expert |
| SR | Surveillance Requirement |
| SS | Safety Significant |
| SSC | Structures, Systems, and Components |
| SSO | Safety System Oversight |
| STP | Surveillance Test Procedure |
| TA | Technical Area |
| TQP | Technical Qualification Program |
| TSR | Technical Safety Requirement |
| USQ | Unreviewed Safety Question |
| VSS | Vital Safety System |
| WI | Work Instruction |
| WMC | Work Management Center |

## Executive Summary

The U.S. Department of Energy (DOE) Office of Environment, Safety and Health Assessments, within the Office of Enterprise Assessments (EA), conducted an independent assessment of the safety significant ventilation systems and interconnected portions of the associated safety class confinement systems at the Los Alamos National Laboratory (LANL) Technical Area (TA) 55 Plutonium Facility. This independent assessment, conducted in August 2014, was part of a larger targeted assessment of safety class and safety significant structures, systems, and components across the DOE complex.

The objective of this EA performance based review was to evaluate the effectiveness of several key management programs of the LANL management and operating contractor, Los Alamos National Security, LLC (LANS), in ensuring that the safety significant ventilation systems and the safety class confinement systems at the TA-55 Plutonium Facility are capable of reliably providing the safety functions credited in the safety basis. The key programmatic areas evaluated were:

- Maintenance
- Surveillance and testing
- Operations
- The cognizant system engineer program and configuration management
- Feedback and improvement.

EA also reviewed the effectiveness of Los Alamos Field Office oversight processes.

The TA-55 Plutonium Facility's safety significant ventilation systems and the safety class confinement systems have demonstrated adequate reliability in recent years, despite the age of most of the equipment. In general, the ventilation systems and associated portions of the confinement systems are well maintained. With one major exception, most surveillance and testing activities for the selected safety systems are properly performed in accordance with technical safety surveillance requirements. Operations are largely conducted by experienced operators in a manner that ensures the availability of the selected safety systems to perform their intended safety functions when required, and most procedures are technically adequate to achieve the required level of system performance. The cognizant system engineer program for TA-55 is adequately implemented, and the cognizant system engineers are knowledgeable of facility processes and their assigned systems.

However, EA identified several areas of weakness that warrant increased management attention to ensure ventilation and confinement systems reliability or operability:

- The implementing procedure addressing the technical safety requirements annual surveillance requirement for the ventilation system does not ensure that all safety functions of the system are actually tested. Thus, there is no assurance that the untested functions of the safety related ventilation system will perform as expected to mitigate the consequences of analyzed accidents.
- The processes for design change closure and document control have shortcomings that contribute to changes not being appropriately identified as part of the affected documents and incorporated in a timely manner once the modification is complete. One consequence of this weakness is a very large backlog (over 2000) of unincorporated changes to priority drawings.
- In several cases, Engineering provided an inadequate technical basis to establish the acceptability of a system modification or to address an identified issue in a safety structure, system, or component.
- Several issues were identified in the training and qualification of equipment operators, maintenance personnel, and key managers and supervisors who are involved in performing, reviewing, and approving important issues management program activities and products.

Although many LANS contractor assurance systems are in place, the procedures and implementation have not been effective in consistently ensuring that safety system related process and performance problems are properly identified, documented, accurately described and categorized for significance, appropriately evaluated for extent of condition and causes, and addressed with effective action and recurrence controls. Assessment of assurance system processes and performance has not been sufficiently rigorous or self-critical, and LANS senior management and line organizations have not been effective in evaluating performance and holding personnel and organizations accountable for compliant and effective assurance system implementation. The performance assurance support organization has not been used effectively to foster effective feedback and improvement processes. Many of the findings and weaknesses that EA identified during this review (including concerns about the issues management program) were also identified during previous EA, field office, and LANS assessments, but the responsible parties have not identified or implemented effective actions to correct the issues or (in some cases) to prevent recurrence. This programmatic weakness in the issues management program is systemic, and it has resulted in many missed opportunities to improve the safety of TA-55 operations.

The Los Alamos Field Office has established many formal processes, procedures, and guidance documents describing the requirements and expectations for oversight of the contractor's management and operation of its nuclear facilities and for self-assessment of the field office's oversight program. The field office technical staff effectively plans, performs, and documents many safety oversight activities, including formal assessments, safety-related document reviews, and Facility Representative and safety system oversight operational awareness activities. However, the field office oversight procedures contain conflicting and inconsistent requirements and management performance expectations, and they do not always reflect current practices and organizations. In addition, the field office has not been effective in routinely monitoring, and holding LANS accountable for deficiencies in, the management of DOE-identified safety issues. The most significant issue for field office oversight is to improve its effectiveness in driving improvements in the contractor's feedback and improvement program and, specifically the LANS issues management program.

**Office of Enterprise Assessments Targeted Review of the Safety Significant Ventilation System and Interconnected Portions of the Associated Safety Class Confinement System, and Review of Federal Assurance Capability at the Los Alamos National Laboratory Technical Area 55 Plutonium Facility**

## 1.0 PURPOSE

The U.S. Department of Energy (DOE) Office of Environment, Safety and Health Assessments, within the Office of Enterprise Assessments (EA), conducted an independent review of the safety significant (SS) ventilation system and interconnected portions of the safety class (SC) confinement system, including the confinement high-efficiency particulate air (HEPA) filters and enclosures at the Los Alamos National Laboratory (LANL) Technical Area (TA) 55 Plutonium Facility (PF-4), which is operated by Los Alamos National Security, LLC (LANS) under contract to the DOE National Nuclear Security Administration (NNSA) Los Alamos Field Office (NA-LA). EA also reviewed the performance of DOE oversight in evaluating the effectiveness of the Federal assurance capability. EA performed a scoping and planning visit on site July 15-17, 2014, and the onsite data collection portion of the review on August 18-28, 2014.

## 2.0 SCOPE

This targeted review of management of safety systems evaluated the effectiveness of processes for operating, maintaining, and overseeing the performance of selected safety systems at PF-4. For this review, EA selected the SS ventilation system and the portions of the confinement system specifically associated with the ventilation system, including the SC confinement HEPA filters, enclosures, and connecting ductwork. The review evaluated the procedures and processes that are intended to demonstrate the ongoing operability and reliability of the systems, as well as the implementation of those procedures and processes for a sample of components within those systems. The review focused on the implementation of PF-4's safety basis as it relates to the selected systems but did not evaluate the adequacy of the documented safety analysis (DSA). EA also evaluated the effectiveness of DOE safety system oversight (SSO) and the effectiveness of the Federal assurance capability. Key observations and results from this review are presented in Section 5.0.

Selected objectives and criteria from the following sections of Criteria, Review and Approach Document (CRAD) 45-11, Revision 3, *Safety Systems Inspection Criteria, Approach, and Lines of Inquiry*, were used to define the scope of this targeted review:

III. Configuration Management
IV. Maintenance
V. Surveillance and Testing
VI. Operations
VII. Cognizant System Engineer (CSE) and Safety System Oversight
VIII. Safety System Feedback and Improvement.

This review also evaluated the effectiveness of both the contractor and field office programs in managing and maintaining safety system performance. The review team used the following criteria from CRAD 45-21, Revision 1, *Feedback and Continuous Improvement Inspection Criteria and Approach – DOE Field Element*, to collect and analyze data on field office oversight activities for evaluation of the effectiveness of the Federal assurance capability:

- DOE Field Element Line Management Oversight Inspection Criteria 1-6
- DOE Field Element Facility Representative Program Inspection Criteria.

## 3.0 BACKGROUND

The DOE independent oversight program is designed to enhance DOE safety and security programs by providing DOE and contractor managers, Congress, and other stakeholders with an independent evaluation of the adequacy of DOE policy and requirements and the effectiveness of DOE and contractor line management performance in safety and security and other critical functions as directed by the Secretary of Energy. The independent oversight program is described in and governed by DOE Order 227.1B, *Independent Oversight Program*, and a comprehensive set of internal protocols, operating practices, inspectors' guides, and process guides.

In a memorandum to DOE senior line management dated November 6, 2012, EA identified "Safety Class or Safety Significant Structures, Systems and Components" as a targeted review area, with a series of reviews starting in 2013. The memorandum also stated that the areas would be further defined in associated review plans and that the performance of DOE oversight would be evaluated during the targeted reviews to provide input to an overall evaluation of DOE's Federal assurance capability. The review of safety systems covered several DOE sites to ensure that EA has sufficient information to provide insights into DOE-wide performance. When all the selected DOE sites have been reviewed, EA will prepare a report summarizing the conclusions of the assessment regarding the overall status of safety system management throughout the DOE complex, common issues, and lessons learned.

NA-LA oversees LANS and is responsible for administering the performance-based contract, executing assigned NNSA and DOE programs, and conducting oversight of work performed at LANL in support of NNSA requirements and priorities. LANL's primary mission is to develop and apply science and technology to ensure the safety, security, and reliability of the U.S. nuclear deterrent; reduce global threats; and solve other emerging national security challenges. For more than 60 years, LANL has served as a research center in the world of science, technology, and engineering, and has made achievements that focus on safety, security, environmental stewardship, nuclear deterrence, threat reduction, operations, communications, and community involvement. Since June 2006, LANS – a partnership that includes the University of California; the Babcock and Wilcox Company; Bechtel National, Inc.; and URS Corporation – has held the contract for managing and operating LANL.

The SS and SC ventilation and confinement systems selected for this review provide confinement and ventilation safety functions for PF-4, which is the main plutonium processing facility within TA-55. The confinement function is essential for mitigating accident consequences and has an active role in lowering the source term from an accidental release of radioactive material. Various structures, systems, and components (SSCs) support the function of active safety components within the systems. The DSA and technical safety requirements (TSRs) identify these SSC as either active engineered safety features or passive design features.

Although the review focused primarily on the selected safety systems, EA considered additional systems during field observations as necessary to obtain a clearer perspective for evaluating implementation of some of the CRADs.

## 4.0 METHODOLOGY

EA completed the targeted review through detailed document reviews and an onsite review of contractor safety system engineering, configuration management, operations, maintenance, and feedback and improvement activities; system material condition; and field office oversight of the selected SS and SC systems. The review included observation of contractor and field office personnel during facility and safety system walkdowns, surveillance tests, contractor assessments, and performance of maintenance on the safety systems. The EA team also performed detailed reviews of documentation associated with system design and change control, surveillance tests, assessments of safety system performance, and maintenance history for the selected safety systems. To evaluate contractor and field element feedback and improvement processes, EA reviewed development, implementation, and evaluation of corrective actions and dissemination and review of program and process documents; interviewed responsible managers and staff; and evaluated samples of process outputs, such as assessment reports, issues management documentation, trend and performance indicator reports, incident and event analysis reports, and lessons-learned publications.

The targeted review process was divided into several stages, including onsite and offsite planning, onsite data gathering activities, report writing, validation, and review. Planning included discussions with responsible site personnel, determination of the details of safety systems to be reviewed, scheduling of the review, collection of applicable site procedures and documents, and document reviews. After the onsite data collection period, a draft independent review report identifying overall perspectives, deficiencies, and opportunities for improvement (OFIs) was made available to line management for review and feedback. Finally, the results of the review were briefed to key managers, consistent with site needs.

## 5.0 RESULTS

The EA review team applied the elements of CRAD 45-11 and CRAD 45-21 to evaluate the following areas:

- Maintenance
- Surveillance and testing
- Operations
- CSE program and configuration management
- Safety system feedback and improvement
- NA-LA safety oversight program.

### 5.1 Maintenance

***Criteria***

*The safety system is included in the nuclear facility maintenance management program and the DOE approved Nuclear Maintenance Management Plan required by DOE Order 433.1B, and is maintained in a condition that ensures its integrity, operability, and reliability.*

*Maintenance processes for the system are in place for corrective, preventive, and predictive maintenance and to manage the maintenance backlog; and the processes are consistent with the system's safety classification.*

*Maintenance activities associated with the system, including work control, post-maintenance testing, material procurement and handling, and control and calibration of test equipment, are formally controlled to ensure that changes are not inadvertently introduced, the system fulfills its requirements,*

*and that system performance is not compromised.*

*The system is periodically inspected in accordance with maintenance requirements.*

*Requirements are established for procurement and verification of items and services. Processes are established and implemented that ensure that approved suppliers continue to provide acceptable items and services.*

To examine the selected elements of the LANL nuclear maintenance management program (NMMP) at TA-55, EA reviewed program documents and implementing procedures; corrective, preventive, and predictive maintenance processes; control and conduct of maintenance; periodic inspections; procurement processes; and maintenance history. The performance-based review included walkdowns of the ventilation and filtration systems and their support systems; observation of preventive maintenance (PM) activities; attendance at planning, prioritization, and scheduling meetings; attendance at pre-job briefs; reviews of completed PM and corrective maintenance (CM) work packages; and observation of receipt inspections for procured parts. These elements are discussed in more detail in the following subsections.

One significant concern for TA-55 that both NA-LA and LANS recognize is that many of the PF-4 Safety SSCs are beyond their design life expectancy. This is true of many of the ventilation system components, especially instrumentation and control components, which in some cases are obsolete and replacement parts can no longer be obtained. TA-55 engineering is developing strategies for upgrading and identifying replacement options for obsolete components. To date, despite the age of the equipment, the TA-55 maintenance program has been able to maintain a high level of operability and reliability for the ventilation and confinement systems. Major efforts are under way and planned to upgrade and revitalize the TA-55 Safety SSCs through the multiple phases of the TA-55 Re-Investment Project.

**Nuclear Maintenance Management Program and Plan**

DOE Order 433.1B, *Maintenance Management Program for DOE Nuclear Facilities*, requires all maintenance of SSCs that are "part of the safety basis" be conducted "in compliance with an approved NMMP." An acceptable NMMP consists of processes to ensure that SSCs are capable of fulfilling their intended safety functions as identified in the facility safety basis. SSCs that are "part of the safety basis" include SC and SS SSCs; other systems that perform important defense-in-depth functions; and equipment relied on for the safe operation and safe shutdown of the nuclear facility and for maintaining the facility in a safe shutdown condition as documented in the safety basis. Support systems for safety SSCs that are required for the safety functions are also included.[1] The LANL NMMP is defined and described in the NA-LA approved procedure P950, *Conduct of Maintenance*, which is supplemented by two series of administrative procedures (AP-WORK-xxx and AP-MAINT-xxx). The institutional level program as defined in procedure P950 and its supporting administrative procedures is based on and complies with DOE Order 433.1B and DOE Guide 433.1-1A, *Nuclear Facility Maintenance Management Program Guide for Use with DOE O 433.1B*. In addition, the maintenance program implemented at TA-55 is substantially compliant with the LANL institutional maintenance program as defined in procedure P950 and is a mature, overall effective program.

The PF-4 SS ventilation systems, the SC confinement systems, and their necessary support systems are included in the maintenance program. The Master Equipment List (MEL), which is electronically maintained in the Computerized Maintenance Management System (CMMS) in accordance with procedure AP-341-404, *Master Equipment List*, includes the key components of the SS ventilation

[1] DOE Guide 433.1-1A, *Nuclear Facility Maintenance Management Program Guide for Use with DOE O 433.1B*, page 1.

systems and the SC confinement systems. The PF-4 ventilation systems are well maintained. During the review, the systems were fully operable, with no out-of-service equipment, no active temporary modifications, and no out-of-date calibration on any system instrumentation requiring it. No complex CM and only limited minor maintenance activities have been performed on the PF-4 ventilation systems in the last three years. There is no current backlog of CM or PM, and no evidence of deferred maintenance associated with these systems.

The TA-55 maintenance group is primarily a "matrixed" organization staffed from the Maintenance and Site Services (MSS) Division. Interviews, interactions, attendance at weekly meetings, and observations of work performance indicated that the TA-55 maintenance group is adequately managed by and staffed with knowledgeable and experienced personnel.

EA reviewed aspects of the training and qualification program for the TA-55 maintenance personnel. Procedure TA55-AP-100, *TA-55, PF-4 Training Implementation Matrix*, identifies the following maintenance positions as subject to the requirements of DOE Order 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*: maintenance manager, maintenance supervisor, maintenance technician, and maintenance worker. In addition to these four positions, procedure AP-MNT-011, *Maintenance Training and Qualification*, establishes training and qualification requirements for two other maintenance positions – maintenance planners and maintenance coordinators – but states that these two additional positions are not subject to the DOE Order 426.2 requirements. A NA-LA assessment of the training and qualification of maintenance personnel (Report # ASRP-FO-3.13.2014-565949), completed in March 2014, identified a finding that maintenance planners should be included in the list of positions that are subject to the DOE Order 426.2 qualification requirements because of their potential impact on the safety basis of nuclear facilities. This issue had not been resolved at the time of the EA review. The NA-LA assessment also identified a finding concerning the need to update training materials for facility-specific qualifications to reflect changes in the safety basis. Discussions with the TA-55 Maintenance Manager confirmed that the vital safety system (VSS) training materials were being reviewed and updated to reflect the current safety basis and that plans for providing the updated training to the maintenance personnel were being expedited.

At an observed pre-job brief for an annual PM task on several of the SS ventilation system fans, the Person in Charge (PIC) did not address the training and qualification requirements for performing maintenance work on a VSS ventilation system. Neither the PIC nor the maintenance workers were aware that the workers at the pre-job briefing were not current on their training for the VSS ventilation system and that none of those workers were on the list of maintenance workers authorized to work on the PF-4 ventilation systems. The Maintenance Manager stated that his "interim compensatory measure" until the building-specific training could be updated and completed was to ensure that the PIC for the job was fully trained, qualified, and on the authorized list. The maintenance workers would essentially be working "under instruction" to the PIC while performing maintenance on the ventilation system. Although this is a weak compensatory measure, during the actual performance of the PM task the maintenance workers were familiar with the equipment, the equipment layout and location, the electrical power supplies, and the local instrumentation and controls. However, the PIC and the maintenance workers did not have a clear understanding of the facility-specific training and qualification requirements and erroneously certified at the pre-job brief that they met all of the training and qualification requirements for the task. (See **OFI-LANS-Maint-1**)

EA reviewed monthly presentations for the MSS program reviews for January 2014 and May 2014. LANS has selected an effective set of performance measures and indicators for the maintenance program, and specifically for TA-55, and presents them to and discusses them with NA-LA on a monthly basis. The governing procedure for establishing performance measures and performance indicators is AP-MNT-007, *Measuring, Analyzing, and Reporting of Maintenance Program Performance*. The information

presented in the January 2014 and May 2014 presentations reflected an effectively managed maintenance program at TA-55.

**Maintenance Processes for Corrective, Preventive, and Predictive Maintenance**

The maintenance processes established in procedure P950 and its supporting administrative procedures (AP-WORK-001 through AP-WORK-006 and AP-MNT-002 through AP-MNT-013) are effectively and sustainably implemented at TA-55. Several observed routine meetings demonstrated the coordinated efforts of the maintenance organization to prioritize, schedule, develop work packages for, and execute PM and CM items. The maintenance scheduling tools are used effectively. Interviews and discussions with maintenance supervisors, planners, Work Management Center (WMC) personnel, procurement personnel, engineering personnel, and operations personnel indicated that the maintenance processes are well understood at TA-55 and overall they are effectively integrated among the contributing organizations.

The number of open maintenance work orders for TA-55 is reasonable, and that number has generally been trending downward. The vast majority of the open work orders are associated with Management Level (ML)-3 (primarily related to defense in depth and worker safety) and ML-4 (non-safety related) SSCs, indicating a generally effective prioritization process for keeping the SS (ML-2) and SC (ML-1) SSCs operable. The performance indicators selected for monthly monitoring are designed to provide warning signs to LANS and NA-LA of significant shortcomings in maintaining the VSSs at TA-55.

**Conduct and Control of Maintenance**

EA observed performance of the annual fan PM on north bleed-off exhaust fans FE-820A and FE-820B in accordance with Detailed Operating Procedure (DOP) TA55-DOP-01025, *Annual PM, PF-4 Belt Driven Laboratory Fans*, which addresses the annual PM for 35 fans. The instructions are written broadly enough to cover all of the fans, so addressing the unique aspects of the different fan sets (e.g., bleed-off exhaust fans) relies on the maintenance workers' knowledge of and familiarity with the equipment and its configuration. For example, a confined space entry is required to perform the rotor checks (Step 5.3 of procedure TA55-DOP-01025) for fans FE-820A and FE-820B, but the procedure does not mention this hazard or any associated controls. To perform the annual PM on fans FE-820A and FE-820B on August 20, 2014, the maintenance team supplemented procedure TA55-DOP-01025 with a Standard Integrated Work Document (IWD) Form 2100-WC to address electrical safety controls not included in TA55-DOP-0105. The IWD activity description states, "This IWD addresses the electrical hazards and controls not covered in the PF-4 Annual Fan PM documents: TA55-DOP-1025 and TA55-DOP-01028." Providing related instructions in different documents is not consistent with the approach advocated in AP-WORK-002, which states:

> *In the interest of reducing paperwork and improving worker efficiency, it is acceptable to have the hazards and controls, typically identified with the IWD, incorporated into Preventive Maintenance Instructions (PMIs). By identifying the hazards and controls within the PMI document, workers will not need to reference an IWD and a PMI to perform the preventive maintenance activity. All information required to safely perform the maintenance work is then contained within one work document thereby helping to ensure the effective and timely performance of the job.*[2]

The maintenance team routinely used TA55-DOP-01025 even though they knew the procedure did not adequately address the confined space and electrical hazards and controls. TA-55 management extended the required periodic review of procedure TA55-DOP-01025 (dated October 13, 2013) to June 24, 2015, even though the procedure had known deficiencies. (See **OFI-LANS-Maint-2**)

[2] AP-WORK-002, page 14.

EA observed the pre-job brief for the annual PM and concluded that it was adequate. However, EA noted several shortcomings in the pre-job brief. The two maintenance technicians involved in the PM did not attend the pre-job brief, so their important roles in the PM were not discussed. In general, the PIC did not discuss at the pre-job brief who was responsible for conducting the various steps in the procedure and how the steps would be coordinated and controlled; this omission may have resulted from the team's familiarity with the annual PM, since it is repeated on 35 fans. As discussed previously, the PIC did not address the training requirements for the job at the pre-job brief and did not note that the maintenance workers performing the job were not on the list of workers authorized to work on the PF-4 ventilation system. The maintenance workers each signed the Pre-Job Brief Attendance Roster stating that they "confirm that I am authorized, qualified, and fit to perform the work" even though they were not currently authorized to perform work on the PF-4 ventilation systems. Finally, the PIC did not mention the need to access a confined space to complete some of the steps for fans FE-820A and FE-820B. The pre-job brief weaknesses were discussed with the maintenance manager during the review.

The maintenance work team effectively coordinated and professionally performed the annual PM on fans FE-820A and FE-820B. Communication within the maintenance team and with the Operations Center was very good. The electricians and maintenance technicians effectively implemented electrical safety precautions. All personnel involved in the PM were familiar with the equipment, tools, and procedure requirements. The maintenance and test equipment (M&TE) used for the PM was current in its calibration. The scope of the PM and the thoroughness with which the maintenance team performed the PM effectively supported the operability and reliability of the PF-4 SS fans.

EA reviewed the completed data sheets for the annual fan PM for fans FE-820A, FE-820B, FE-822A, and FE-822B (procedure TA55-DOP-01025 Attachments J and K). For all four fans, the inspection of the fan rotor for defects (Step 5.3) was marked as not applicable (N/A), with the remark that they "were unable to check rotors due to confined space." In addition, a comment was included in Step 5.2 (fan shaft bearings inspections) for fan FE-820A that the step was not performed for the "inside bearing due to confined space." Designating these steps as N/A did not meet the intent of the PM, since the steps are applicable for these fans but were not performed at the time because the confined space hazard was not adequately addressed in the DOP and/or IWD. The same issue was evident for FE-820B in the 2013 annual PM. (Confined space entry for fans FE-820A, FE-822A, and FE-822B appears to have been authorized for the 2013 annual PM, even though TA55-DOP-01025 does not identify the confined space hazard.) Additional data sheets from 2011, 2012, and 2013 show other instances of inappropriate use of N/A. (See **OFI-LANS-Maint-3**)

Step 5.15 requires the current on each phase to be measured and recorded, and it establishes a generic criterion of "motor current should be below name tag ratings." The data sheets are fan-specific and therefore could include the name tag rating for the fans, but they do not state an acceptance criterion for the current draw. Overall, there is no verification or documentation that the recorded current readings are compared to the name tag ratings for the fan motors in accordance with the intent of the procedure step. (See **OFI-LANS-Maint-2**)

Procedure AP-WORK-005, *Work Closeout*, requires multiple reviews of completed work orders to ensure that the full scope of work has been completed and the documentation for the work is complete. In addition, the Maintenance Manager routinely reviews a selection of completed work packages to evaluate completeness and quality.

**Periodic Inspections**

Both DOE Order 430.1B, *Real Property Asset Management*, and DOE Order 420.1B Change 1, *Facility Safety*, include requirements to inspect and assess the physical condition of SSCs. Procedure AP-MNT-

004, *Facility Condition Inspection*, incorporates the requirements of DOE Order 430.1B to periodically inspect the material condition of LANL facilities. For the TA-55 ventilation and confinement systems, LANS accomplishes the periodic inspections through procedure AP-341-901, *Performing Vital Safety System Assessments*, which establishes the LANL periodic assessment process for Safety SSCs. VSS assessments of the PF-4 ventilation and confinement systems in accordance with Procedure AP-341-901 were completed in 2011 and 2014. Based on review of the reports for these assessments, the assessments are performed in a manner and at a level of detail to meet the applicable DOE order requirements.

The TA-55 TSRs in Section 6.0, *Design Features*, identify in-service inspection (ISI) requirements for the passive engineering safety features credited in the TA-55 DSA. The intent of the ISIs is to periodically ensure that the design features remain capable of providing their credited safety function and associated functional requirements as demonstrated by meeting their DSA-defined performance criteria. ISIs for the PF-4 SC confinement system include a visual inspection of visible portions of the filter plenum structures and ductwork from the plenums to the structures at least once every three years. Similar visual inspections every three years are also required for the SS glovebox systems and the SS ventilation system ductwork and plenums. TA-55 TSR Section 6.2.18 requires an ISI of the "visible portions" of the safety-significant ventilation system ductwork and plenum structures. However, the term "visible portions" has been subject to differing interpretations, and the TA-55 TSR Basis does not clarify or amplify this term. Procedures TA55-ISI-6218, *In-Service Inspection of Safety-Significant Ventilation System*, and TA55-ISI-611, *In-Service Inspection of PF-4 Confinement System*, make it clear that the inspections "are to be performed from readily accessible platforms or walkways. Ladders, man-lifting devices, or other means of elevating personnel to reach otherwise inaccessible areas are not required." The scope of the visual inspections has also been restricted in practice by the interpretation that inspections are not required in "inaccessible" areas, such as posted confined spaces and radiological contamination areas (including areas in the overhead and on top of equipment and components where radiological surveys are not routinely performed). The NA-LA Facility Representative (FR) for TA-55 has raised concerns about the lack of thoroughness of the ISIs of the ventilation system because so much of the system is excluded as being difficult to access but is nonetheless visible (Issue LASO-WI06.01-55-DC-10-16 and repeated in a 2012 FR review). Corrective action documentation – Performance and Feedback Improvement and Tracking System (PFITS) #2010-745 – indicates that the ISI procedures were revised to "utilize the monitor/camera equipment by the technicians executing the procedures as well as [radiological control technician] support to inspect the ductwork not visible/easily accessible." However, procedures TA55-ISI-6218 (Revision 2) and TA55-ISI-611 (Revision 1) do not include any discussion, expectations, or requirements for using "monitor/camera equipment" to aid in visually inspecting portions of the ventilation system that are otherwise difficult to access. Section 3.3, *Special Tools, Equipment, Parts, and Supplies*, of both ISI procedures refers to "Camera/Monitor on a stick," but the Performance section of the procedures (Section 5.0) does not mention the camera/monitor or provide any expectations or requirements for using the camera/monitor to complete the ISIs. The documentation for the ISIs completed in 2012 for the SC confinement system and the SS ventilation system provides no evidence that a "monitor/camera on a stick" was used to facilitate a thorough visual inspection of the two systems. The expectations for performing visual inspections of visible portions of the ventilation and confinement systems as required by the TA-55 TSR ISIs are still poorly defined in the ISI implementing procedures. (See **OFI-LANS-Maint-4**)

**Procurement Processes**

Procedure P840-1, *Quality Assurance for Procurement*, establishes the process and requirements for procuring parts, equipment, supplies, and services to support the maintenance efforts at TA-55. The process invokes the same procurement quality requirements for ML-1 (SC SSCs) and ML-2 (SS SSCs) purchases. ML-1 and ML-2 procurements are required to be purchased from a supplier with a quality assurance program in accordance with American Society of Mechanical Engineers (ASME) Nuclear Quality Assurance (NQA) -1-2008/2009a, *Quality Assurance Requirements for Nuclear Applications*, and included on the LANL Institutional Evaluated Supplier List, or to follow the commercial grade dedication process in procedure AP-341-703, *Commercial Grade Dedication*. For the SS ventilation system, the ventilation system CSE is designated as the technical subject matter expert and in many cases is also the requestor for the purchase requisition/procurement request. Interviews with the TA-55 Procurement Team Manager, the CSE, and the TA-55 supervisor for the maintenance planners indicated that LANS has effectively implemented the procurement process with good integration between the three organizations (maintenance, engineering, and procurement).

Procedure P840-1 requires receipt inspections of all ML-1, ML-2, and ML-3 purchases (which includes defense-in-depth and worker safety related SSCs). Certified inspectors from the Quality and Performance Assurance (QPA) Division at the site's warehouse (TA-3 SM-30) perform the receipt inspections in accordance with an approved Receipt Inspection Plan. Procedure P330-9, *Suspect Counterfeit Items (S/CI)*, requires all ML-1, ML-2, and ML-3 items to be inspected for indications of S/CI during the receipt inspection. Interviews with and observation of the QPA receipt inspectors, as well as review of two closed-out procurement packages, indicated that LANS has an effective process for ensuring that procured items meet the expected quality for use in a DOE nuclear facility.

EA performed a detailed review of the procurement process for nuclear grade HEPA filters. The quarterly System Health Report for the ventilation and confinement systems (SHR-14-TA55-HVAC/HVACCF-010) for October through December 2013 reported that out of 140 filters procured, 48 failed receipt inspection at either the DOE Filter Test Facility (FTF) or at LANL. This high failure rate (also observed at other DOE sites) results in a very slow rate of fulfillment for filter orders and makes it challenging for nuclear facilities to manage their filter replacement needs. The QPA receipt inspectors at the site warehouse (where the receipt inspections are completed for the incoming HEPA filters) stated that most of the filters are rejected at the FTF before shipment to LANL. LANL and FTF personnel have aligned their receipt inspection criteria to minimize the number of filters that are accepted at the FTF but then rejected at LANL due to manufacturing defects. The LANS QPA inspectors view this process as effective. However, a number of individual HEPA filters in a received order of ML-1 HEPA filters undergoing receipt inspection at the LANL warehouse during the EA review were found to have been damaged during shipment from the FTF, resulting in failed receipt inspections. At the end of the EA review period, LANS was investigating the cause of the damage to the filters and determining a disposition path for the rejected filters.

Overall, LANS has effectively implemented the procurement process in support of the maintenance program at TA-55.

**Maintenance History**

TA-55 maintains the maintenance history in the CMMS in accordance with procedure P950. Procedure AP-WORK-005, *Work Closeout*, includes steps for the WMC to develop an "equipment history brief" within the CMMS for CM work orders. This process is intended to electronically link the information from the CM work order to a specific piece of equipment on the MEL and should facilitate accessing the maintenance history for that specific piece of equipment within the CMMS, allowing, for example, trend

analysis at the equipment level. Procedure AP-WORK-005 states that equipment history briefs are not developed for PM and predictive maintenance work orders. A note in Section 5.2 (Step 3) also states that "a history brief ID can only be generated when the work order task is written to a piece of equipment on the M101 panel." AP-WORK-001, *Work Initiation, Screening, and Acceptance*, which covers the process for generating a work order, does not address this nuance of the CMMS. Procedure AP-WORK-005 Section 5.4 also includes a step to scan certain completed work order documentation for CM and PM and link it into the CMMS; this process allows retrieval of maintenance history information from the CMMS on a work order number basis (i.e., if you know the work order number, you can easily retrieve the data recorded for that work order), but not on an equipment basis. However, discussions with the WMC personnel, the supervisor of the work planners, and a CSE indicated a lack of familiarity with the method for retrieving the maintenance history information in CMMS for a TA-55 specific component or system. During the EA review, several members of the TA-55 maintenance staff were unsuccessful in attempts to extract the maintenance history for components of the ventilation system (e.g., fan FE-820A), and they demonstrated a lack of familiarity with how to search for the information in the CMMS. DOE Guide 433.1-1A states that, "Regular users [of the maintenance history] should be trained to access and search the history databases and files." (See **OFI-LANS-Maint-5**)

**Maintenance Summary**

Overall, TA-55 has a mature and effective maintenance program that complies with DOE Order 433.1B. LANS is inspecting and maintaining the SS ventilation systems and the SC confinement systems in a manner that ensures their operability and reliability. The TA-55 maintenance personnel were knowledgeable of their roles and responsibilities and effective in implementing the maintenance program safely and efficiently. EA identified several areas for improvement resulting in five OFIs, which are detailed in Section 8.0 of this report. The primary concern about the continued reliability of the SS ventilation system and the SC confinement system is the age and (in some cases) obsolescence of portions of the systems, which is a recognized concern of NA-LA and LANS management.

## 5.2 Surveillance and Testing

***Criteria***

*Surveillance and testing of the system demonstrates that the system is capable of accomplishing its safety functions and continues to meet applicable system requirements and performance criteria.*

*Surveillance and test procedures confirm that key operating parameters for the overall system and its major components remain within safety basis and operating limits.*

*The acceptance criteria from the surveillance tests used to confirm system operability are consistent with the safety basis.*

*Instrumentation and measurement and test equipment for the system are calibrated and maintained.*

EA reviewed the surveillance test procedures (STPs) and results used to meet the TSR surveillance requirements (SRs) for the selected ventilation system and the associated confinement system components. The review included three years of records of annual SRs, one year of records for monthly SRs, and approximately ten weeks of records of weekly SRs. Additionally, EA observed the performance of daily and weekly TSR SRs; observed tabletop simulations of selected annual SRs; and reviewed calibration documentation and selected results for instruments and indicators relied upon to meet the SRs.

For the most part, surveillance and testing activities for the selected systems and components are properly

performed in accordance with TSR SRs. (Note: No TSR-specific administrative controls are directly associated with the selected systems.) STPs are generally well written and technically accurate, and (other than the exceptions noted below and in Section 5.3, Operations) they adequately incorporate the SRs for the selected systems, including appropriate acceptance criteria. Instrumentation and M&TE for the selected systems were adequately calibrated and maintained to support the STPs. However, EA identified a significant concern about the content of the annual STP addressing the SR for an annual system functional test.

Specifically, the SR requiring an annual system functional test of the ventilation system and facility control system (FCS) was not incorporated into the associated facility STP sufficiently to meet the SR and verify the operability of the FCS and the PF-4 ventilation system as required by the TSRs. According to the description of the FCS in the 2011 TA-55 DSA, Chapter 4, *Safety Structures, Systems, and Components*, one of the subsystems of the FCS is the Data Acquisition and Control System, consisting of an array of programmable logic controllers (PLCs) throughout the PF-4 basement and TA-55 Operations Center. The field PLCs acquire both analog and digital data from field devices associated with the safety related equipment. Digital data is transmitted directly to the master PLCs. Analog inputs are scaled (converted into digital signals) at the analog input cards in the field; these values are also transmitted to the master PLCs. In the case of the ventilation system PDTs, this happens before the field PLCs see the data. Outputs from the ventilation system master PLCs, which are transmitted to the field PLCs and then on to field devices associated with safety system equipment, are entirely digital. The master PLCs perform the primary logic functions for integrated system operation, including the logic determinations for safety-related alarms and interlocks (such as fan starts and trips) at pre-determined safety-related setpoints defined in the safety basis. The TSR defines a system functional test as the injection of a simulated or actual signal as close to the sensor as practicable to verify operability, including required alarms, interlock(s), trip functions, and failure trips. SR 4.1.1.8.a-e requires the system functional test to verify five specific criteria related to the ventilation system described in DSA Chapter 4. For example, SR 4.1.1.8.b states, "When the glovebox exhaust header $\Delta P$ >-0.8 in. wc with respect to the laboratories, all active ventilation systems except the running glovebox exhaust system stop." Chapter 4 also states that "each of the criteria is tested in the annual channel functional test of the FCS." TA55-STP-103, *Ventilation System Functional Test*, provides the specific actions written to meet the criteria of the SR (and presumably the DSA Chapter 4 requirement for an annual channel functional test of the FCS). However, the STP does not provide the necessary actions to fully demonstrate several of the criteria. For example, to test SR 4.1.1.8.b, TA55-STP-103 places the FCS in a test mode that does not allow the FCS to change equipment status; injects a pre-determined test signal (e.g., a signal less negative than -0.8 in. wc) into the FCS master controller in the TA-55 Operations Center; and then verifies that the appropriate alarm message is received on the FCS. This methodology does not inject a simulated or actual signal at the glovebox exhaust header differential pressure transmitter (or as close to the transmitter as practicable). Therefore, it does not test the actual performance of the field sensor, field transmitter including the scaling function of the analog input cards in the field (conversion of the analog signal to a digital signal), the field circuitry logic, or the wiring going to the FCS master controller. Further, the TA55-STP-103 test methodology does not verify that "all active ventilation systems except the running glovebox exhaust system stop" as required by SR 4.1.1.8 (b), so as to test the requisite interlocks(s), trip functions, and failure trips. (See **Finding-LANS-ST-1**)

When EA identified this deficiency during onsite data collection, LANS management stated that the SR was never meant to test anything beyond the logic operation of the system and that STP-103, as written, was sufficient to meet the SR. LANS management reaffirmed this position during a fact-finding meeting on September 3, 2014, citing some potentially conflicting statements in DSA Chapter 5, *Derivation of Technical Safety Requirements*, and the TSR bases for SR 4.1.1.8. NA-LA has written similar findings against this STP. As early as April 2010, in *LASO Safety System Oversight Assessment Report for the TA-55 Confinement Ventilation System*, finding VSS-TA55-VENT-F-10-19 states, "The ventilation

system functional test does not adequately satisfy the TSR definition of a system functional test to verify operability and demonstrate compliance with the applicable TSR surveillance requirement." In response to this finding, TA-55 management performed a "prompt operability determination" and concluded that the system was operable based on the STP addressing each safety basis criteria with the logic verifications. EA noted that the prompt operability determination did not address the question of whether the STP met the TSR definition of a system functional test. (See **Finding-LANS-ST-1**)

While some statements in Chapter 5 and the TSR bases may be inconsistent, a conservative approach to nuclear safety would address the fundamental need to test the safety functions of a system as specified in Chapter 4. Nothing in Chapter 5 or the TSR bases would contradict that need. (See **Finding-LANS-ST-1**)

Further, the current STP does not meet the provisions of 10 CFR 830, *Nuclear Safety Management*. Part 830.3, *Definitions*, defines SR as: "Surveillance requirements means requirements relating to test, calibration, or inspection to ensure that the necessary operability and quality of safety structures, systems, and components and their support systems required for safe operations are maintained, that facility operation is within safety limits, and that limiting control settings and limiting conditions for operation are met." An STP written to perform a system functional test must fully test the specific safety functions described in the DSA to meet the 10 CFR 830 definition requirement to verify that "the necessary operability and quality…required for safe operations are maintained." STP-103 does not fully test all safety function criteria and thus does not fully demonstrate operability of the system as required by the SR for a system functional test. Without meeting the SR, the ventilation system cannot be considered operable as specified in TSR SR 4.0.1, which states, "Failure to meet a surveillance … SHALL constitute failure to meet the [limiting condition for operation] condition statement." Although the DSA shows that the calculated dose to the maximally exposed offsite individual for all releases within the building remains below the DOE guideline of 25 Rem based solely on SC systems such as confinement, the DSA also assumes that the SS function of the ventilation system will significantly further reduce that dosage if operating, as well as providing protection to the facility workers. Without demonstrating the functionality of the system as described in the DSA, LANS cannot demonstrate confidence in the system operating as designed. (See **Finding-LANS-ST-1**)

During onsite data collection, EA also notified NA-LA management of the concerns about the failure to meet the ventilation system annual SR. NA-LA held several meetings with LANS regarding this concern and issued formal correspondence to LANS requiring revision of the STP to ensure that it demonstrates that the ventilation system and the FCS meet the requirements of the SR and the functional requirements specified in Chapter 4 of the DSA.

**Surveillance and Testing Summary**

Surveillance and testing activities for the selected safety systems are, for the most part, properly performed in accordance with TSR SRs. With the exception of the annual ventilation system STP, surveillance and testing of the system demonstrate that the system meets applicable system requirements and performance criteria. However, EA identified a significant concern in that the annual system functional test STP does not address the minimum functional requirements for the ventilation system and the supporting FCS as listed in the safety basis and therefore does not meet the SR. Significant management attention is warranted to ensure that the annual STP can fully demonstrate PF-4 ventilation system operability and to provide adequate confidence that the SS functions of the ventilation system will perform as designed in the event of an accident.

## 5.3 Operations

***Criteria***

*Procedures are technically accurate to achieve required system performance for normal, abnormal, remote shutdown, and emergency conditions.*

*Operations personnel are trained on procedure use, proper system response, failure modes, and required actions involved in credible accident scenarios in which the system is required to function.*

*Operations personnel are knowledgeable of system design and performance requirements in accordance with the facilities safety basis.*

*Formal processes have been established to control safety system equipment and system status to ensure proper operational configuration control is maintained in accordance with DOE Order 422.1, Conduct of Operations.*

For the most part, operations were conducted in a manner that ensures the selected safety systems are available to perform the intended safety functions when required. Procedures are generally technically adequate to achieve the required system performance; the exceptions are the alarm and emergency response instruction (AERI) discussed below and the SR procedure for the annual ventilation system functional test discussed above in Section 5.2. With a few exceptions, operations personnel are trained on procedure use, proper system response, failure modes, and required actions for credible accident scenarios in which the selected systems are required to function. No discrepancies were noted in the documentation of completed lessons, certification/recertification records, or qualification cards. Although some training deficiencies were identified, most facility operators have extensive facility experience, and operations personnel are knowledgeable of systems design and performance requirements. Logbooks and round sheets are comprehensive and correctly completed. Shift routines and operating practices provide operations personnel with a current operational awareness (OA) of the selected safety systems, including verification of normal configuration of the major ventilation equipment and major flow paths. Finally, formal processes have been established to control safety system equipment and system status to ensure that proper operational configuration control is maintained.

Although operations are generally adequate, EA observed a few areas where the AERI needs improvement, as well as a significant training and qualification deficiency. If left uncorrected, these shortcomings could reduce the level of confidence and reliability in the selected safety systems' ability to perform as required.

TA55-AERI-001, R12, *Operations Center Alarm/Emergency Response Instruction*, provides specific instructions for alarm and emergency conditions in a series of 77 discrete attachments. For the most part, the procedure is technically adequate and complete in addressing the operator actions for credible abnormal and emergency event initiators assumed in the DSA. However, in a few cases, the attachments do not provide for optimal emergency response (See **OFI-LANS-Ops-1**):

- A few AERI attachments rely on operator or management decisions on emergency response actions without providing criteria or suggestions to guide the decisions. For example, Attachment 7, *Loss of Pressure Differential*, states, "Determine if a HARDWIRE SHUTDOWN is required (Attachment A)," and "Determine if an orderly exit is required (Attachment B)." Attachments A and B provide specific instructions on how to perform the evolutions but provide no criteria for making these determinations. In another example, Attachment 10, *Fire Alarm PF-4*, requires the operators to determine whether an orderly exit is required as a result of a fire alarm, but the only direction given in

Attachment 10 is to initiate the orderly exit "if fire condition necessitates or under supervisor/Ops Manager direction."

- A few AERI attachments direct emergency response actions that could have significant negative consequences if performed incorrectly, but the attachments do not provide specific, single-action steps needed to perform the evolution correctly. For example, Attachment 51, *PF-4 Fire*, provides an instruction to "Entomb PF-4 (close all vault doors, intake and exhaust plenums sealed)" but provides no specific directions on how to perform the evolution and provides no component identifiers. In another example, Attachment 77, *Wildland Fire Response*, provides instructions for a "passive safe shutdown" of the ventilation system but does not define this state, provide specific directions on how to perform the evolution, or provide component identifiers.

None of the eight current TA-55 equipment operators (EOs) are qualified as required by DOE Order 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*, and the TA-55 DSA. DOE Order 426.2 requires qualified operators, and TA55-AP-100, *TA-55, PF-4, Training Implementation Matrix*, provides the mechanisms for meeting DOE Order 426.2 requirements. This matrix specifies EOs as qualified positions and states that the qualification program for EOs fully meets the DOE order requirements with no exemptions. DSA Section 5.5.3.2.11, *Training and Qualification Program*, states, "Personnel involved in operations affecting nuclear safety are to be trained in their tasks before assuming the responsibilities of the position." CT-TA-55-EOP-QS-082, R3, *TA55 Equipment Operator Qualification Standard*, specifies the training necessary to become a qualified EO and includes the EO task descriptions and training requirements for each task. For example, in the case of the ventilation system, one of the specific task descriptions states, "Return ventilation system to operation following a loss of power, equipment failure, or system alignment." Training requirements for this task include classroom training on the PF-4 ventilation and ductwork system. Only two of the current TA-55 EOs have received this classroom training. The rest are not fully qualified for this task as required, and in some cases have been performing the duties of EO for several years without being fully qualified. (See **Finding-LANS-Ops-1**)

Most of the current TA-55 EOs have never completed the requirements for initial EO qualification, such as completing all training requirements and passing a comprehensive examination. Two of the current EOs were qualified in 2010, but they did not complete their two-year requalification requirements and therefore have not been qualified EOs since 2012. According to TA-55 management, much of the TA-55 EO training material, including the written examination and the training lesson plan for the PF-4 ventilation and ductwork system, was known to be inadequate as early as 2010, and it is being revised to better reflect current EO duties, management expectations, and system design. However, the deficiencies in the training program were never formally identified in the LANL PFITS and thus did not benefit from this system's corrective action planning and tracking capabilities. Management indicated that the new training program would be ready for implementation by the end of 2014. However, in the absence of formal identification of the problem, associated corrective actions, and compensatory actions for not meeting operator qualification requirements as specified in the EO qualification curriculum, operators' competence with the ventilation and supporting systems cannot be assured. (See **Finding-LANS-Ops-1**)

**Operations Summary**

Operations are largely conducted in a manner that ensures the availability of the selected safety systems to perform their intended safety functions when required. Most procedures are technically adequate to achieve required system performance. For existing procedures such as operating procedures and STPs, lesson plans that include training objectives have been developed and administered, and Operations Center operators are trained on specific operations procedures and are knowledgeable of systems design and performance requirements. Most facility operators have extensive facility experience. Shift routines and operating practices provide operations personnel with current OA of the selected safety systems,

including verification of the normal configuration of the major ventilation equipment and major flow paths. However, EA noted two problems that, if left uncorrected, could reduce confidence in the selected safety systems' ability to perform as required. Specific areas of concern include the lack of specificity in the AERI for some emergency actions and the lack of qualified TA-55 EOs.

### 5.4 Cognizant System Engineer Program and Configuration Management

***Criteria***

*The DOE contractor has established an effective system engineer program as defined in DOE Order 420.1B Change 1 to ensure continued operational readiness of identified systems to meet their safety functional requirements and performance criteria.*

*Changes to system requirements, documents, and installed components are formally designed, reviewed, approved, implemented, tested, and documented.*

Within the CSE element, EA reviewed the CSE program, CSE training and qualifications, CSE roles and responsibilities, operations and maintenance technical support, and some aspects of configuration management. The configuration management review included examination of three change packages.

**CSE Program**

DOE Order 420.1B Change 1 requires that protocols for implementing the facility CSE program must address the following elements:

- Identification of systems covered by the CSE program
- Configuration management
- Support for operations and maintenance.

The LANL *Facilities Engineering Processes Manual,* P341, briefly describes the CSE program as it is applied to hazard category 2 and 3 nuclear facilities. Vital safety systems are identified and CSEs are assigned as directed in procedure AP-341-101, Revision 2, *Designating Vital Safety Systems and Cognizant System Engineers*. CSEs are assigned to both active and passive systems classified as SC or SS, and to systems with important defense-in-depth functions. P341 also specifically addresses configuration management, support for operations and maintenance, and training and qualification of CSEs. P341 adequately addresses these fundamental program elements.

**CSE Training and Qualifications.** DOE Order 420.1B Change 1 requires that CSEs be qualified as described in DOE Order 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities* (November 15, 1994), Chapter IV, paragraph 2f, Technical Staff for Non-Reactor Nuclear Facilities. The LANL *Facility Engineering Training and Qualification Manual*, P343, addresses training and qualification requirements for CSEs, including system-specific training and oral qualification board examination. Requalification is required bi-annually. The qualification requirements and associated training requirements in the manual meet the requirements of DOE Orders 420.1B Change 1 and 5480.20A. At TA-55, LANS has rigorously implemented the P343 manual. The training records for the two CSEs involved in this review confirmed that they were appropriately selected, trained, and fully qualified. Documentation was compliant with the bi-annual requalification requirement and reflected an overall commitment to training and qualification of the CSEs that was comprehensive, well documented, and timely.

**CSE Roles and Responsibilities.** LANL *Facility Engineering Training and Qualification Manual*, P343, also includes an Engineering Roles and Responsibilities Matrix for Configuration Management and Support to Operations and Maintenance, which outlines roles and responsibilities for CSEs in those areas. This document, in combination with P341 (noted above), adequately describes and establishes requirements for a CSE program which meet the requirements of DOE Order 420.1B Change 1.

The CSE is the focal point for system documentation, with roles in the configuration management process, procurement of spare parts and replacement items, and development of maintenance recommendations based on manufacturer guidance. Broadly, the CSEs are also involved in:

- Maintaining continual awareness of system status and configuration
- Tracking and trending system performance
- Reviewing and approving vendor submittals
- Preparing unreviewed safety question (USQ) evaluations
- Approving design changes
- Concurring with surveillance test results
- Performing operability evaluations
- Conducting system assessments.

EA reviewed the TA-55 program to assess performance in several of these areas and the tools available to the CSE to meet the varied expectations.

LANL procedure AP-341-802 Revision 3.1, *System Health Reporting*, provides guidance for CSEs in tracking and reporting on the performance of their systems. It requires each CSE to develop a system health monitoring basis. Once that basis is approved, the CSE must collect and analyze data and use it to prepare periodic system health reports (SHRs).

The assigned CSEs for ventilation and confinement were well informed on the status and physical condition of their systems. In particular, the CSE for ventilation exhibited active participation in maintenance activities related to that system. Tracking and trending were performed in accordance with AP-341-802, and quarterly SHRs were issued.

The SHRs assess system function against the metrics and criteria established in the system health basis, providing a meaningful tool for tracking the status of system components, maintenance activities, surveillances, and open issues. The SHRs are also used to track corrective action commitments. The two reviewed SHRs were in accordance with procedure AP-341-802. The most recent SHR covered the period from July 1, 2013, until December 31, 2013. Operability and availability were reported to be 100%. (LANL exempts outages due to planned maintenance from the calculation of system availability.) The report noted positively that vibration data is now being taken and processed internally and is used to predict future maintenance issues. It identified one open corrective action on the system and no late surveillances. PM and CM work orders for the period were listed. One trend was noted (increasing differential pressure on the inlet cooling coils for two supply plenums). Overall, the SHRs are an effective tool for managing issues and reporting on system health.

The document receipt process ensures that vendor manual submittals are put into Documentum, the electronic records system, before distribution. The CSE is the primary receiver of this information and also performs an important role in independently verifying that vendor manuals are retrievable through this system.

Among other responsibilities, the CSE must maintain qualification to perform and/or review USQ screenings and determinations related to assigned systems, supplementing efforts by the safety basis group with system-specific knowledge and input. The CSE performs a similar role in preparing operability evaluations when necessary. EA verified compliance with this requirement as part of the training review.

**Periodic VSS Assessments.** LANL Procedure AP-341-901 Revision 4, *Performing Vital Safety System Assessments*, governs the internal assessment process, with assessments required for safety significant systems as a minimum every five years. The most recent assessment of these systems was performed in early 2014 with the report issued in June 2014. *LANL Vital Safety System Assessment Report Summary for: Ventilation System/Ventilation Confinement System*, SAR-14-TA55-HVAC/HVACCF-003, looked at design information, surveillance and testing, configuration management, and maintenance. The assessment included a review of design basis documents, walkdowns to verify field configuration, and examination of several design change packages. It was performed by three TA-55 individuals not normally associated with those systems (limited independence). The LANL assessment was acceptably in-depth and compliant with DOE-STD-1073-2003.

**Resolution of Technical Issues.** EA followed up on selected issues identified in an April 2010 SSO assessment performed by NA-LA, FO/SET:19CF-250299, *TA55 Confinement Ventilation System*. EA identified several significant technical issues on safety SSCs from the April 2010 assessment that have not been adequately addressed.

In finding VSS-TA55-VENT-F-10-11, NA-LA questioned the closure of valves in fire sprinkler lines to plenums. LANL responded that those valves were normally closed by original design, but noted that the plenums should have drains to accommodate water from the deluge nozzles. LANL closed the original PFITS item, 2010-1737, to Design Change Form (DCF) 157, which was originated on September 21, 2010, to add drain lines. At that time, LANL identified this as a potential National Fire Protection Association (NFPA) code compliance issue. However, EA could find no record that DCF 157 had ever been processed. (See **OFI-LANS-CSE/CM-1**)

In finding VSS-TA55-VENT-F-10-15, NA-LA questioned the lack of damper functional testing. In discussions with the CSE, EA found that approximately 50 dampers are required to change position (either go full open or full closed) on loss of air to their actuators. Although many of these dampers get cycled in the normal course of fan switching and other routine system evolutions, LANL has not established regular periodic maintenance requirements. NA-LA had identified a vendor recommendation that, "All automatic dampers should be checked and serviced on a regular schedule. Recommended interval is every 6 months, preferable not more than 12 months. Maintenance staff should prepare and enforce adherence to this planned and scheduled maintenance." LANL prepared procedure PA-DOP-01188 Revision 0, *PF-4 Ventilation System Critical Damper Positioning Verification*, and performed that procedure during performance of STP-103 in 2013. However, no requirement is in place to drive performance of this procedure in the future. (See **OFI-LANS-CSE/CM-2**)

In finding VSS-TA55-VENT-F-10-21, NA-LA questioned design airflows through some HEPA filters that exceeded the tested ratings for the filters. Flow rates in excess of design capacity result in reduced filter efficiency and indeterminate filtering performance, which is not in compliance with DOE STD-3020-2005, *Specification for HEPA Filters Used by DOE Contractors*. The confinement system design description (SDD), TA55-SDD-BLDG-1210 R1, *Safety Class Confinement System Design Description*, states in section 3.3.2 that HEPA filters must meet this standard. LANL prepared a written justification based on actual flow rates during normal system operation, but did not address the highest flow rates predicted under design basis event conditions. During off-normal events, such as design basis events, loss of a normal confinement boundary could significantly change flow resistances in the system, leading

to pressure readings that would drive the variable speed fans to the upper limits of their operating ranges with commensurate higher flows through the HEPA filters. (See **Finding-LANS-CSE/CM-1**)

During a walkdown of the PF-4 basement, an NA-LA FR found a small hole in a flexible exhaust boot between an exhaust fan and the exhaust ductwork. These boots are part of the confinement boundary. They provide separation between the fan and duct for seismic and thermal purposes and are made of glass fabric impregnated with silicone sealant. LANL determined that the boot should be replaced like-for-like. NA-LA verified completion of that activity. LANL also instituted an annual inspection of the boots to prevent recurrence of this concern by identifying wear issues earlier. During the problem evaluation process, LANL noted that these boots are susceptible to damage from fire and determined that combustible-free zones should be established in the immediate vicinity of each boot. EA's questioning of the CSE about this issue raised the possibility, later confirmed, that the south side bleed-off fan room had not been posted as a combustible-free zone, although it contains such boots. (See **OFI-LANS-CSE/CM-3**)

**Configuration Management**

Chapter 5, *System Engineer Program*, of DOE Order 420.1B, Change 1, Attachment 2, requires hazard category 1, 2, and 3 nuclear facilities in operational status with SC or SS SSCs to have a documented configuration management program to ensure consistency among system requirements, performance criteria, documentation, and physical configuration. It notes that DOE-STD-1073-2003 provides an acceptable means of meeting these requirements. A similar requirement is contained in DOE Order 413.3B, which is also applicable to LANL, and states that, "A configuration management process must be established that controls changes to the physical configuration of project facilities, structures, systems and components in compliance with ANSI/EIA-649A and DOE-STD-1073-2003."

The EA team limited its review of configuration management to three of the five principal areas: design requirements, change control, and document control. These areas are addressed individually below.

**Design Requirements.** Design requirements must be established in design basis documents to ensure that the safety basis requirements and commitments are being met and to establish design inputs for lower tier design implementing documents, such as calculations, physical drawings, and procurement specifications. LANL procedure AP-341-405 Revision 3.1, *Identification and Control of Technical Baseline, Variances, Alternate Methods, and Clarifications in Operating Facilities,* governs the technical baseline for the facility. It defines the minimum documents required and assigns the CSE responsibility for identifying and maintaining the Technical Baseline List for each system. It also provides guidance on the classification of system drawings as priority, support, or general drawings. EA reviewed both the piping and instrumentation diagrams (P&IDs) and the SDDs for the ventilation system and the confinement system. EA noted discrepancies in Section 3.4.2 of TA55-SDD-BLDG-1210, which calls for monthly efficiency testing of HEPA filter banks in six places, a requirement that should have been met every 18 months. No other discrepancies were noted. The technical baseline process was adequately applied, resulting in an appropriately documented design basis. **(**See **OFI-LANS-CSE/CM-4**)

**Change Control.** Change control is the process through which changes to the facility SSCs are proposed, evaluated, approved, and implemented. A structured, procedurally controlled process is necessary to ensure that facility impacts are appropriately analyzed before a change is implemented and that affected documents are updated to reflect the configuration of the facility after a change occurs. The change control process is governed by AP-341-517 Revision 1, *Design Change Form*, which describes the process for creating, implementing, and closing work packages and for making physical changes to the facility. EA reviewed this procedure and interviewed key individuals within the TA-55 organization

to assess the requirements in place to manage the facility technical design basis during the change process.

The DCF development process is adequately robust. Proposed changes undergo reviews before and after approval, ensuring that impacts on the system are thoroughly evaluated. Design authority representatives (as defined in P341) perform technical reviews in accordance with AP-341-621 Revision 2, *Design Authority Technical Review.* The CSEs also perform detailed technical reviews of impacts to these systems. Both of these processes help identify impacts on other upper tier and lower tier documents. USQ evaluations are generated by qualified safety basis evaluators.

The DCF closure process is less robust. As discussed below under Document Control, timely updating of drawings upon completion of a modification is a longstanding issue.

EA reviewed three change packages for ventilation system and confinement system SSCs in order to sample implementation of the change control process. The first, DCP-09-004, documents a completed modification that refurbished three air dryers in the PF-4 ventilation system. The air dryers provide dry air to the Zone 1 system for supply to the gloveboxes. The dryers are non-safety related and seismically qualified for position retention only (ML-4, performance category 3), although one aspect of this modification was to upgrade the anchorage of the dryers to the building foundation for position retention purposes during a seismic event. The refurbishment included general replacement of desiccant and components with moving parts; installation of new digital controls; removal of concrete anchors; and installation of a new anchorage design using Drillco maxi-bolts. A hazard analysis was performed to identify potential jobsite hazards and impacts to the facility, and a USQ evaluation was performed.

The original calculations in the package were adequate. However, during implementation, Field Change Request (FCR)-004 approved a reduction in anchor bolt embedment depth from 4½" to 4" and in anchor bolt diameter from 1/2" to 3/8". The FCR and the associated USQ screen referenced a calculation, 5789-09-S-01, R1, that was contained in FCR-001 but did not evaluate the anchor bolt changes. When EA questioned the basis for approval of FCR-004, LANL was able to determine that the engineering contractor for that job, Merrick & Company, had reviewed the changes. Merrick prepared the drawing revisions that went into the FCR and revised the calculation, but did not transmit the calculation revision for inclusion in the package. Therefore, this change package does not contain or reference adequate technical justification for the embedment depth change and bolt diameter reduction in FCR-004. Additionally, the USQ determination for FCR-004 referenced the original calculation as the basis for its conclusion when, in fact, the package did not include any technical justification for the acceptability of the change, indicating lack of diligence in the USQ preparation process. **(**See **Finding-LANS-CSE/CM-2**)

The second change package that EA reviewed, DCF-13-55-0004-080, was initiated to design and install four new exhaust sample points in the PF-4 Zone 1 exhaust downstream of the HEPA filters to monitor for and quantify potential radioactive releases. When implemented, this package will make new connections to existing ductwork to install new suction piping, which will then be connected to the existing continuous air sampling system. At the time of the EA review, this package was engineering complete but implementation had not begun. Figure 1 is excerpted from drawing 55Y-003274 R.0 (unclassified) in the design change package.

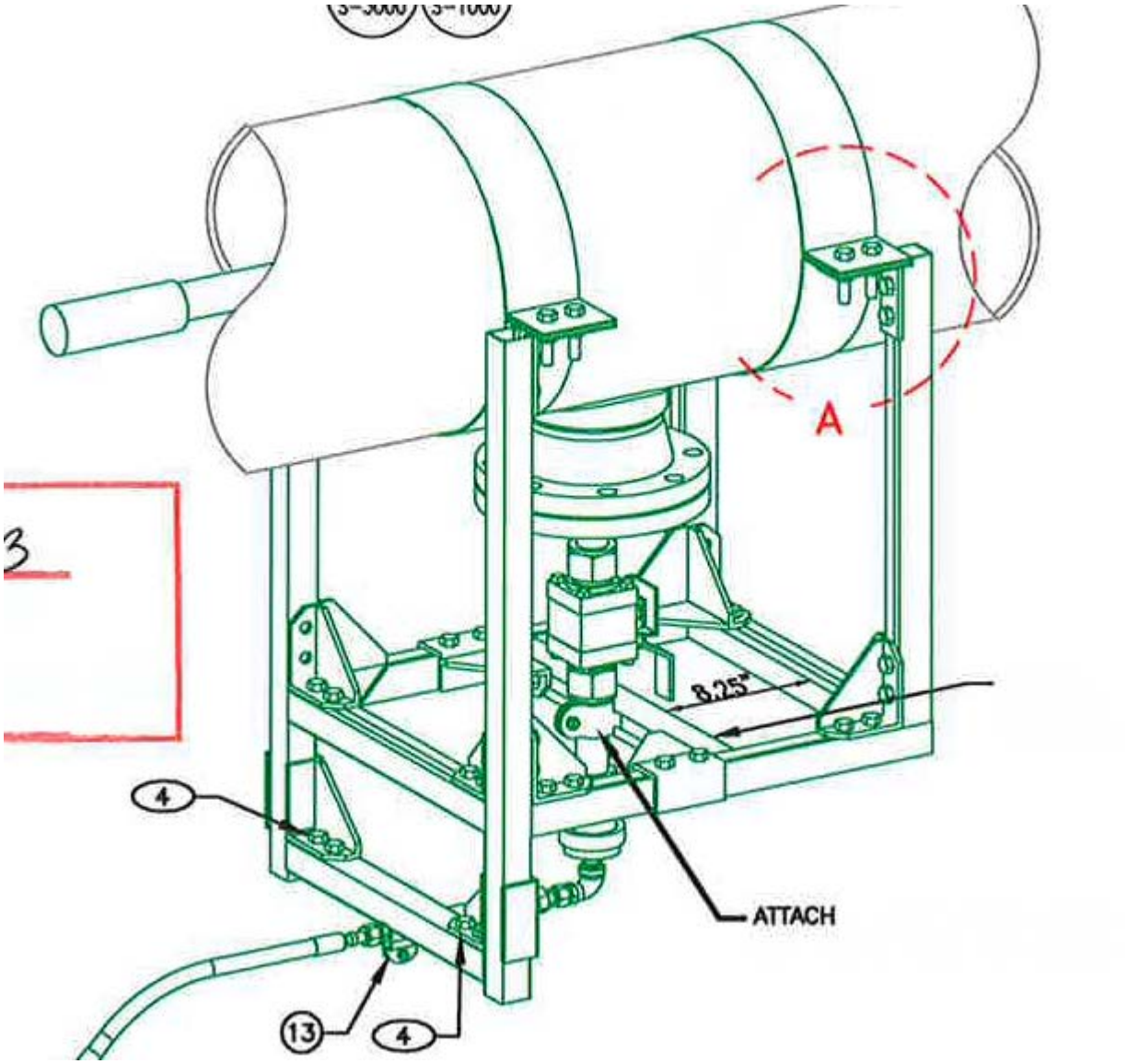


**Figure 1. Proposed New Exhaust Sample Point Configuration**

The duct is 16 gauge sheet metal, with a 1/16" wall thickness. At each new sample point, 6" diameter 150 pound class pipe fittings are to be welded to the duct. The pipe transitions to 1-1/2" downstream of a blind flange and to ½" downstream of a filter canister. The assembly is supported laterally on the 1-1/2" portion and vertically on the ½" portion from a unistrut frame strapped to the duct itself. EA identified several concerns about the design and with the supporting analysis:

- The weight of the assembly was underestimated by 10 to 15% because the weight of the weldolet (a type of reinforced pipe fitting normally used at branch locations in piping) was omitted, resulting in commensurate underestimation of calculated loads and stresses. The calculation did not reference any design input or source for component weights.
- The frame does not provide any significant vertical support to the assembly, resulting in a concentrated weight to be supported by the sheet metal duct.
- The package did not include any analysis of local stresses at the attachment to the duct or any

consideration of stress intensification effects, which could increase calculated stresses significantly.
- The design of the weldolet-to-duct attachment calls for a 1/8" weld (twice the duct wall thickness), increasing the potential for burn-through on the duct during the welding process and creating an unplanned breach in the confinement boundary.
- The structural analysis did not assess the impact of the added assembly and support frame weight on the qualification of adjacent duct supports. This duct and its supports are SC and are required to remain functional after a design basis seismic event.
- The USQ screen for this package concluded that it did not present a failure of a different type than those already considered. Given the issues identified here, that conclusion may have been incorrect.

EA noted other minor issues in the package. The P&ID update did not include line sizes for the larger fittings. The specification called for 300 pound class fittings, while the drawings indicated 150 pound class fittings. No class break was shown on the P&ID at the SC boundary. Because of these considerations, the modification design and analysis in this change package are not adequate to ensure that the SC duct will continue to meet its performance expectations following implementation. **(**See **Finding-LANS-CSE/CM-3**)

The final change package that EA reviewed, DCP-10-001, upgraded large doors that form portions of the confinement boundary. This package is closed. The technical portions of the package are adequate. Changes to door anchorages were evaluated as part of the upgrade, and the affected priority drawings were red-lined to as-built prior to closure. Support and general drawings have not been updated. This package also evidenced an effective and thorough review process. It was noted that the closure package, a PDF file pulled from Documentum for this review, contained numerous pages with legibility issues, indicating problems in the document scanning process. (See **OFI-LANS-CSE/CM-5**)

**Document Control.** Document control is an essential aspect of configuration management. Design records must be kept up to date, and processes must be in place to ensure that the latest version, reflecting the as-built status of the facility, is available for use. In describing the change process, AP-341-517 states that priority baseline documents must be updated before the change package is closed but does not address other types of documents. Some ongoing practices are not supportive of effective document control. For example:

- Priority drawings are not always updated in a timely manner after a physical modification. An internal LANL assessment performed in early 2014 (discussed below under Assessments) found that drawing AB308 sheet M31 had not been updated to reflect the change in ducting in that area by DCF-250-003. This drawing remained out of date at the time of this review, and the DCF remains open awaiting the drawing update. Discussions with Engineering personnel revealed a large backlog (approximately 2,750) of unincorporated changes against priority drawings that is being worked off at a rate of 150 per year. Each drawing update may incorporate multiple changes from several design change packages, and approximately 200 old design change packages are affected. Therefore, TA-55 has a significant backlog of open change packages remaining to be closed. This backlog impedes configuration control, since the design basis can be determined only by reviewing the issued drawing and all unincorporated changes. (See **OFI-LANS-CSE/CM-6**)
- Procedures do not require logging of change package impacts against support and general category drawings, but these are now logged in practice, based on guidance in a desktop instruction. DOE STD-1073-2003 requires that all drawings be kept up to date, not just priority drawings. (See **OFI-LANS-CSE/CM-8**)

- The data entry process for change packages in Documentum does not require a second-party review or verification to ensure the accuracy of entries. (See **OFI-LANS-CSE/CM-8**)
- Design change packages remain in hard copy until closure. They are not available from Documentum until they are scanned after closure, even though they are needed to ensure accurate representation of the current configuration. Change packages reviewed as part of this assessment were implemented over multiple years, during which time that information was available only in hard copy, and only in two places. (See **OFI-LANS-CSE/CM-7**)
- Changes to documents that are part of a design change package (such as SDDs) do not get posted against those documents to ensure retrievability by other parties. (See **Finding-LANS-CSE/CM-4**)

**Cognizant System Engineer Program and Configuration Management Summary**

The CSE program for the ventilation and confinement systems and the implementing procedures are consistent with the requirements of DOE Order 420.1B Change 1. Engineers have been assigned to each of the SC and SS systems. The CSEs are knowledgeable of facility processes and their assigned systems. Within the configuration management program, design requirements and bases for these systems are well established and documented. The design change package development process is also robust. However, technical justifications provided to support design changes were found to be weak or inadequate. Also the processes for design change closure and document control have some shortcomings that contribute to changes not being appropriately posted against affected documents (all affected documents, not just priority drawings) and incorporated in a timely manner once the modification is complete. TA-55 has a very large backlog of priority drawing updates, creating a significant impediment to effective configuration management. Finally, the LANS response to several previous NA-LA assessment issues related to the selected systems was inadequate in determining and completing corrective actions, indicating a less-than-robust corrective action process.

## 5.5 Safety System Feedback and Improvement

***Criteria***

*The contractor's assurance system has processes in place and effectively monitors and evaluates engineering, configuration management, maintenance, surveillance and testing, operations, and operating experience, including the use of performance indicators/measures, allocation of resources and the identification and application of lessons learned.*

*Formal processes are in place and effectively implemented to identify and analyze problems and issues (including operational incidents and events) related to engineering, configuration management, maintenance, surveillance and testing, and operations assurance activities and conditions; to identify, track, monitor, and close corrective actions; and to verify the effectiveness of corrective actions.*

*Results of engineering, configuration management, maintenance, surveillance and testing, and operations assurance processes for safety systems are periodically analyzed, compiled and, as appropriate, reported or available to DOE line management as part of contract performance evaluation.*

A critical aspect of ensuring VSS functionality, operability, and reliability is a feedback and improvement process incorporating monitoring and trend analysis for system operability, analysis of incidents and off-normal conditions, and lessons learned. EA evaluated the establishment and implementation of feedback and improvement programs and processes that affect nuclear safety systems at PF-4. Specifically, EA reviewed feedback and improvement program and process documents; interviewed responsible managers and staff; and evaluated samples of process outputs, such as assessment reports, issues management

documentation, trend and performance indicator reports, incident and event analysis reports, and lessons-learned publications related to nuclear safety conditions and activities at PF-4.

LANL feedback and continuous improvement programs and processes are described in SD320, *Los Alamos National Laboratory Contractor Assurance System Description Document*; SD200, *Integrated Safety Management System Description Documen*t; and SD330, *Los Alamos National Laboratory Quality Assurance Program*. SD320 describes four basic contractor assurance system (CAS) components: goals, metrics, assessments, and improvements. The Goals element includes a set of defined multi-year goals and associated performance improvement strategies and commitments and incorporates risk management and requirements flowdown. Performance is measured with metrics that are developed and monitored at various organization levels and maintained in a web-based Metrics Dashboard, with key laboratory-wide metrics aggregated in an Executive Risk Register monitored routinely by senior management. The Assessments CAS component includes management and independent assessments as well as structured, but less formal, management observation activities. The Improvements CAS element includes issues management (described by LANL as performance feedback and improvement), process improvement (using proven techniques such as Lean Six Sigma), and lessons learned. Since early 2012, the CAS has been administered at the institutional level through the QPA Division in the Business Innovations associate directorate in the Operations and Business principal directorate. The designated Contract Assurance Officer is the Principal Associate Director for Operations and Business. Previously, a contractor assurance group reporting directly to the Deputy Laboratory Director administered the CAS. LANS is contractually committed to implement ASME NQA-1-2008, *Quality Assurance Requirements for Nuclear Facilities Applications.* The general requirements in the quality assurance program structure and responsibility section of NQA-1 requires that assurance personnel have sufficient authority, direct access to responsible levels of management, organizational freedom, and access to work to perform their function, including sufficient independence from cost and schedule. Movement of the assurance authority under an operations and business entity with more indirect reporting to the Director's Office may not meet the spirit or intent of NQA-1. (See **OFI-LANL-F&I-1**)

The CAS is implemented by LANS workers and contractors, with oversight and participation by line managers, line organization assurance staff, and functional area and subject area staff. Assurance functions related to the PF-4 facility and activities are implemented by staff from the Associate Directorate for Nuclear and High-Hazard Operations (ADNHHO) and the Associate Directorate for Plutonium Science and Manufacturing (ADPSM). Although the CAS has been implemented, some process and implementation deficiencies limit its effectiveness, as described in the following sections.

**Assessment Program**

The LANL assessment program is described in program description PD328, *LANL Assessment Program*. The assessment program is implemented in accordance with a set of procedures that detail the development and maintenance of an integrated assessment schedule (IAS) and the requirements and actions for planning, performing, and documenting internal independent assessments; management self-assessments; and management observations and verifications (MOVs). In addition to these laboratory-wide types of assessment activities, the implementation of LANL nuclear facility safety basis requirements and controls designed to implement facility safety bases (e.g., TSRs, safety management programs, specific administrative controls, and design features) is regularly assessed by conducting implementation verification reviews as described in DOE Guide 423.1-1A, *Implementation Guide for Use in Developing Technical Safety Requirements.* VSSs are routinely assessed. EA reviewed assessment-related program documents, approximately eight formal assessment reports, and a sampling of MOV reports related to nuclear facilities and related safety management systems.

Procedure P238-1, *Performance Assurance Planning Cycle and Integrated Assessment Schedule Maintenance*, details the use of a structured, risk-based assessment planning tool for managers and assurance personnel in independent, line, and functional organizations to develop annual assessment schedules. Organizations are to identify required (mandatory) process and operational assessments and elective assessments based on process and operational risks, performance, trends, process changes, and event data analysis. Collectively, the input from laboratory organizations forms the IAS. However, implementation of the assessment planning process by the nuclear organizations – i.e., the TA-55 Facility Operations Director (FOD), ADPSM, and ADNHHO – is less structured than the process detailed in LANL procedures. Mandatory assessments have been identified but are often postponed, few elective assessments are performed and in general the selection process is informal. For the attributes identified in P238-1, LANS has not identified the population of organizational functional and administrative programs and processes, and individual areas are not being assessed. Assessments planned or scheduled by the TA-55 FOD for fiscal year (FY) 2014 and 2015 are all related directly to VSSs, but no elective assessments are identified for administrative or functional processes (e.g., issues management, assessment planning, occurrence reporting). ADPSM has identified processes/functional areas but inappropriately describes them as "risk statements," without identifying the risk. In addition, ADPSM proposes only four management assessments for FY 2015, and only one of eight planned assessments for FY 2014 had been completed as of two months from the end of the FY, while two were postponed until FY 2015 and one was cancelled. ADNHHO is attempting to identify business processes and functional area risks but has found it challenging to effectively execute the process for analyzing the many areas/activities, risks, and facilities in this organization. Inconsistencies and deficiencies in the application of the assessment planning process are known, and the QPA staff initiated a Lean Six Sigma process analysis for performance assurance planning in March 2014 but has not completed this review. (See **OFI-LANL-F&I-2**)

A cornerstone of the LANL independent assessment program for nuclear and moderate or high hazard facilities since 2007 is the conduct of facility-centered assessments (FCAs). Approximately three FCAs are performed annually. The CAS description document describes FCAs as "periodic, comprehensive, performance-based reviews of work activities at key facilities" that "are conducted within the framework of the major safety management programs that govern all LANL facility operations." The assessment planning procedure indicates that the performance of an FCA is directed by the Institutional Management Review Board (IMRB) or by Associate Directors (ADs) where the assessments have the same rigor and focus on "compliance and work execution." Otherwise, the CAS description states only that the IMRB directs performance of FCAs. Furthermore, FCAs are only briefly referenced and defined in assessment planning procedure P328-1 and are not addressed by name or function in procedure P328-2, *Independent Assessment*, or in the assessment program description document (PD328). Although no institutional procedure specifically governs the identification, planning, or execution of FCAs, QPA-PA-QP-001.000, *Managing Facility Centered Assessments*, issued in November 2013, describes the roles and responsibilities of QPA personnel and procedure steps for planning, performing, and documenting an FCA. The QPA procedure describes the program as a partnership between QPA, which provides the program leader, assessment team leaders, and deputy team leaders, and the ADNHHO, which provides assistance in scheduling and identification of key operations to assess. (See **OFI-LANL-F&I-3**)

Per the QPA procedure, FCAs are performed at facilities on a three-year cycle to provide ongoing evaluation of key functional areas and performance trends. EA reviewed a sample of FCA reports for assessments conducted since 2007. FCAs have been valuable, in-depth reviews that have identified many issues for correction and opportunities for improvement. However, it appears that the scope and depth of FCAs have declined over the years. Older FCAs addressed 15 to 20 functional areas, with almost the same number of subject matter experts (SMEs) conducting the evaluation. On the other hand, recent FCAs have as few as 4 SMEs evaluating 15 functional areas, with a notable reduction in the number of findings and OFIs. While the reviewed FCAs addressed different facilities, involved different assessors,

and might reflect performance improvement, the overall process warrants evaluation to ensure that the effectiveness of the program has not degraded due to resource allocation or process evolution. (See **OFI-LANL-F&I-3**)

QPA initiated a formal assessment quality review process several years ago. QPA Work Instruction QA-PA-WI-002.000, *Work Instruction for Evaluation of Assessment Plans and Reports*, approved in August 2013, describes a process for sampling 80% of LANL independent and management assessment plans and reports each quarter, evaluating the samples against provided quality criteria, and communicating the results to the assessment team leaders and to team leaders assigned for the current year. The instruction also states that the results are to be posted to the LANL Metrics Dashboard quarterly. The work instruction provides an extensive list of evaluation criteria (12 for plans and 22 for assessment reports), with possible numerical scores for each criterion. QPA provided EA with records for evaluations of 106 plans and 117 assessment reports in the past three years, indicating a significant level of effort. However, there is no evidence that these results had been provided to any team leaders or to management. The evaluation results were included in a QPA organizational level metric, but not an institutional level metric. Further, the metric for assessment reports is reported as "yellow" (48 to 68 percent of available rating points) and the metric detail sheet identifies a number of "opportunities for improvement," but no specific corrective actions have been identified to improve assessment quality. In addition, the criteria and allocated points do not sufficiently prioritize critical elements, such as identifying all deficiencies as formal issues and properly categorizing deficiencies as findings rather than OFIs (which were not review criteria), and allocating four times as many points for the team leader signing the report (which was always done) than allocated for more substantive criteria. (See **OFI-LANL-F&I-4**)

Managers in LANL nuclear facilities also conduct routine, documented facility walkthrough inspections to observe work activities, material conditions, and compliance with safety requirements in accordance with procedure P328-4, *Management Observation and Verification*. Problems and issues requiring follow-up are required to be entered into the LANL issues tracking system. In 2014, due to the criticality safety program issues and associated work shutdown in PF-4, ADPSM issued memoranda formally emphasizing management floor presence and increased expectations for managers to conduct documented MOVs from one per month to one per week. This expectation applies to over 60 managers and is being formally tracked and monitored by senior management. One potential weakness in the MOV process is that procedure P328-4 permits organizations to document MOVs in organization-developed systems instead of using the MOV module in PFITS, and many organizations use such alternate systems. This fragmentation of information hampers effective institutional monitoring of program implementation and trending.

Most of the assessment reports that EA reviewed reflected comprehensive and rigorous evaluations of processes, conditions, work activities, and performance documentation. Issues requiring resolution or further evaluation were identified and input to PFITS. Two notable exceptions to this conclusion are further described below.

The management self-assessment of the LANL CAS and CAS implementation (report issued in September 2013) was not sufficiently comprehensive, rigorous, or self-critical. The assessment identified no findings, two "issues," three observations, and six OFIs. The term "issue" is not included in the list of assessment result types specified in procedure P328-3, *Management Assessments*, which specifies only findings, OFIs, and noteworthy practices. In addition, the first OFI identified in the report states that multiple organizations were not processing findings (non-compliances with requirement) in accordance with the LANL issues management process, thus meeting the definition of a finding, not an OFI. Several of the criteria cited for evaluating CAS implementation, as well as the evaluation text, focused on process rather than performance. For example, the first "implementation" criterion for the five evaluated CAS elements is that the CAS "processes" are sufficiently defined so they can be executed in a repeatable and

predicable manner. Another "implementation" criterion is that formal issues management "processes" exist that apply to all areas covered by the CAS and that roles and responsibilities are clearly identified. In a number of areas, the assessor's evaluation of implementation was based solely on interviews, with no review of performance. A variety of statistics were cited as positive attributes that actually indicated performance weaknesses warranting improvement actions. For example: (1) approximately 92 percent of PFITS items had been screened by the Management Review Board (MRB) as required by procedure, (2) approximately 80 percent of closed PFITS items had objective evidence provided as required, and (3) 80 percent of objective evidence (when provided) supported closure. (See **OFI-LANL-F&I-5**)

Another recent QPA assessment reflected weaknesses in the identification of evaluation criteria. The report of an independent assessment of MRBs (issued in March 2014) evaluated 23 LANL MRBs against 16 criteria developed from requirements in P322-4, *Laboratory Performance Feedback and Improvement Process*. The criteria addressed requirements, and the assessment included interviews, document reviews, and meeting observations and resulted in three findings and several improvement items; however, the criteria did not include any qualitative elements. For example, most of the criteria were based on "yes/no" questions, such as whether an MRB was established or whether an Improvement Management Coordinator (IMC) was appointed. None of the criteria addressed whether the MRB's actions or decisions were adequate or accurate, just whether they were made. Criteria topics that could have evaluated qualitative elements, but did not, included trending, extent of condition, self-evaluation of performance, and review of objective evidence. (See **OFI-LANL-F&I-6**)

**Issues Management**

EA reviewed the issues management program description document, implementing procedures, and MRB charters; attended MRB meetings and Executive Management Review Board (EMRB) meetings; and reviewed numerous PFITS records. LANL has established a set of procedures and guides that detail the processes, requirements, and guidance for documenting, categorizing, evaluating, and correcting deficiencies and addressing OFIs using a graded approach. Program description document PD322, *Laboratory Performance Feedback and Improvement*, outlines the LANL issues management program. The requirements and actions for managing problems and improvement opportunities are detailed in procedure P322-4. Performance feedback includes negative process or performance issues (e.g., non-compliances with requirements, findings, or deficiencies), as well as noteworthy practices, identified through internally or externally conducted assessment activities or resulting from incidents, accidents, or operational events. Each organization manages feedback through chartered MRBs established by ADs or Principal ADs. ADNHHO, ADPSM, and the TA-55 FOD have appointed MRBs. Feedback is entered into PFITS by the personnel identifying the issue or by designated organization IMCs. The procedure does not require feedback items identified as OFIs, recommendations, or observations to be entered into PFITS or formally managed, but leaves this decision to management's discretion. The IMC prepare the feedback information for management review (including clarifying the issues, recommending risk levels for some issues, and recommending an improvement approach) and identifies an Improvement Responsible Manager (IRM). The MRB reviews feedback information and designates a risk level if applicable, an IRM, and the improvement approach to be used. A set of criteria for two risk levels are provided for non-compliances that have significant (Risk Level 1) or moderate (Risk Level 2) impacts on various factors, such as health and safety, reliability or safety function of the facility, meeting regulatory requirements, potential for recurrence, or effect on other items or activities. Non-compliances that do not meet these criteria are not assigned a risk level. The three available management approaches are the Issues and Corrective Action Management (ICAM) process for Risk Level 1 or 2 issues or DOE Occurrence Reporting and Processing System (ORPS) reportable events; the Performance Improvement Action Tracker (PIAT) system for issues deemed less significant, including non-compliances not assigned a risk level and OFIs for which actions need to be tracked to closure; and improvement processes, such as Lean Six Sigma or untracked management action. Procedure P322-4 specifies the minimum requirements

for management elements for Risk Level 1 and 2 issues, such as causal analysis and effectiveness reviews, and includes guidance for developing corrective actions and effectiveness reviews. In addition, a QPA SharePoint website provides additional guidance regarding issues management activities. The only direction or requirements for the PIAT process in P322-4 is related to the IRM's responsibility for reviewing evidence for action completion. Procedures P322-1, *Causal Analysis and Corrective Action Development*, and P322-3, *Performance Improvement from Abnormal Events*, provide additional specific requirements and process steps for managing issues.

In addition to local organization MRBs, the IMRB is mentioned briefly in the CAS description document SD320, and several procedures (P322-4, P322-1, PD328 and P328-1, P322-3, and P781-1, *Conduct of Training*) specify some responsibilities for the IMRB. These include roles or responsibilities for managing institutional matters, such as performance feedback, governance, assessments, and risk categorization, as well as expectations addressing efficiency in management and mission and operational performance. These documents also describe the IMRB's roles and responsibilities for developing and approving the IAS, directing performance of FCAs, evaluating and assigning/managing action for significant institutional and external issues, monitoring performance feedback and improvement, and taking action on trend analysis. The LANL Director established the IMRB by charter on May 1, 2012. However, the Director reconfigured the IMRB in the spring of 2014 to the EMRB. The EMRB has no charter but is a larger, AD-level management team that focuses on the Risk Register and Metrics Dashboard. The EMRB has not been fulfilling all functions specified in the IMRB charter.

Although the processes are adequately documented for the most part, the LANL issues management program does not adequately establish processes and controls that are fully effective in ensuring that process and performance problems are identified and entered into PFITS, accurately described and categorized for significance, appropriately evaluated on a graded approach for extent of condition and causes, and addressed with effective action and recurrence controls. Safety issues have been improperly closed with inadequate evaluation, irrelevant or inadequate corrective actions, insufficient recurrence controls, lack of consideration of extent of condition and cause, and missing or insufficient objective evidence for closure. (See **Finding-LANS-F&I-1**) EA observed many examples of performance and process deficiencies in the management of safety issues:

- Many of the nuclear safety related PFITS issues that EA reviewed had not been appropriately or effectively managed by LANS. Deficiencies included inadequate evaluation of the issues; irrelevant or inadequate corrective actions; no corrective actions for specific examples supporting a broader issue; insufficient recurrence controls; lack of consideration of extent of condition or causes; missing or insufficient objective evidence; and issues inappropriately rolled into other issues for which existing actions were insufficient or irrelevant, without providing additional actions to address the newly added issues. NA-LA and EA have formally identified significant deficiencies in the LANL issues management program numerous times in the past. EA evaluated a sample of the issues resulting from 2012 and 2013 NA-LA assessments of the laboratory's management and resolution of issues related to nuclear facility safety systems to evaluate how well LANL managed the new issues resulting from these assessments. That review identified the following concerns:

    - A September 2012 NA-LA assessment of the effectiveness of LANS corrective actions for safety system issues identified five findings reflecting incomplete and inaccurate issue screening and characterization, inadequate documentation in PIAT, inadequate issue significance grading process, and ineffective corrective actions and recurrence controls. NA-LA described these as findings that "represent a significant risk to performance." EA determined that LANS had not effectively addressed any of the five findings. Four of the issues were rolled into existing PFITS issues, and three of these were subsequently rolled again into other existing PFITS items. The new "parent" PFITS items either did not address the topic

of the new issue or indicated "no further action required." LANS identified no actions in PFITS to address the specific technical performance deficiencies cited in the NA-LA report that supported four of the findings. The fifth NA-LA finding was related to ineffectively addressed findings from a 2011 waste management FCA, and the PFITS item (2012-4184) remains open two years later, with one proposed action (to review the findings to ensure they were effectively addressed) that was due on December 24, 2013.

- NA-LA conducted three assessments in December 2013 to evaluate the effectiveness of LANL's issues management system in addressing findings identified in three 2011 SSO nuclear facility VSS assessments (fire suppression system, lightning protection system, and uninterruptible power supply). These reviews found that approximately 23 percent of the collective issues from these assessments had not been effectively addressed, that 18 of the *adequately* addressed issues were missing some documentation in PFITS to demonstrate effective resolution, and that 3 issues showed no objective evidence that they were effectively addressed. NA-LA inappropriately chose to address these deficiencies only on a case-by-case basis, rather than identifying the large number of deficiencies in management of VSS-related issues as a programmatic finding. LANS also failed to identify and address this collection of new issues as a new programmatic feedback item. Further, EA determined that LANL had been ineffective in addressing one of the new issues (ineffectively addressed NA-LA finding) and associated recommendations. Specifically, for PFITS 2011-3795, LANS did not reopen the PFITS item as recommended and did not document any action that may have been taken to address the issue of the adequacy of changes made in the mounting method used for the UPS Seismic Kit. For PFITS 2011-3765, LANS never added the missing objective evidence to support closure in PFITS.

- EA conducted a shadow assessment of the NA-LA assessment of LANL issues management conducted in 2012 as discussed above and also conducted a separate review of corrective actions taken by LANS related to previously reported EA fire protection issues. The EA review determined that LANS had not adequately evaluated six of the nine EA findings, and specifically that LANS did not address safety basis compliance or the adequacy of systems that challenged safety basis requirements.

- LANS was deficient in dispositioning a 2010 NA-LA SSO finding related to the lack of a USQ determination for locking the HEPA filter plenum sprinkler isolation valves in the closed position in the PF-4 Confinement Ventilation System. The MRB screened the finding to be handled via the PIAT process (i.e., the MRB determined that this was not a moderate or significant risk issue and required no analysis). LANS determined that the lack of a USQ determination was not an issue because the configuration was part of the original, approved design and thus involved no change to the safety basis that would require a USQ determination. On the other hand, LANS also determined that leaving the valve in the closed position did not meet NFPA requirements and that an equivalency or exemption ruling from the NFPA would be required to document that "valving out" the plenum sprinklers was acceptable. At this point, LANS should have closed out this PIAT item and opened a new PFITS record for the deviation from NFPA requirements. LANS did not do this, and subsequently determined that the preferred configuration was to open these valves and leave them open during normal operations; no equivalency or exemption decision would be requested of NFPA. However, leaving the valves in the open position would require the installation of drain valves in the plenums. A design change to install drain valves was initiated and all PFITS actions were closed, but no additional action was initiated to actually install the drain valves. As of August 2014, the valve configuration remains non-compliant with NFPA, the PIAT record remains open, and there is no open action to install the drain valves to achieve compliance. (See **Finding-LANS-F&I-1** and **OFI-LANS-CSE/CM-1**)

- One of the actions for addressing the NA-LA findings from the 2012 corrective action assessment discussed above was for QPA to perform an analysis of closed performance feedback records. QPA established nine evaluation criteria at the PFITS record (i.e., issue) level and five evaluation criteria for the action level. Criteria address adequacy of feedback descriptions, justifications for deletion or "no further action required" determinations, consideration of extent of condition, cause analysis, adequacy of corrective actions, adequacy of objective evidence for closure, and timeliness of action completion. QPA evaluated more than 100 PFITS records (closed in May 2014), involving over 230 actions, and determined that for 6 of the 14 criteria, performance was considered a "concern" (i.e., over 15% of the records or actions did not meet the criteria). However, QPA's conclusions did not result in any additional action or new issues. QPA is continuing to sample completed PFITS monthly against these criteria and plans to summarize the results after six months. This planned six-month delay in the results summary (indicating that issues management deficiencies identified by NA-LA in 2012 were continuing to occur) to the personnel responsible for implementing the issues management process contributes to further performance deficiencies within the organization and fails to alert senior management to the problems. (See **Finding-LANS-F&I-1** and **OFI-LANS-F&I-6**)

- An NA-LA SSO assessment conducted in July 2014 included an evaluation of LANS's corrective actions to address the findings from a 2010 SSO fire protection system VSS assessment. The 2014 assessment identified that LANS had not effectively resolved more than half of the findings related to this safety system.

- The EMRB is not functioning as a replacement for the IMRB as specified in various CAS documents and has not assumed the responsibilities of the IMRB by any formal mechanism (e.g., procedure, charter, memorandum).

- P322-4 adequately defines and details the interface with event reporting processes, the improvement approach for event based issues, and the distinctions between Risk Level 1 and 2 issues and event based issues, which are not assigned risk levels but ranked in accordance with DOE directive significance category criteria. However, P322-4 does not adequately describe the ICAM-ORPS module, through which reportable event based conditions are managed.

- Training is not required, but only "recommended," for managers, supervisors, responsible line managers, IRMs, and MRB members who are involved in performing, reviewing, and approving important issues management program activities and products. Although procedure P322-4 requires IMCs to complete four different training courses related to issues management, it identifies only "recommended" training courses for IRMs and MRB members who have many important responsibilities and final decision making authority for effectively managing and resolving safety issues. A QPA independent assessment of MRBs, completed in March 2014, found that none of the 69 MRB members reviewed had completed the recommended training. Procedure P322-1 does not require any task specific training for responsible line managers (RLMs) or appointing officials with causal analysis and corrective action development responsibilities and only "recommends" a human performance improvement (HPI) investigation course. Procedure P322-3 states that managers and supervisors involved in event investigations or cause analysis should "consider" taking LANL formal courses in causal analysis and HPI. Without these fundamental courses, managers and supervisors may not fully understand their responsibilities or possess the minimum competencies needed to effectively perform their assigned issues management program functions.

- The definition of terms and recommended improvement approaches are inconsistently and inadequately defined in P322-4 and QPA website guidance and are not adequately linked to risk level evaluations and determination. For example, different improvement approaches are recommended for

assessment feedback issues described as “concerns”, “deficiencies”, and “weaknesses”, but these terms are not defined, although any of these terms could represent issues of variable risk and significance. In addition, LANS defines the term “issue” is specifically as a failure to meet requirements that results in a “significant risk to performance,” and criteria for categorizing feedback are defined for Risk Level 1 as having “significant” impacts on safety, health, environment, and reliability and for Risk Level 2 as having “moderate” impacts in these areas. However, in many places P322-4 refers to Risk Level 2 “issues,” contradicting those definitions.

- Causal analysis and corrective action development procedure P322-1 makes no distinction between root and apparent causes, even though the DOE ORPS manual specifies root and apparent cause analysis for different event significance levels. The results of LANL cause analyses are directed to be “conclusions” and “causal factors,” rather than causes. P322-1 also does not address recurrence controls (as distinct from corrective actions) except for one oblique reference; however, P322-4 states that corrective action plans include actions intended to prevent recurrence. P322-1 inadequately addresses evaluation of extent of condition in that it requires extent of condition to be considered only for ORPS Significance Category 1 (no such conditions have been identified at LANL for years) and Risk Level 1 conditions (one in the past three years) and for Noncompliance Tracking System reportable issues (as required by DOE directives). Further, P322-1 says that extent of condition is only “recommended” for moderate level cause analyses (for such issues as ORPS Significance Level 2 and 3 and LANL Risk Level 2 conditions). However, P322-4 states that, at a minimum, a statement of extent-of-condition consideration is to be included in PFITS for Risk Level 2 “issues.” Although the procedures are non-conservative in addressing the use of extent-of-condition evaluations, EA’s review of a sample of fact finding reports for ORPS reportable and sub-ORPS events indicated that extent of condition is routinely considered for these events and included as action in PFITS.

- P322-3, the abnormal events performance improvement procedure, places additional laboratory administrative requirements on declaring and managing DOE ORPS Significance Category R (recurring events), thereby possibly discouraging appropriate identification of recurring events in ORPS. P322-3 specifies that declaration of a Category R event requires the concurrence of the Deputy Laboratory Director and “chartering of a resource intensive Team Investigation.”

- The distribution of risk categorizations and improvement approaches indicates a non-conservative threshold for applying the more rigorous management elements of the ICAM process to process and performance problems. Only one issue has been categorized as Risk Level 1 since 2011, and DOE ORPS reportable events constituted approximately 40 percent of problems managed in the ICAM process between 2011 and August 14, 2014. Approximately ten times as many problems are managed by the less-rigorous non-ICAM improvement approaches.

**Event Reporting and Analysis**

LANL has established processes for identifying, investigating, and reporting reportable events and periodically analyzing performance trends for events and safety issues as required by DOE directives. The CAS description and Attachment Six of the LANL Conduct of Operations Manual, P315, describe the general processes and identify the policies and procedures for investigating and reporting abnormal events. Institutional procedure P322-3 details the process for responding to, reporting, investigating, and managing corrective/preventive actions for events. Causal analysis and corrective action procedure P322-1 provides additional detail on ORPS investigation and analysis, and performance assurance document CAO-FSD-322-3-001, *Abnormal Events Handbook*, details the requirements and processes for QPA, FODs, and ADNHHO personnel involved in responding to abnormal events.

LANS identifies and formally addresses many incidents at TA-55 that do not rise to a level requiring reporting to DOE by means of fact finding meetings to identify and correct process or performance deficiencies and weaknesses. "Fact findings" are conducted for more than three times as many non-ORPS reportable incidents/events as reportable events. The TA-55 fact finding reports include generally comprehensive documentation of the incidents (detailed incident descriptions and timelines and identification of participants and work activities and actions taken), as well as initial analysis of apparent causes and proposed corrective/preventive actions. However, TA-55 has recently changed its description and documentation of immediate investigations of incidents and events as fact findings, rather than as the "critiques" that are described in institutional procedures and the *Abnormal Events Handbook*. Further, because the LANS procedure includes cause analysis and corrective action identification in the fact-finding process, significant biases could be introduced before all the facts of the event have been established. The cause analysis and results during fact findings may be conducted by persons who lack cause analysis training, and their status and role are not adequately defined in contrast to the requirements and expectations for cause analysis performed by trained analysts as detailed in performance feedback improvement procedures. Determining causes during a fact finding effort with a group, rather than with selected and trained analysts, can detract from the fact finding process, as well as adversely affecting or conflicting with subsequent cause analysis efforts during the issues management process. (See **OFI-LANL-F&I-7**)

Trending is discussed in several processes and reported in the *LANL Mirror* (a quarterly lessons-learned publication) for both ORPS and sub-ORPS events at the macro level. For example, the FY 2014 third-quarter *Mirror* reported on 37 occurrence reports, which were grouped according to the ten ORPS reporting criteria. Trends for most types of events showed improving trends. However, six of the nine events at TA-55 in that quarter were "Facility Status" events that involved performance degradation of an SC or SS SSC, or a support system that is required for safe operation of the SC and SS SSC. This proportion of Facility Status events represents a significant increase for this group – four times the TA-55 average. However, LANS initiated no action and offered no explanation for this trend. (See **OFI-LANL-F&I-8**)

**Operating Experience/Lessons Learned**

LANS has established and implemented a generally robust, structured operating experience/lessons learned program that identifies, evaluates, and provides for appropriate application of lessons learned from external operating experience and internal activities, conditions, and events. Lessons learned are being generated and put into SharePoint libraries for the site and certain divisions. Lessons learned are identified, distributed, and incorporated into safety meetings/messages, work planning, training, and work execution by management and staff.

The basic lessons-learned program expectations defined in SD320, *Los Alamos National Laboratory Contractor Assurance System Description Document*, is augmented by Process Description PD323, *LANL Operating Experience Program*, and implemented at the institutional level by procedure P323-1, *Operating Experience and Lessons Learned Process.* EA reviewed the facility-level procedure that implements lessons learned guidance for TA-55 (TA-55-AP-078, R0 *Lessons Learned Program*) and provided feedback for an in-process revision. Procedures adequately detail the roles, responsibilities, and action steps to identify, communicate, and apply internally and externally generated lessons learned. The SharePoint website is easily accessible and is searchable by keywords. As discussed above under Event Reporting and Analysis, trending information is shared, but existing processes are not effective in translating the trend results into effective action. (See **OFI-LANS-F&I-8**)

Procedure P781-1 *Conduct of Training*, requires the incorporation of lessons learned in the development and revision of training. The *Conduct of Training Manual*, CT-COT-MAN-633, further requires

evaluation of lessons learned, industry operating experiences, and occurrence reports for inclusion in training development, continuing training, and examinations. Records of continuing training for certified operators partially demonstrated implementation of the lessons-learned requirements of P781-1. However, as discussed in Section 5.3 of this report, the training program for equipment operators has not been implemented as required, and implementation of the lessons-learned requirements of P781-1 for the TA-55 equipment operator training program is not evident. (See **Finding-LANS-Ops-1**)

Procedure P300, *Integrated Work Management*, specifically addresses the inclusion of past experience and lessons learned in the work planning process through the job hazards analysis process and includes requirements for performing post-job reviews to identify lessons learned for future work. *Integrated Work Document (IWD) Part 4, Feedback/Post Job Reviews* is used to document lessons learned from work activities. A 2012 revision of this procedure strengthened the requirement for documenting feedback and lessons learned and better integrated the expectations with other institutional lessons-learned processes.

Procedure P950, *Conduct of Maintenance*, describes how lessons learned are used in the maintenance of facilities and systems. Administrative procedure AP-WORK-002, *Work Planning*, requires LANL personnel use the MSS Division Lessons Learned online archive for collecting and sharing maintenance-related lessons learned. Administrative procedure AP-MNT-007, *Measuring, Analyzing, and Reporting of Maintenance Program Performance*, establishes the controls for gathering maintenance performance data, analyzing trends, determining the cause of problems, identifying corrective actions to prevent recurrence, and taking action to ensure continuous improvement. Administrative procedure AP-WORK-005, *Work Closeout*, also has a requirement for the work management team to review completed work packages for lessons learned and to identify improvements in the work process. EA found that one lesson learned from a work package completed in 2014 addressing "System & Component Failure, Heating Hot Water Systems" was well written and included action recommendations.

While lessons-learned information is captured through post-job reviews, sharing of this information beyond the work team depends on follow-up by the supervisor/PIC to initiate a shareable lesson learned within the FOD or at the institutional level. Fact-finding meetings after events may or may not result in assignments to generate a lesson learned.

The TA-55/Plutonium Science and Manufacturing (PSM) lessons-learned coordinator distributes lessons learned to first line managers through the *FLM Weekly Safety Message,* which is a resource for weekly staff safety meetings. The lessons-learned coordinator emails daily and weekly lessons learned of potential interest for the daily TA-55/PSM standup meeting. At the site level, a daily lesson-learned link is posted on the *LANL Inside NEWS* website.

The LANL institutional lessons-learned coordinator screens operating experience/lessons-learned data sources (i.e., DOE ORPS reports and published lessons learned, as well as non-DOE sources) daily for applicability to LANL, using the Lessons Learned Process Team (a multi-disciplined group that collects, screens, and makes lessons learned available) and enlisting the help of technical SMEs and knowledgeable organization staff as needed, to determine appropriate actions (e.g., distribution for sharing and application, or requiring a formal response). LANL continues to publish the *LANL Mirror*, a quarterly publication on the review and analysis of events and lessons learned at the laboratory and from *Operating Experience Weekly Summary* emails. The LANL lessons-learned coordinator maintains a comprehensive spreadsheet of operating experience documents reviewed, applicability reviews conducted, actions taken, and feedback from end users.

Both LANL and NA-LA have input lessons learned to the DOE lessons learned-system, reflecting active engagement and valued interaction with the system.

**Performance Measures**

LANS Contract Clause H.4.(j) specifies use of "a process for development of performance metrics and performance targets to assess programmatic and operational performance, including benchmarking of key systems and process areas with other NNSA/DOE contractors and industry and research institutions to enhance processes, that will result in achievement of best in class/industry performance where efficient, cost effective and does not compromise ISM and ISSM [integrated safety management and integrated safeguards and security management]."

The LANL CAS document states that the CAS consists of the following principal components: goals, metrics, assessments, and improvements. LANS has established a mature process for analysis of trends through metric measurement described by PD324, *LANL Metrics Program*, and implemented through the CAS description document SD320. This process description states that "The purpose of the Laboratory Metrics Program is to provide a comprehensive framework for metrics that allows for effective monitoring and managing of organizational performance in order to achieve safe and secure mission delivery." These metrics are derived from laboratory goals and support risk-based decision-making to select goals, measures, assessments, and improvements. Metrics developed at the process level flow up to the LANL Metrics Dashboard that reports monthly on the status, with green/yellow/red colors representing the status of the measures. Any red or yellow metrics are to be annotated with an explanation and action plans in the Dashboard Briefing Book.

In addition to the Metrics Dashboard, laboratory management has for years employed an Executive Risk Register as a tool for informing senior management of ongoing, current performance in areas of risk to accomplishing the laboratory's mission and complying with contractual and regulatory requirements. Areas of concern to senior management and risks to the laboratory are identified and added to the Risk Register, and associated conditions and performance are monitored through supporting metrics documented and maintained in the Register. The condition of individual risk areas are color coded (green, yellow, red). The status of items on the Risk Register are routinely briefed and reviewed by senior management in EMRB meetings (and previously in IMRB meetings). Senior management adds or deletes items as appropriate, based on evolving conditions, requirements, and performance. However, the requirements and process for establishing, maintaining, and using the Executive Risk Register are not described by any formal LANL procedure.

SD320 states the following:

> "To anticipate changing risk levels and emerging risks across all activities, the LANL CAS ensures that trending and analysis approaches are in place for the Laboratory's key systems, identified in Table C.1. Data sets used for trending and analysis are selected for providing insight into system performance and actionable information. Results of trending and analysis for the key systems are provided to management entities with the appropriate decision-making authorities, such as the LANL Executive Team, the LANL Team, the Institutional Management Review Board (IMRB), organizational MRBs, and subject area management committees."

The EMRB has taken on the responsibilities of the "LANL Executive Team" as described in SD320, although this transfer of responsibilities has not been formally established. The "LANL Team" discussed in SD320 (with responsibilities for establishing and maintaining effective metrics) is not defined, and it is not clear who is currently responsible for what. Further, LANL organizations often incorrectly or insufficiently describe "risks" by simply stating a condition, without identifying the adverse consequences (the risk). This deficiency is apparent in the institutional Executive Risk Register and individual Dashboard metrics, as well as in risks identified for assessment planning. Further, the "risks" being monitored are not necessarily the greatest risks in a topical or functional area. For example, the issues

management risk in the Executive Risk Register is that the trend of an increasing number of open issues and the long average cycle time to closure "may indicate an unsustainable process." Timely closure of issues is certainly important, but it is not the greatest risk in managing issues, and it is especially not the greatest weakness that EA identified in the LANL issues management program (as discussed above). The term "unsustainable process" inadequately describes the risk of allowing uncorrected safety-related process and performance deficiencies to persist, potentially without evaluation or mitigation. Further, although the "quad charts" associated with LANL metrics include a field for analysis, there is no field for documenting the actions being taken or the associated documentation, such as PFITS numbers for metrics rated as yellow or red or trending negative, and metrics owners do not always put this information in the analysis field. In the case of the "yellow" Executive Risk Register metrics for issues management, the analysis is simply a rewording of the risk statement indicating that an adverse trend in open issues may indicate an unsustainable process. In many cases, the quad charts have no entries for the analysis or the owner's comments or actions as required by PD324. (See **OFI-LANL-F&I-9**)

**Safety System Feedback and Improvement Summary**

LANS has established and is implementing feedback and improvement programs and processes necessary for evaluation of nuclear safety processes and performance at LANL. Feedback and improvement processes are described in program description documents and procedures. Many assessment-like activities are planned and scheduled to evaluate programs and performance at LANL nuclear facilities using a structured process, and these activities are performed and documented as scheduled and in a generally comprehensive and rigorous manner. Safety issues are identified and input to an issues management process using a graded approach. Incidents and events, including those below DOE occurrence reporting thresholds, are formally documented and investigated, and corrective actions are identified and implemented. Internal lessons learned are identified, documented, shared, and, along with external lessons learned, screened for inclusion in work documents and training. Knowledgeable, engaged performance assurance staff and line organization issues management coordinators provide management with guidance and analytical feedback concerning processes and performance, and they communicate facility and institutional assurance activities and results.

However, the performance feedback and improvement program needs significant management attention. A considerable number of safety issues are not being effectively managed (i.e., properly categorized and evaluated, addressed by corrective and preventive actions that are developed and implemented effectively, and closed when proper actions are completed and supporting evidence is verified). Process and procedure weaknesses contribute to implementation deficiencies. Senior management, line organizations, and independent assessments have not been sufficiently rigorous or self-critical when evaluating performance in managing safety issues or holding personnel accountable for compliant and effective implementation. In addition, the performance assurance group is not used effectively to foster effective and compliant feedback and improvement processes, and its organizational placement and roles, responsibilities, and authorities warrant evaluation by senior management.

## 5.6 Los Alamos Field Office Safety Oversight Program

***Criteria***

*DOE field element line management has established and implemented oversight processes that evaluate contractor and DOE programs and management systems, including site assurance systems, for effectiveness of performance (including compliance with requirements). Such evaluations are based on the results of operational awareness activities; assessments of facilities, operations, and programs; and assessments of the contractor's assurance system. The level and/or mix (i.e., rigor or frequency in a particular area) of oversight may be tailored based on considerations of hazards, the maturity and operational performance of the contractor's programs and management systems. (DOE Order 226.1B 4b(1)).*

*DOE field element line oversight program includes written plans and schedules for planned assessments, focus areas for operational oversight, and reviews of the contractor's self-assessment of processes and systems. (DOE Order 226.1B 4b(2)).*

*The DOE field element has an issues management process that is capable of categorizing findings based on risk and priority, ensuring relevant line management findings are effectively communicated to the contractors, and ensuring that problems are evaluated and corrected on a timely basis. For issues categorized as high significance findings, the issues management process ensures that:*

- *A thorough analysis of the underlying causal factors is completed;*
- *Corrective actions that will address the cause(s) of the findings and prevent recurrence are identified and implemented;*
- *After completion of a corrective action or a set of corrective actions, the conduct of an effectiveness review using trained and qualified personnel that can verify the corrective action/corrective action plan has been effectively implemented to prevent recurrences;*
- *Documentation of the analysis process and results described in (a) and maintenance tracking to completion of plans and schedules for the corrective actions and effectiveness reviews described in (b) and (c) above, in a readily accessible system. (DOE Order 226.1B 4b(4)).*

*Oversight processes are tailored according to the effectiveness of contractor assurance systems, the hazards at the site/activity, and the degree of risk, giving additional emphasis to potentially high consequence activities. (DOE Order 226.1B 4b(5)).*

*DOE line management has established and communicated performance expectations to contractors through formal contract mechanisms. Such expectations (e.g., safety performance measures and commitments) are established on an annual basis, or as otherwise required or determined appropriate by the field element. (DOE Order 226.1 B 4c).*

*DOE line management has in place effective processes for communicating oversight results and other issues in a timely manner up the line management chain, and to the contractor as appropriate, sufficient to allow senior managers to make informed decisions. (DOE Order 226.1B 4d).*

*Field elements have developed and implemented an Operating Experience (OE) Program and identified and designate an OE Program Coordinator. The OE Program uses a graded approach when addressing the applicability of requirements and the basis for this approach is documented based upon the review*

*and analysis of the hazards and risks for the program and its operational activities. (DOE Order 210.2A, 4a).*

*DOE field element line management reviews and approves the initial contractor assurance system program.*

In addition to the focused review of the LANL feedback and improvement processes that affect nuclear safety systems, EA performed a broader evaluation of the establishment and implementation of NA-LA programs and processes for conducting oversight of the management and operation of nuclear safety systems and NA-LA internal feedback and improvement systems and performance. Specifically, EA reviewed program and process documents, interviewed responsible managers and staff, and evaluated samples of process outputs, such as assessment schedules; assessment, surveillance, and OA reports; issues management data; and contract performance-based evaluations.

**NA-LA Oversight Program**

Management Procedure (MP) 00.08, *Implementation of Los Alamos Site Office Line Oversight*, details the overall approach, responsibilities and requirements for conducting line oversight of the LANL management and operating contractor, LANS. Details of how the various oversight program elements are performed are provided in implementing procedures and work instructions (WIs). MP 00.08 describes the use of transactional oversight, systems oversight (direct observation and evaluation of processes and performance, including OA and assessment activities), and systems-based oversight (output from the CAS, coupled with sampling verification of requirement implementation). The procedure addresses the DOE/LANS contract defined approach to oversight of increasing contractor accountability as a result of implementing an effective CAS, with a shift in the balance from transactional to systems-based oversight as the CAS demonstrates maturity, based on the inherent risk of the activity or functional area. Oversight techniques discussed in the procedure include management self-assessments; external assessments; joint assessments with LANS; assessment of the CAS; independent assessment of facilities, operations, and programs; OA activities; shadowing of LANS-conducted assessments; and annual evaluation of performance to contract requirements. The procedure also describes performance of risk-informed (based on annual formal risk analyses), for-cause focus area assessments, such as operational readiness reviews and reviews of the effectiveness of LANL corrective actions. NA-LA assessments and NA-LA-owned issues are entered into the appropriate modules in the ePegasus database used by NNSA. Issues in LANL programs, processes, and performance are entered into PFITS and ePegasus.

NA-LA has defined a comprehensive, risk-based oversight program and established implementing procedures for developing formal oversight plans and schedules. However, there are weaknesses in these procedures, and the documentation and performance of oversight planning activities and routine monitoring of contractor management of DOE-identified issues lack sufficient rigor. Most of the reviewed procedures and WIs contain requirements that either are insufficiently defined or conflict with other procedures or WIs, as discussed below. (See **OFI-NA-LA-F&I-1 through 5**)

**Assessment and Operational Awareness Activities**

Procedure MP 00.13, *Risk Informed Oversight Planning*, details the requirements and action steps for planning and conducting transactional and systemic CAS oversight activities. The procedure details the development of an NA-LA annual master assessment schedule (MAS) and integration of the MAS with the laboratory's assessment schedule into an IAS. MP 00.13 specifies that the MAS is developed by the Assistant Managers (AMs) and staff for their assigned functional areas, using a risk-based analysis of functional area elements. This procedure details a step-by-step process and tools for performing the risk analysis and a template for summarizing the results. It also allows AMs to conduct a subjective analysis

for developing the assessment plan instead of using this process and tools. The CAS program manager collates the AMs' assessment plans into an integrated schedule for the NA-LA Manager's approval.

In addition, NA-LA has established WI 00.13, *Annual Assessment Planning*, which provides a tool and structured process for SMEs to rate the maturity of the CAS in each functional area. Using this process, the SMEs are to consider alignment with laboratory goals, the LANL Metrics Dashboard, assessment performance, issues management, and other improvement processes, such as lessons learned and Lean Six Sigma. SMEs rate the areas as mature, mature with improvement needed, not mature, or no CAS for that area, and draw a conclusion as to whether or how oversight for the coming year is to be modified as a result of the evaluation. SMEs are to identify and evaluate the risks for the functional areas within their responsibility and, based on the CAS evaluations, identify the assessments to be performed, including regulatory-required assessments. The laboratory's IAS input is reviewed, proposed assessments are modified as appropriate, and the MAS is approved by the NA-LA Manager and sent to the contractor for integration into the IAS.

EA reviewed the oversight planning outputs from both the MP 00.13 and WI 00.13 processes for nuclear safety functional areas. A great deal of appropriate oversight is being scheduled, performed, and documented, but there are process and performance weaknesses in oversight planning. Although various pieces of the specified planning processes are performed and documented, the MP and the WI are not well integrated, and the two processes are not always rigorously and uniformly applied. Neither procedure discusses the use or inclusion of shadow assessments in the MAS, and MP 00.13 does not reference review of or integration of the MAS with the laboratory's assessment schedule. Although generally rigorous, the risk assessment and assessment plans for the Nuclear Safety Team for FY 2013 and FY 2014 were not developed using the format or tools of MP 00.13. Active and passive SC and SS SSCs in the various nuclear facilities were each evaluated for risks and required timing for assessments by LANS or NA-LA, and then ranked for assessment priority. The risk analysis for FRs was not up to date, and no independent assessments from this group were identified for input to the schedule in FY 2014 or planned for FY 2015. Further, the CAS manager was not able to locate SME functional area evaluation forms (Attachment 1 from WI 00.13), used for assessment planning and collective CAS evaluation, for FY 2013, and the evaluation forms for many functional areas were not submitted in FY 2012 (reports for 8 of 44 identified functional areas were submitted) or FY 2014 (reports for 13 of 44 areas were submitted). (See **OFI-NA-LA-F&I-1**)

NA-LA is planning, scheduling, and performing self-assessments of Federal programs. In general, most of the reports that EA reviewed were appropriately comprehensive, substantive, and well documented. Procedure MP 04.01, *Integrated Project Team Roles and Responsibilities*, defines the establishment and functioning of cross-functional teams in support of project execution. However, these teams are not identified, do not routinely act to integrate oversight, and do not perform integrated oversight activities. No FR/SME team assessments are planned or performed. NA-LA has not included cross-functional contractor performance discussions in weekly Periodic Issue Report meetings, which also have been abandoned. (See **OFI-NA-LA-F&I-1 and 5**)

The requirements and processes for conducting independent assessments of LANL programs and processes are contained in MP 00.12, *LASO Independent Assessment Process*. This procedure was last revised in 2009 and does not address current LANL and NA-LA organizations and processes. The procedure does not have action steps for team members to review and sign reports or for management to review and approve reports, although an attached template contains team member and team leader approval signature blocks. The procedure references the previous LANL contractor's issues management system and states that contractor issues are entered into ePegasus, even though MP 00.08 requires contractor issues be entered into and tracked in PFITS. MP 00.08 also exhibits various other deficiencies. (See **OFI-NA-LA-F&I- 2**)

A separate work instruction, WI 06.03, *Facility Representative Contractor Assessment*, describes process steps for FR team assessments that are not consistent with the governing field office procedures MP 00.12 and MP 00.08. It requires FRs to verify only that corrective actions are "completed," not that they are adequate or effective. (See **OFI-NA-LA-F&I-2**)

EA reviewed a sample of 15 completed assessment reports related to nuclear safety. In general, the assessments were well planned, thorough, and well documented. The reports were balanced in identifying good processes and performance as well as many substantive deficiencies in LANL processes and performance. The reports were formally transmitted to the contractor, typically with directions to enter findings into PFITS and notify NA-LA of the record numbers. However, in many cases, NA-LA identified numerous deficiencies related to safety system issues and LANS's ineffective evaluation of safety system findings, but NA-LA's reports identified only the individual examples of deficient corrective action as findings and did not roll the examples into a single finding or create another finding for the deficient issues management program. (See **OFI-NA-LA-F&I-5**)

As discussed above, NA-LA nominally collects CAS evaluation input from functional area SMEs annually, and identifies and reports many CAS-related process and performance deficiencies to the contractor for resolution. In addition, the NA-LA CAS Program Manager and his AM meet biweekly with the LANS QPA Division leader to discuss issues management and other CAS topics. However, LANS's performance in self-identification of problems – and especially in effectively resolving problems – has remained problematic, and NA-LA has not been successful in driving significant improvement. The last formal NA-LA assessment of the laboratory's CAS was in 2010 and was limited to interviews with contractor managers and members of the contractor's Board of Governors. While that assessment report was critical of the progress and effective implementation and use of the CAS, it focused primarily on problems and inconsistencies in managers' identification and use of feedback data to drive improvement and did not evaluate the various CAS element processes or implementation. In 2011, the NA-LA CAS Program Manager provided the NA-LA Manager with a compilation and analysis of the functional area CAS reviews for FY 2012 assessment planning. That analysis identified several concerns about some NA-LA organizations' failure to submit CAS review forms, lack of alignment in the ratings and narrative descriptions provided by functional area managers, and the lack of CAS maturity indicated by the ratings. The summary information in the NA-LA CAS analysis report included business and security organization evaluations but did not single out nuclear safety as a rating area. However, the best ratings were at the "mature, but improvement needed" level, and several averaged out at the "not mature" rating. The former rating indicates that the elements of the CAS are in place but that the CAS lacks sufficient implementation or effectiveness to support management decisions on program improvement. These ratings are generally consistent with the ratings provided for FY 2014 assessment planning. There is no indication that any additional, formal actions were taken as a result of that analysis to address either the problems in NA-LA staff's completion of the evaluations or the contractor's continuing poor CAS performance. In addition, there is no evidence of any subsequent or continuing NA-LA action to provide a collective status determination or tabulation of CAS status for functional area elements. (See **OFI-NA-LA-F&I-3**)

Although much of the oversight for LANL nuclear facilities is transactional, many of NA-LA's planned oversight activities are shadow reviews of contractor assessment activities. The data from these reviews is not used for collectively evaluating the LANL CAS. MP 00.08 describes the use of shadowing LANS assessments as an NA-LA assessment mechanism, and WI 00.04, *Assessment Shadow Activity Reporting*, describes requirements for conducting and documenting a shadow assessment, including record forms to be attached in the ePegasus assessment record. These forms provide a list of evaluation attributes (with associated guidance) for rating the LANS assessment and a field for a narrative summary of the assessment and issues identified by the NA-LA assessor. However, NA-LA has not used the collective

results of these evaluations of the CAS assessment element to formally evaluate contractor performance for this element. (See **OFI-NA-LA-F&I-3**)

In addition to independent and shadow assessments, oversight functions include performing OA activities, developing and using performance measures to evaluate programs and management systems, and evaluating the effectiveness of the LANL CAS. These activities are performed and documented by external groups, program/functional area owners, FRs, and SMEs. SSO responsibilities for OA are explicitly stated in MP.06.02 and are discussed in the next section of this report. These oversight activities identify contractor process and performance deficiencies and opportunities for continuous improvement. WI-06.01, *Operations Oversight/Surveillance Issues Reporting*, requires Operations personnel to record each OA activity in ePegasus. Most issues in ePegasus are entered by SSO engineers, and only a few are entered by FRs and functional area SMEs. In practice, FR activities are reported to the FR lead in a weekly summary, but OA activities are commonly documented in ePegasus only if an issue is identified and documented on a form (Attachment A) from WI 00.12, *Oversight Issues Reporting*. This is also true for SSO and SME activities, but no weekly reports are generated. Only Operations personnel have any formal direction regarding the documentation of OA activities. Because OA results are a key element in determining the scope and mix of evaluations that need to be performed, the absence of a documented record for what facility conditions and contractor processes and activities were evaluated through OA inhibits assessment planning and CAS evaluation. Further, although WI 06.01 states that it "supplements" WI 00.12, it conflicts with both WI 00.12 and MP 0012; WI 06.01 requires issues to be communicated to LANS as an email enclosure, but WI 00.12 does not assign responsibility nor address transmitting the issue to the contractor, and MP 00.12 requires independent assessment reports and associated findings be transmitted to LANS through the NA-LA Contracting Officer or Contracting Officer Representative. NA-LA oversight procedure MP 00.08 also requires that assessments and findings be transmitted through the Contracting Officer, but is silent on findings from OA activities. (See **OFI-NA-LA-F&I-2**)

**NA-LA SSO Program**

NA-LA has established and implemented processes and procedures to effectively implement the SSO program in accordance with Appendix D of DOE Order 426.1, *Federal Technical Capability*. The roles, responsibilities, qualifications, and NA-LA management's expectations of NA-LA SSOs are adequately defined in NA-LA MP 06.02, *Safety System Oversight.* Implementation of the SSO program is supported through a suite of additional NA-LA procedures and WIs, most of which are discussed below. The personnel currently assigned to the SSO roles for the selected systems are appropriately trained and qualified in accordance with MP 02.04, *Technical Qualification Program*. A Site Specific Qualification Standard for SSO personnel was developed and is required in addition to General Technical Base and Functional Area (technical specialty) qualification standards. One SSO engineer is assigned duties other than his original assignment, which was to serve as the SME for fire protection, so no qualified SSO is assigned specifically to maintain an appropriate fire protection technical capability. (See **OFI-NA-LA-F&I-4**) The supervisor of the Nuclear Safety Team (which includes the SSOs) was recently assigned responsibility for supervising the SSOs and is in the process of completing his qualification as a Senior Technical Safety Manager under approved compensatory measures.

NA-LA SSO engineers perform scheduled independent assessments of system performance, equipment configuration, and material condition of assigned systems and safety management programs as identified in the NA-LA *Master Assessment Schedule/Integrated Assessment Schedule*. SSO engineers also conduct OA reviews, which include system walkdowns and program/document reviews, such as corrective actions, maintenance, surveillance, design change packages, modification packages, and safety basis revisions. Results of OA activities (primarily issues) are documented in accordance with WI 00.12, *Oversight Issues Reporting*. System reviews are formally identified and scheduled in the IAS. NA-LA

SSO engineers also routinely assess LANL's CSE program to ensure the operability, reliability, material condition, and performance of assigned systems.

The SSO assessments performed at LANL have been sufficiently scoped and thoroughly performed to identify significant VSS issues over a number of years. As discussed in Section 5.5 of this report and under Management of Safety Issues below, LANS has not effectively addressed many of these issues. (See **OFI-NA-LA-F&I-3 and 5**)

**Facility Representative Program**

The responsibilities and requirements for managing and implementing the FR program are described in NA-LA MP 06.04, *LA Field Office Facility Representative Program.* NA-LA currently has 9 fully qualified FRs assigned to nuclear facilities; its needs analysis indicates full staffing as 16. As described above, the NA-LA operations organization has not scheduled any formal assessments by the FRs for FY 2014 or 2015, citing lack of resources and the need to meet OA and reactive oversight responsibilities. (See **OFI-NA-LA-F&I-1**)

FR training records are complete and adequate. In interviews, the FRs demonstrated knowledge of DOE requirements and facility-specific knowledge of TA-55. As noted above in the discussion of assessment and OA activities, and as observed by the EA team in field activities related to the ventilation and confinement systems, the nuclear facility FRs are active in monitoring facility work activities and conditions. EA reviewed approximately 30 OA activity/issue reports, 40 daily oversight activity reports issued by nuclear facility FRs, and ten Monthly Status/Trend Reports developed for the Operations AM. These are used to formally document and communicate to senior management a summary of plant activities and FR oversight. Issue reports (WI 06.01, Attachment A) are communicated directly by the FR to the affected LANL facility manager and recorded in ePegasus. EA identified no concerns with the reviewed documentation and communication provided by the reports.

**Management of Safety Issues**

Requirements and action steps for managing both Federal and contractor issues identified by NA-LA are contained in NA-LA procedures MP 00.08 and MP 00.12, and implementing work instructions WI 00.12, *Oversight Issues Reporting*, and WI 00.14, *Federal Issues Management.* Additional, and sometimes conflicting, instructions for managing issues are also included in WIs for independent assessments, FR assessments, shadow assessments, and functional area processes. Issues are categorized as observations or findings in most documents, although MP 00.08 defines another category of issue as a "weakness." When entered into ePegasus, observations are automatically closed, and no fields are provided for documentation of any follow-up, even for negative observations (condition, process, or performance issues). When findings are entered into ePegasus, fields are opened for follow-up, approval of the corrective action plan, and verification and management approval of corrective action effectiveness. MP 00.08 requires that NA-LA owned issues be entered into ePegasus and LANL issues entered into PFITS, but other instructions require entry of all issues into ePegasus. MP 00.08 does not address any requirements or instructions for follow-up or approval of issue closure or objective evidence, although MP 00.12 and the implementing WIs do. The title of WI 00.12 is somewhat misleading in that it does not address reporting issues to the contractor, but references other procedures or WIs that do. WI 00.12 also has a number of other errors and omissions, such as not defining issue severity as indicated; stating that the step/action table is for OA activities but not mentioning assessments; not providing any guidance or expectations for review of objective evidence or evaluation of the adequacy of closure; and indicating that ePegasus may not have been used to document issues but failing to indicate how acceptable closures are to be documented if issues have not been entered in ePegasus. Also, several procedures still refer to the Periodic Issue Report process, which was abandoned several years ago. (See **OFI NA-LA-F&I-2**)

The last biennial review of nuclear safety performance by the NNSA Chief of Defense Nuclear Safety (CDNS) in August 2012 identified the following weakness in the packaging and transportation area, but is more broadly applicable: "The Site Office could not provide documented evidence that sufficient OAA [OA activities] of the TSD [transportation safety document] TSR implementation is being performed to maintain confidence in the contractors continued compliance with the safety management program expectations." This is the same concern that EA identified above regarding the lack of documentation of OA activities. The actions for this finding in ePegasus do not mention OA activities or require recording of the activities. This issue is still open in ePegasus (ACT-SO-8.27.2012-461341), with no actions specified. The CDNS report also identified findings related to NA-LA technical qualification program (TQP) training. A subsequent self-assessment by the NA-LA TQP manager included a follow-up to the CDNS report and identified non-compliance with DOE Order 226.1b, paragraph 4.b(4) in that NA-LA has no expectation for timeliness of corrective actions and several issues were closed without corrective action. These issues remain unresolved. The ePegasus issue tracking system does not require a management or independent review of closure for issues, and NA-LA procedures provide insufficient guidance or direction on required follow-up and closure of issues. WI 06.01 specifies that Operations staff are to "track findings/observations to closure and evaluate effectiveness." If the issue has been "satisfactorily dispositioned," it is to be closed in ePegasus. There are no requirements to document how the issue was dispositioned, what NA-LA reviewed, or why closure was deemed satisfactory. In addition, all of the 2012 corrective action assessment findings remain in "pending follow-up" status in ePegasus. Four findings from a 2012 assessment evaluating the implementation and effectiveness of the CAS related to project management and national security missions were cancelled without comment in ePegasus in August 2014 by a staff member who is no longer on site. (**See OFI-NA-LA-F&I-5**)

**Contractor Performance Evaluation**

NA-LA evaluates the laboratory contractors' performance on their contracts with DOE in accordance with NNSA Policy NAP-4A, *Corporate Performance Evaluation Process for Management and Operating Contractors*. This "strategic performance evaluation" process is described in NA-LA P 540.2, *Contractor Performance Evaluation Process*, and three implementing WIs for developing annual performance evaluation plans (PEPs), conducting performance monitoring, and preparing the year-end performance evaluation report (PER). EA reviewed the FY 2013 and FY 2014 PEPs, the FY 2013 PER, and several quarterly feedback reports for FY 2014. The annual PEPs provide the criteria for determining the amount of award fee earned for managing and operating the Laboratory. Five broad performance objectives (i.e., Managing the Nuclear Weapons Mission; Broader National Security Mission; Science, Technology, and Engineering and Other DOE Mission Objectives; Operations and Infrastructure; and Leadership) are defined, with a set of associated and increasingly specific "contributing factors" and "site-specific outcomes." Several criteria have a possible direct relationship to nuclear safety, but some are part of the Operations and Infrastructure and Leadership objectives, each with 20 percent of at-risk fee. For example, the 2014 PEP identified a contributing factor in Operations and Infrastructure to "deliver effective, efficient, and responsive ES&H [environment, safety, and health] management and processes." An associated site-specific outcome was to demonstrate measurable improvements and maturation in the LANL safety culture, improve ADNHHO safety performance in the areas of formality of operations and safety basis implementation, and complete implementation of corrective actions to ensure the long term viability of the criticality safety program. Contributing factors relevant to nuclear safety in the Leadership objective for FY 2014 included promoting a culture of critical self-assessment and transparency and demonstrating performance results through the institutional use of the Management Assurance System. No site-specific outcomes were identified for this objective. The quarterly feedback reports provide brief narrative summaries of overall performance, specific initiatives or activities, and issues or areas needing contractor attention for each performance objective. The FY 2013 PER, a collaborative effort between NA-LA and NNSA Headquarters program offices, contained a more detailed narrative discussion of performance for each objective and the contributing factors and site-specific

outcomes. The current NNSA-directed evaluation process has few evaluation criteria related to nuclear safety, and those are broadly defined, with no objective measures and few criteria tailored to a specific site. This approach allows substantially subjective performance evaluations and little monetary sanction applicable or available related directly to nuclear safety performance. The FY 2012 PER did tabulate numerous performance elements in each of the five performance objectives, and the FY 2013 PER provided a narrative discussion of performance for each objective. Performance deficiencies in CAS elements were identified in both reports, and NNSA/NA-LA reduced the at-risk fee by 26% for FY 2012 and by 18% for FY 2013.

**NA-LA Safety Oversight Program Summary**

NA-LA has established many formal processes, procedures, and guidance documents describing the requirements and expectations for oversight of the contractor's management and operation of its nuclear facilities and for self-assessment of the NA-LA oversight program. The NA-LA technical staff effectively plans, performs, and documents many safety oversight activities, including formal assessments and safety-related document reviews. In addition to formal assessments, FRs and SSOs provide effective continuous and routine OA feedback to the contractor and DOE management. These oversight activities identify contractor process and performance issues that are communicated to the contractors for resolution. Despite the defined oversight program and generally effective implementation, management attention is needed to address weaknesses in oversight program planning, issues management, CAS evaluation, and contractor accountability for effective CAS implementation.

## 6.0 CONCLUSIONS

The PF-4 SS ventilation systems and the SC confinement systems have demonstrated a high level of reliability in recent years, despite the age of most of the equipment. This level of performance is indicative of substantially effective implementation of several key management programs within TA-55, consistent with the EA review team's observations. In general, the ventilation systems and associated portions of the confinement systems are well maintained through an effective maintenance program. Most surveillance and testing activities for the selected safety systems are properly performed in accordance with TSR SRs. Operations are largely conducted by experienced operators in a manner that ensures the availability of the selected safety systems to perform their intended safety functions when required, and most procedures are technically adequate to achieve the required level of system performance. The CSE program for PF-4 is effectively implemented, and the CSEs are knowledgeable of facility processes and their assigned systems.

Although the reviewed systems are generally well maintained and operated, EA identified several areas of weakness that may impact system reliability and/or operability and warrant increased management attention:

- The process for verifying that SR implementing procedures address the annual TSR SR for the ventilation system does not ensure that all safety functions of the system as described in the safety analysis are actually tested. Thus, there is no assurance that the untested functions of the safety related ventilation system will perform as expected.
- The processes for design change closure and document control have shortcomings that contribute to changes not being appropriately posted against all affected documents or incorporated in a timely manner once the modification is complete. One consequence of this weakness is a very large backlog (over 2000) of unincorporated changes to priority drawings.
- In several cases, Engineering provided an inadequate technical basis to establish the acceptability of a system modification or to address an identified issue in a safety SSC.

- Several issues were identified in the training and qualification of equipment operators, maintenance personnel, and key managers and supervisors who are involved in performing, reviewing, and approving important issues management program activities and products.

For the most part, LANS has established the feedback and improvement programs and processes necessary for evaluation of nuclear safety processes and performance at LANL, and these processes are described in program description documents and procedures. Many assessment-like activities are planned and scheduled for evaluating programs and performance at LANL nuclear facilities using a structured process; these activities are performed and documented as scheduled and in a generally comprehensive and rigorous manner.

However, the LANS assurance system procedures and implementation have not been effective in consistently ensuring that safety system related process and performance problems are properly identified, documented, accurately described and categorized for significance, appropriately evaluated for extent of condition and causes, and addressed with effective action and recurrence controls. Assessment of assurance system processes and performance has not been sufficiently rigorous or self-critical, and LANS senior management and line organizations have not been effective in evaluating performance and holding personnel and organizations accountable for compliant and effective assurance system implementation. The performance assurance support organization has not been used effectively to foster effective feedback and improvement processes. Many of the findings and OFIs that EA identified during this review (including concerns about the issues management program) were also identified during previous EA, NA-LA, and LANS assessments, but the responsible parties have not identified and/or implemented effective actions to actually correct the issues or (in some cases) to prevent recurrence. This programmatic weakness in the issues management program is systemic and results in many missed opportunities to improve the safety of TA-55 operations. Additional weaknesses were identified in feedback and improvement, and the overall feedback and improvement program is in need of significant management attention.

NA-LA has established many formal processes, procedures, and guidance documents describing the requirements and expectations for oversight of the contractor's management and operation of its nuclear facilities and for self-assessment of the NA-LA oversight program. The NA-LA technical staff has effectively planned, performed, and documented many safety oversight activities, including formal assessments, safety-related document reviews, and FR and SSO OA activities. However, the NA-LA oversight program procedures contain conflicting and inconsistent requirements and management performance expectations, and they do not always reflect current practices and organizations. In addition, NA-LA has not been effective in routinely monitoring, and holding LANS accountable for deficiencies in, the management of DOE-identified safety issues. The most significant issue for NA-LA oversight is to improve NA-LA's effectiveness in driving improvements in the contractor's feedback and improvement program and the LANS issues management program.

The findings and OFIs identified during the EA review are summarized in Section 7.0 and Section 8.0 of the report, respectively.

## 7.0 FINDINGS

As defined in DOE Order 227.1, *Independent Oversight Program*, findings are significant deficiencies or safety issues 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. Findings may identify aspects of a program that do not meet the intent of DOE policy or Federal regulation. Corrective action plans must be developed and implemented for EA independent

oversight appraisal findings. Cognizant DOE managers must use site- and program-specific issues management processes and systems developed in accordance with DOE Order 227.1 to manage these corrective action plans and track them to completion.

**Los Alamos Field Office**

None.

**Los Alamos National Security, LLC**

**Finding-LANS-ST-1: LANS did not incorporate the SR requiring an annual system functional test of the ventilation system and FCS into the associated facility STP sufficiently to meet the SR and verify the operability of the FCS and the PF-4 ventilation system as required by the TSRs.**

**Finding-LANS-Ops-1: LANS did not implement the EO qualification program sufficiently to ensure that the facility is staffed with qualified EOs as required by DOE Order 426.2 and the DSA.**

**Finding-LANS-CSE/CM-1: Contrary to the requirements of DOE STD-3020-2005, SC HEPA filters in the PF-4 ventilation system exhausts may be exposed to flow rates in excess of their rated capacity during a design basis event, resulting in reduced efficiency and potential failure to meet design performance requirements.**

**Finding-LANS-CSE/CM-2: Contrary to the requirements of DOE Order 420.1B Change 1, LANS made changes to the physical configuration of VSS components without adequately documenting that the changes were technically acceptable and would not invalidate the capability of those components to perform their required functions.** This lack of adequate technical basis was also carried forward into USQ determinations, which are not always accurate or factual and therefore do not meet the requirements of 10 CFR 830.

**Finding-LANS-CSE/CM-3: Contrary to the requirements of DOE Order 420.1B Change 1, change package DCF-13-55-0004-080 failed to provide adequate technical justification to conclude that the proposed change could be made without unacceptable impact on the ability of the safety-related confinement system to perform its expected functions.**

**Finding-LANS-CSE/CM-4: Contrary to the requirements of DOE STD-1073-2003 (required by DOE Order 420.1B), facility-wide procedures do not adequately address the posting of design changes against affected documents and drawings as required to ensure that the design change impact information is identifiable and retrievable by other users of those documents.**

**Finding-LANS-F&I-1: LANS has not adequately implemented an issues management program with processes and controls that are fully effective in ensuring that process and performance problems are identified and entered into PFITS, accurately described and categorized for significance, appropriately evaluated on a graded approach for extent of condition and causes, and addressed with effective action and recurrence controls, as required by DOE Order 226.1B, ASME NQA-1, and the LANS CAS description document SD320.**

## 8.0 OPPORTUNITIES FOR IMPROVEMENT

This section summarizes the OFIs identified during the EA independent review. These potential enhancements are not intended to be prescriptive or mandatory. Rather, they are suggestions offered by EA that may assist site management in implementing best practices, or provide potential solutions to minor issues identified during the review. In some cases, OFIs address areas where program or process improvements can be achieved through minimal effort. It is expected that the responsible line management organizations will evaluate these OFIs and accept, reject, or modify them as appropriate, in accordance with site-specific program objectives and priorities.

**Los Alamos Field Office**

**OFI-NA-LA-F&I-1: The formality, execution, and documentation of the oversight planning process need improvement.** Specific actions to consider include:

- Review and revise as needed MP 00.13 and WI 00.13 to promote uniform evaluation of risks and identification of oversight activities. Establish procedural requirements and mechanisms for better documenting the process used and the rationale/justification for the identification of functional area elements, risk ranking, and the number and types of oversight activities selected in the oversight planning process.
- Review and revise as needed MP 04.01 to ensure integration of oversight activities and periodic planning and performance of team assessments between FRs and SMEs.
- Establish mechanisms to ensure that all personnel are accountable for completing and documenting appropriate risk and CAS evaluations.
- Ensure that senior management in NA-LA and NNSA Headquarters re-evaluate resource allocations based on the current FR staffing analysis, placing priority on enabling sufficient oversight of nuclear safety.
- Clarify OA activity reporting and ensure that documentation fully supports oversight planning.

**OFI-NA-LA-F&I-2: Review and update oversight program documents to eliminate conflicts and inconsistencies, clarify expectations and requirements, and reflect the current organization and field office practices.**

**OFI-NA-LA-F&I-3: Improve CAS implementation and effectiveness determinations and data to fully support oversight planning efforts and hold the contractor fully accountable for continuing weaknesses in CAS performance.** Specific actions to consider include:

- Review procedures and WIs and revise processes as necessary to better define the requirements and steps for evaluating and rating CAS performance collectively and for individual functional areas and individual CAS elements, to ensure consistent, accurate, and useful data and analysis for input to the oversight planning process.
- Incorporate direction and mechanisms for the use of the results data from shadow assessments in evaluating CAS implementation and effectiveness.
- Perform formal baseline assessments of CAS effectiveness for each functional area and evaluate performance changes annually, taking appropriate actions for declining or stagnant performance.

**OFI-NA-LA-F&I-4: Formally assign a qualified SSO and ensure sufficient availability to act as the SME for the fire protection functional area.**

**OFI-NA-LA-F&I-5: Strengthen the NA-LA issues management program.** Specific actions to consider include:

- Ensure that all procedures and WIs are consistent and require entry of LANS-owned issues in ePegasus.
- Ensure that the NA-LA staff uses ePegasus to document the review and closure of all issues.
- Ensure that procedures require all issues, whether identified by OA activities or assessments, are transmitted through correspondence from the Contracting Officer or Contracting Officer Representative.
- Ensure that programmatic and management system deficiencies, as well as individual deficiencies are identified in all correspondence. Ensure that the contractor is held accountable for addressing both programmatic issues and individual supporting issues. Consider lowering the threshold for requiring formal responses with corrective action plans in correspondence transmitting programmatic issues to the contractor.
- Define, document, and communicate requirements and guidance for timeliness and level of effort for reviewing and closing issues documented in ePegasus and PFITS, with allowances for unusual/extenuating circumstances, and require management review and acceptance of closure of issues.

**Los Alamos National Security, LLC**

**OFI-LANS-Maint-1: The TA-55 maintenance organization should improve maintenance supervisors' and maintenance workers' awareness and understanding of the TA-55 facility-specific training and qualification requirements.**

**OFI-LANS-Maint-2: Update procedure TA55-DOP-01025, *Annual PM, PF-4 Belt Driven Laboratory Fans*, with consideration given to:**

- Incorporating the electrical hazard controls currently included in a supplemental IWD.
- Identifying, analyzing, and defining adequate controls for the confined space hazards associated with some fans covered by TA55-DOP-01025.
- Improving the data sheets (attachments to TA55-DOP-01025 for each fan set) to ensure that maintenance performers and reviewers recognize when recorded data is outside of the expected ranges.
- Incorporating lessons learned and recommended improvements from the maintenance workers and supervisors.

**OFI-LANS-Maint-3: Clarify management expectations for the maintenance supervisors, maintenance workers, and personnel responsible for reviewing completed work documentation on when it is appropriate to declare a required procedural step "Not Applicable."**

**OFI-LANS-Maint-4: Revise procedures TA55-ISI-6218 and TA55-ISI-611 to clarify the expectations for performing the ISI visual inspections of visible portions of the ventilation and confinement systems using a camera and monitor to view difficult-to-access areas.**

**OFI-LANS-Maint-5: Facilitate the retrieval of maintenance history data in the CMMS for specific pieces of equipment or systems.** Consideration should be given to:

- Evaluating the method for entering maintenance history data into CMMS to ensure that it facilitates data retrieval.

- Ensuring that potential users of the maintenance history data in CMMS (e.g., maintenance planners, maintenance supervisors, WMC personnel, and systems engineers) are adequately trained on how to retrieve maintenance history data in CMMS.

**OFI-LANS-Ops-1: Improve TA55-AERI-001, R12, *Operations Center Alarm/Emergency Response Instruction*, by specifying discrete actions to ensure optimal response to all postulated abnormal events and emergencies.** Specific actions to consider include:

- Establish basic criteria or suggestions within the attachments for decisions on emergency response actions, such as ventilation hardwire shutdown or PF-4 evacuations.
- Provide specific action steps for major emergency response actions, such as performing a PF-4 entombment or a ventilation system passive safe shutdown.
- Review all AERI attachments to ensure that improvements are addressed for emergency response actions outside the scope of this ventilation system review.

**OFI-LANS-CSE/CM-1: Re-assess DCF 157 and, if not processed for approval, re-open PFITS item 2010-1737.**

**OFI-LANS-CSE/CM-2: Revise the PM program to include cycling and functional performance verification for dampers required to change position following a loss of air supply to the actuator.**

**OFI-LANS-CSE/CM-3: Post the south side bleed-off fan room as a combustible-free zone.**

**OFI-LANS-CSE/CM-4: Correct discrepancies in the confinement system SDD concerning the periodicity of HEPA filter efficiency testing.**

**OFI-LANS-CSE/CM-5: In the process for creating electronic records via scanning of hard copies, include measures to ensure that the scanning process creates a legible record.**

**OFI-LANS-CSE/CM-6: Increase the focus on working off the backlog of unincorporated changes to priority drawings.** Efforts to reduce the backlog should focus first on SS and SC systems.

**OFI-LANS-CSE/CM-7: Scan design change packages into Documentum at design completion (prior to implementation).** Information on impacts to affected documents and drawings should be available to other parties at that point.

**OFI-LANS-CSE/CM-8: Develop a procedural requirement for logging change package impacts against support and general category drawings.** The data entry process for change packages in Documentum should require second party verification to ensure the accuracy of entries.

**OFI-LANS-F&I-1: Review and revise as necessary the organizational placement and reporting structure of the QPA function to ensure an appropriate level of visibility, access to the Director's office, and separation from cost and schedule influences as required by ASME NQA-1-2008.**

**OFI-LANS-F&I-2: Prioritize the finalization of the QPA Lean Six Sigma assurance planning analysis and the development and implementation of resulting recommendations and corrective actions to improve assessment planning processes and implementation, including formal oversight and management of the improvements.**

**OFI-LANS-F&I-3: Formalize the requirements, responsibilities, and process steps for planning and conducting FCAs (or their equivalent), either in an institutional level procedure or as an**

**addendum to the independent assessment procedure.** Include a description of this assessment mechanism in assessment program description document PD328. Evaluate the allocation of resources and defined scopes of recent FCAs (or their equivalent) to ensure that the expectations, rigor, and quality of the assessments performed in this key feedback program are maintained at an appropriate level.

**OFI-LANS-F&I-4: Review the QPA assessment plan and report evaluation process and improve the evaluation criteria, revise the WI, and implement the evaluation process to provide feedback to assessment performers, line managers, and the institutional performance indicator dashboard to promote continuous improvement in assessment activities.**

**OFI-LANS-F&I-5: Require MOVs to be documented in PFITS to foster visibility and trending capability.**

**OFI-LANS-F&I-6: Review and strengthen QPA oversight activities for performance assurance program elements through more rigorous assessment criteria and more assertive communication of identified weaknesses in line performance.**

**OFI-LANS-F&I-7: Review and revise, as needed, the procedures for conducting event fact findings rather than critiques.** Ensure that expectations and requirements for performing causal analysis and documentation of causes are clearly separated from fact-finding efforts. Ensure that the results of early causal analysis efforts are integrated with and do not adversely affect subsequent PFITS causal analysis.

**OFI-LANS-F&I-8: Develop or strengthen processes that translate trend information into actions.**

**OFI-LANS-F&I-9: Strengthen the metrics program.** Specific actions to consider include:

- Formalize the requirements and processes for development, maintenance and use of the Executive Risk Register in procedures.
- Conduct an independent assessment of the metrics program with a focus on accurate selection and descriptions of risks and the adequacy of information provided on quad charts. For metrics that reflect needed improvements, ensure that planned or in-progress actions are documented and that associated control documentation is referenced.

## 9.0 ITEMS FOR FOLLOW-UP

EA will continue to follow up on actions and satisfactory closure of the findings identified in this report.

# Appendix A
# Supplemental Information

**Dates of Review**

Scoping Visit: July 22-24, 2014

Onsite Review: August 18-28, 2014

**Office of Enterprise Assessments Management**

Glenn S. Podonsky, Director, Office of Enterprise Assessments
William A. Eckroade, Deputy Director, Office of Enterprise Assessments
Thomas R. Staker, Director, Office of Environment, Safety and Health Assessments
William E. Miller, Director, Office of Nuclear Safety and Environmental Assessments
Patricia Williams, Director, Office of Worker Safety and Health Assessments

**Quality Review Board**

William A. Eckroade
Thomas R. Staker
William E. Miller
T. Clay Messer
Karen L. Boardman
Michael A. Kilpatrick

**Enterprise Assessments Site Lead**

Ron Bostic – Lead

**Enterprise Assessments Reviewers**

Robert Freeman – Lead
Charles Allen
Ron Bostic
Robert M. Compton
Ed Stafford
Eric Swanson

## Appendix B
## Documents Reviewed

TA55-DSA-2011-R1.5, *TA-55 Documented Safety Analysis*
TA55-TSR-2011-R1.5, *TA-55 Technical Safety Requirements*
SDD-TA55-VNT-023, *PF-4 Ventilation and Ductwork System Design Description*
TA55- SDD-BLDG-1201, *PF-4 Safety Class Confinement System Design Description*
AB588 sheets 1-9
TA55-AP-100, *TA-55, PF-4 Training Implementation Matrix*
TA55-DOP-01025, *Annual PM, PF-4 Belt Driven Laboratory Fans*
TA55-ISI-6218, *In-Service Inspection of Safety-Significant Ventilation System*
TA55-ISI-611, *In-Service Inspection of PF-4 Confinement System*
TA55-STP-103, *Ventilation System Functional Test*
TA55-AERI-001, R12, *Operations Center Alarm/Emergency Response Instruction*
SHR-14-TA55-HVAC_HVACCF-001, *System Health Report*
SHR-14-TA55-HVAC_HVACCF-010, *System Health Report*
SHB-09-TA55-VNT-027, *System Health Report Bases*
SAR-14-TA55-HVAC/HVACCF-003, *LANL Vital Safety System Assessment Report Summary for: Ventilation System/Ventilation Confinement System*
CT-TA-55-EOP-QS-082, R3, *TA55 Equipment Operator Qualification Standard*
PA-DOP-01188, *PF-4 Ventilation System Critical Damper Positioning Verification*
TA-55-AP-078, *Lessons Learned Program*
TA55-PLAN-061, *Priority Drawing Development and Maintenance*
DCP 10-001, *Confinement Door Replacement*
DCP 09-004, *Dryer Refurbishment*
DCF 13-55-0004-080, *Exhaust Stack Monitor Addition*
P950, *LANL Conduct of Maintenance*
AP-MNT-004, *Facility Condition Inspection*
AP-MNT-006, *Preventive and Predictive Maintenance*
AP-MNT-007, *Measuring, Analyzing, and Reporting of Maintenance Program Performance*
AP-MNT-010, *Maintenance History*
AP-MNT-011, *Maintenance Training and Qualification*
AP-MNT-013, *Deferred Maintenance Identification and Reporting*
AP-WORK-001, *Work Initiation, Screening, and Acceptance*
AP-WORK-002, *Work Planning*
AP-WORK-003, *Work Scheduling*
AP-WORK-004, *Work Performance*
AP-WORK-005, *Work Closeout*
SD100, *Integrated Safety Management System Description Document with embedded 10 CFR 851 Worker Safety and Health Program*
SD200, *Integrated Safety Management System Description Documen*t
P300, *Integrated Work Management for Work Activities*
P315, *LANL Conduct of Operations Manual*
SD320, *Contractor Assurance System Description Document*
PD322, *Laboratory Performance Feedback and Improvement*
P322-1, *Causal Analysis and Corrective Action Development*
P322-3, *Performance Improvement from Abnormal Events*
P322-4, *Laboratory Performance Feedback and Improvement Process*
PD323, *LANL Operating Experience Program*
P323-1, *Operating Experience and Lessons Learned Process*

PD324, *LANL Metrics Program*
PD328, *LANL Assessment Program*
P238-1, *Performance Assurance Planning Cycle and Integrated Assessment Schedule Maintenance*
P328-2, *Independent Assessment*
P328-3, *Management Assessments*
P328-4, *Management Observation and Verification*
QPA-PA-QP-001.000, *Managing Facility Centered Assessments*
QA-PA-WI-002.000, *Work Instruction for Evaluation of Assessment Plans and Reports*
SD330, *Los Alamos National Laboratory Quality Assurance Program*
P330-9, *Suspect Counterfeit Items*
P341, *Facilities Engineering Processes Manual*
AP-341-101, *Designating Vital Safety Systems and Cognizant System Engineers*
AP-341-402, *Engineering Document Management in Operating Facilities*
AP-341-404, *Master Equipment List*
AP-341-405, *Identification and Control of Technical Baseline, Variances, Alternate Methods, and Clarifications in Operating Facilities*
AP-341-505, *Design Change Package*
AP-341-506, *Engineering Change Notice*
AP-341-517, *Design Change Form*
AP-341-521, *Identification and Control of Critical Spare Parts*
AP-341-611, *System Design Descriptions*
AP-341-621, *Design Authority Technical Review*
AP-341-703, *Commercial Grade Dedication*
AP-341-801, *Post Modification/Post Maintenance Testing*
AP-341-802, *System Health Reporting*
AP-341-901, *Performing Vital Safety System Assessments*
PD342, *Engineering Standards Manual*
P343, *Facility Engineering Training and Qualification Manual*
P781-1, *Conduct of Training*
P840-1, *Quality Assurance for Procurement*
PA-AP-01000, *Document Control Processes*
PD-1020, *Document Control and Records Management*
CAO-FSD-322-3-001, *Abnormal Events Handbook*
CT-COT-MAN-633, *Conduct of Training Manual*
ASM-FO-IO.2.2012-469808, *Los Alamos Field Office Verification of the Closure of Federal Training & Qualification Deficiencies Self-Assessment Report,* 2/13/2014
ASRP-NSM-12.12.2012-485082, 4301 NSM:8BR-384576, *Transmittal of Fiscal year 2012 Los Alamos National Security LANS) Contractor Assurance System (CAS) Assessment – Project Execution,* 12/10/2012
*Review of LASO approach to DOE Order 226.1A Oversight of Safety and Health implementation,* February 2009
FO:40EC-555830, *Facility Representative Staffing Plan for FY2014*, 1/21/2014
*ADNHHO-ADPSM-FY14 Performance Assurance Planning Results* (spreadsheet), 9/10/13
CAOAM-07-04 Director's Institutional Assessment, *Facility and Stockpile Management and Support Operations at the Technical Area 55 Plutonium Facility,* 9/25/2007
FO/26JK:449469 - *TA-55 Glovebox System SSO Report,* June 2012
FO/CF:529548 - *TA-55 Instrument Air System (IAS) SSO Report*, July 2013
FO/SET-19CF:250299 - *TA-55 Confinement Ventilation System SSO Report,* April 2010
FO/SET-26FB:407407, *Self-Assessment of the LASO Safety System Oversight Program,* December 2011
DIR-12-131, *FY12 Annual CAS Assurance Letter*, 10/4/2012

DIR-13-215, *FY32 Annual CAS Assurance Letter*, 8/28/2013
OPS:26JRF-567495, *Transmittal of Field Operations Oversight Issues - Assessment Report for Los Alamos National Laboratory Nuclear Maintenance Management Program ASRP-FO-3.13.2014-565949*
FO:4OJRF- 521603, *Transmittal of Maintenance Program Issues - Transmittal of Los Alamos Field Office Nuclear Maintenance Management Program Oversight Assessment Report,* (ASRP-FO-S.1.2013-S09073), 7/2013
QA-13-088-ABL, *Request for causal analysis and corrective action plan to address systemic QA concerns,* 6/18/2013
DIR-13-183, *Response to QA-13-088-ABL, Request for causal analysis and corrective action plan to address systemic QA concerns,* 7/3/2013
SBD-CS-PLAN-13-001-RO, *Nuclear Criticality Safety Program Assessment,* 4/30/2013
PFITS 2013-406 *PADOPS Metrics Data Quality Management Assessment,* 7/22/2014
MP 00.08, *Implementation of LASO Line Oversight*
MP 00.09, *Employee Concerns Program,* Rev 6
MP 00.12, *LASO Independent Assessment Process*
MP 00.13, *Risk-Informed Oversight Planning,* Rev 2
MP 00.14, *Operating Experience Program Procedure*
MP 00.15, *Management Assessment for Federal Operations,* Rev 1
MP 00.18, *Differing Professional Opinion,* Rev 2
MP 02.01, *LASO Criticality Safety Oversight Procedure*
MP 02.03, *LASO Emergency Management Program - Oversight Procedure*
MP 02.04, *Technical Qualification Program,* Rev 7
MP 04.01, *Integrated Project Team Roles and Responsibilities*
MP 06.01, *NA-00-LA Readiness Review Procedure*
MP 06.02, *Safety System Oversight,* Rev 6
MP 06.04, *LA Field Office Facility Representative Program*
MP 06.05, *Facility Representative Training and Qualification,* Rev 3
WI 00.02, *Document Review,* Rev 0
WI 00.04, *Assessment Shadow Activity Reporting,* Rev 4
WI 00.05, *Assessment Change Control,* Rev 6
WI 00.09, *Work Authorization Review and Approval*, Rev 1
WI 00.12, *Oversight Issues Reporting,* Rev 1
WI 00.13 *Annual Assessment Planning,* Rev 1
WI 00.14, *Federal Issues Management*
WI 06.01, *Oversight/Surveillance Issues Reporting,* Rev 4
WI 06.03, *Facility Representative Contractor Assessment,* Rev 3
WI 06.04, *LANL Incident Notification and Response,* Rev 2
PD 00.05, *Stop Work,* Rev. 0
PLAN 00.14, *Integrated Management System Description Including LASO Functions, Responsibilities, and Authorities (FRAs)*
NNSA Policy NAP-4A, *Corporate Performance Evaluation Process for Management and Operating Contractors*
NA-LA P 540.2, *Contractor Performance Evaluation Process*
FO/SET:19CF-250299, *Safety System Oversight Assessment - TA55 Confinement Ventilation System*