

**Independent Oversight Review of the
Los Alamos National Laboratory Corrective
Action Effectiveness Review**



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**Office of Safety and Emergency Management Evaluations
Office of Enforcement and Oversight
Office of Health, Safety and Security
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Acronyms

BIO	Basis for Interim Operation
CMR	Chemistry and Metallurgy Research
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
EWMO	Environmental Waste Management Operations
FOD	Facility Operational Directorate
FCA	Facility Centered Assessment
FSS	Fire Suppression System
HSS	Office of Health, Safety and Security
ICAM	Issues and Corrective Action Management
LANL	Los Alamos National Laboratory
LASO	Los Alamos Site Office
MRB	Management Review Board
NCR	Non-conformance Report
NFPA	National Fire Protection Association
PFITS	Performance Feedback Improvement Tracking System
PIAT	Performance Improvement Action Tracker
RANT	Radioassay and Nondestructive Testing
SC	Safety Class
SSC	Structures, Systems, and Components
SSO	Safety System Oversight
TA	Technical Area
TSR	Technical Safety Requirement
WCRRF	Waste Characterization, Reduction, and Repackaging Facility
WETF	Weapons Engineering Tritium Facility

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1. PURPOSE

The Office of Enforcement and Oversight (Independent Oversight), within the Office of Health, Safety and Security (HSS), evaluated the Los Alamos Site Office (LASO) safety system oversight (SSO) assessment of Los Alamos National Laboratory's (LANL) corrective actions to address prior LASO SSO findings. The purpose of the LASO assessment was to evaluate the effectiveness of LANL's performance feedback and improvement process and provide U.S. Department of Energy (DOE) line management with objective information on LASO's effectiveness in managing corrective issues related to nuclear facility safety. The LASO assessment was conducted July 25-29, 2012, and the final report was issued on October 22, 2012.

An HSS subject matter expert shadowed the LASO assessment team and independently evaluated the review process. The scope of the HSS independent review was selected based on current HSS priorities to focus oversight activities on nuclear facilities, particularly the adequacy and effective management of corrective actions affecting nuclear facility safety systems and follow-up to previous HSS findings.

2. BACKGROUND

LANL is required to implement effective corrective actions to address deficiencies and non-compliances. LANL System Description 320, *LANL Contractor Assurance System Description Document*, credits the performance feedback and improvement process as the structured issues management system for providing timely reporting and taking compensatory corrective actions when needed. LANL Procedure 322-4, *Laboratory Performance Feedback and Improvement Process*, defines the process and program elements.

3. SCOPE

LASO assessed a representative sampling of findings and observations from prior LASO assessment reports. The sampling consisted of 62 safety system issues that had been identified from 2008 to 2012 and were being tracked in the LANL Performance Feedback Improvement Tracking System (PFITS), and a limited review of 59 findings and observations identified by LASO SSO staff during the Environmental Waste Management Operations (EWMO) facility centered assessment (FCA). The selected issues represented a number of LANL nuclear facilities, including Technical Area (TA)-55; Chemistry and Metallurgy Research (CMR) Facility; the Weapons Engineering Tritium Facility (WETF); and the Waste Characterization, Reduction, and Repackaging Facility (WCRRF), Radioassay and Nondestructive Testing (RANT) Facility, and Area-G within the EWMO Facility Operations Directorate (FOD) as shown in Table 1.

Several of these assessments had been performed with HSS subject matter experts who independently assessed selected technical areas, focusing on the adequacy and implementation of nuclear facility safety basis requirements; these included:

- *Independent Oversight Review of the Los Alamos National Laboratory Waste Characterization, Reduction, and Repackaging Facility (WCRRF) Fire Suppression System*

- *Independent Oversight Review of the Los Alamos National Laboratory Chemistry and Metallurgy Research (CMR) Facility Fire Suppression Vital Safety System*
- *Assessment of the Los Alamos National Laboratory Technical Area (TA)-55 Fire Suppression System Upgrade to Safety Class.*

Table 1. Safety System Issues Reviewed by Year, Nuclear Facility

Year	TA-55	CMR	WETF	EWMO	Total
				WCRRF/RANT/Area-G	
2008/2009	3	2	2	3	10
2010	7	4	7	2	20
2011	6	5	3	11	25
2012	1	2	2	2	7
	18	13	13	18	62

The LASO assessment considered the following aspects of the LANL issues management process:

- Characterizing the findings
- Resolving the deficiencies and non-conformances
- Preventing recurrence
- Evaluating issue applicability through extent-of-condition reviews.

To conduct the assessment, LASO evaluated a representative sampling of past findings, each of which included a substantial amount of data. LASO established the following criteria for evaluating the adequacy of item identification, screening, binning, and closure:

- Timeliness and accuracy of PFITS entry
- Management Review Board (MRB) review of the issue
- The management-selected risk and performance improvement approach used
- Proposed actions specified to resolve the issue
- Validation of corrective actions taken to resolve the issue, including a review of documentation used to support closure of the PFITS issue, as included or referenced in the PFITS record, for adequacy, completeness, and effectiveness.

The HSS independent review focused on:

- Review of the LASO assessment, including:
 - Assessment planning
 - Methodology used to evaluate PFITS records
 - Attendance at interviews and MRB meetings
 - Final assessment report and findings.
- Review of the validation and closure of previously reported HSS fire protection issues from the three prior reports on which HSS and LASO coordinated efforts (as identified above).

4. RESULTS

Effectiveness of LASO Assessment

Overall, the LASO assessment was performed using a well defined plan with clear objectives. The team was composed of individuals who added value to the assessment with their unique expertise and experience working with the PFITS. For example, team members had specific knowledge of the initial development of the PFITS process, criteria for binning of items that were affected by Occurrence Reporting and Processing System and Price-Anderson Amendments Act categorization, and the inherent risks associated with safety system issues.

Even though LANL had a defined process and procedure, the LASO assessment appropriately identified significant limitations in the initial screening and binning of the safety system items. For example, because the initial screening questions were answered by people without the necessary skills, knowledge, or training, only one of the safety system items reviewed was identified as a safety basis violation. The binning of the items was limited as well, due to the unqualified term "significant risk to performance" that was applied to each item. The PFITS process includes two different tracking systems: Issues and Corrective Action Management (ICAM), and Performance Improvement Action Tracker (PIAT). In the absence of a correct definition and associated level of risk, all of the safety system items were inappropriately binned into PIAT. The inappropriate placement of these items in PIAT bypassed the level of rigor required for ICAM issues, such as completing a causal analysis and a formal corrective action plan. Many of these safety system items had been previously identified as safety structure, system, and component (SSC) non-conformances; challenged system operability; or posed new information for evaluation.

The weaknesses in the initial screening and binning led to similar negative effects throughout the process, including the identification of corrective actions. As a result, LASO appropriately concluded that more than half of the 62 safety system items had been closed without adequate actions or sufficient documentation, leaving many issues in an indeterminate status. The LASO assessment had also identified similar concerns regarding the lack of coordination and integration of LANL processes from a prior HSS review, citing a 2008 HSS Independent Oversight Inspection of LANL that stated, "LANL procedures for problem identification, timely response, and resolution of facility and safety equipment deficiencies, engineering issues, and maintenance service needs are fragmented and not fully understood." The LASO assessment team appropriately concluded that LANL had not implemented effective corrective actions. HSS agrees with this conclusion. Of the five criteria that were evaluated during the assessment, four were not met (see Appendix C). The LASO assessment team identified five findings, two observations, and one noteworthy practice; these are described in detail in the LASO assessment report.

The five findings are listed below:

1. The LANL Performance Feedback Improvement process does not ensure complete and accurate issue screening and characterization in PFITS.
2. The PFITS PIAT process serves as an action tracking system but does not provide adequate documentation and linkage with other management system actions to provide the transparency discussed in the *LANL Contractor Assurance System Description Document*.
3. The feedback management process does not specify adequate grading to categorize the significance of findings based on risk as required by DOE O 226.1B, Attachment 1, paragraph 2.b(3)(b).

4. Corrective action management of the 2011 EWMO FCA findings and observations was ineffective, noncompliant with LASO direction, and did not meet the intent of the *LANL Contractor Assurance System Description Document*.
5. For half of the closed PFITS records reviewed (29 of 52), the corrective actions proposed and then completed did not fully resolve the issue and were not adequate to prevent recurrence contrary to the intent of the *LANL Contractor Assurance System Description Document*.

HSS supports LASO's conclusions and agrees that the findings are appropriate and well supported, given the significant programmatic weakness that were identified.

The LASO team was successful in its approach – i.e., selecting a representative sample of safety system findings and observations across several nuclear facilities to provide a benchmark of performance across several FODs. The sampling approach was also effective in demonstrating that no individual FOD was unfairly targeted, but rather that each FOD was being assessed using a fair and balanced approach. The LASO team needed additional time to compile the significant amount of data accumulated during the assessment, so its report was delayed; the field review was completed in July, but the final report was not issued until late October.

Effectiveness of LANL Resolution of HSS Findings

This review showed that LANL adequately evaluated and resolved three of the nine findings identified for HSS follow-up that were included within the scope of the LASO assessment. Corrective actions included initiating an NCR, revising hydraulic calculations, and replacing degraded fire protection equipment.

However, six findings were not adequately evaluated due to the initial PFITs screening question for determining if there was a safety basis violation being left blank. As a result, these findings did not address safety basis compliance or adequacy of systems that challenged safety basis requirements. Examples of safety basis non compliance issues include two findings that were identified and documented in the *LASO Safety System Oversight (SSO) Assessment Report for the Waste Characterization, Reduction, and Repackaging Facility (WCRRF) Fire Suppression System (FSS)*. Finding SSO-F-6 WCRRF FSS identified that the fire water supply piping feeding the WCRRF FSS was being preconditioned prior to the performance of the annual hydrant flow test surveillance (normal valve lineup changed). This finding identified that the TSR annual flow surveillance test did not demonstrate operability of the FSS system in the normal operational lineup. The procedure requires that before performing the hydrant flow test, utility personnel must close the cross connect valve, thereby taking the system out of the normal operational lineup and possibly influencing the results of the flow test. This finding was reported for building TA-50-69 on September 14, 2011, but LANL deleted it based on a LANL review conducted on October 13, 2011, which concluded that a noncompliance did not exist. LASO was not notified that the item had been deleted, and the procedure does not require such notification. HSS agrees that this finding should not have been deleted and that the finding continues to represent a potential TSR violation for the FSS vital safety system.

The other finding, SSO-F-4 WCRRF FSS, identified that the hydraulic demand of the FSS and the water supply capability had not been thoroughly analyzed to account for system modifications, as-found conditions, water supply degradation, and DOE-STD-1066 design margins. The action noted in PFITS stated that an engineering request was submitted to design engineering to perform the hydraulic calculation. This finding was closed, but the hydraulic calculation was not revised. These examples underscore the programmatic weaknesses in the LANL PFITS process and illustrate that safety basis items are not being evaluated appropriately, and thus, appropriate corrective actions are not being determined.

5. CONCLUSIONS

Overall, the LASO assessment was performed using a well defined plan with clear objectives and a knowledgeable assessment team. The LASO assessment was effective in identifying significant limitations in the LANL issues management process. LASO appropriately concluded that the LANL process did not meet the overall objective of ensuring that effective corrective actions are implemented.

The HSS independent review determined that most of the previous HSS findings that were selected for this review had not been appropriately evaluated and adequately resolved by LANL. Some of these issues are particularly significant because they challenge the FSS's ability to perform its credited safety functions as documented in the safety basis.

6. OPPORTUNITIES FOR IMPROVEMENT

Independent Oversight identified the following opportunity for improvement. This recommendation is not intended to be mandatory. Rather, it is to be reviewed and evaluated by the responsible line management organization and accepted, rejected, or modified as appropriate, in accordance with site-specific program objectives and priorities.

OFI-1: LASO should consider performing similar reviews on an annual basis to monitor the closure of PFITS items and develop performance benchmarks for the effectiveness of the program.

OFI-2: LANL Contractor Assurance function should evaluate the approach and methodology of the LASO assessment to identify lessons learned that may be applied to the independent assessment (to include FCA) and management assessment processes to strengthen future evaluations of issues management implementation within programmatic organizations and FODs.

7. ITEMS FOR FOLLOW-UP

HSS will monitor LANL's response to the LASO report and follow up to ensure that LANL's actions are appropriate for the specific items that had not been closed adequately, given the significant nature of the findings and the conclusions drawn in the LASO report. Nine other findings from past HSS reviews were described as being significant (see Appendix B), but were not included in the sample set of data for the LASO assessment. HSS will perform an independent review to evaluate the closure of these items.

Appendix A Supplemental Information

Dates of Review

Onsite Review: July 25-29, 2012

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Appendix B Issues Follow-up from HSS Inspection Reports

Italic entries in this table refer to issues not included in the sample set of data for this review

Issues Follow-up from the 2010 HSS Inspection (report issued September 2010) for the TA-55 Fire Suppression System (FSS Upgrade to Safety Class				
Finding No.	Finding Description	Site Issue Status	Included in Corrective Action Assessment Y/N	Comments/Observations
SSO-TA55-SCFSS-F-10-11	The diesel fire pumps exceed the NFPA permitted 5% degradation for fire pump performance testing, thereby challenging their qualification as SC SSCs.	Closed	Y	Closure of the item was adequate.
SSO-TA55-SCFSS-F-10-02	FSS non-compliances with NFPA code requirements have not been documented, evaluated, and dispositioned as nonconforming conditions (i.e., NCRs) as required by LANL P330-6, Nonconformance Reporting, nor evaluated as discrepant as-found conditions per LANL SBP112-3, Unreviewed Safety Question (USQ) Process.	Closed	Y	Closure of the item was adequate.
<i>SSO-TA55-SCFSS-F-10-13</i>	<i>To meet DOE's expectation for SC- reliability and operability, the 2008 DSA or TSRs, Rev. 1.4 Provide insufficient control of isolation valves to non-seismically-rated buildings, and Fail to adequately recognize that only when both FSS subsystems are operable can redundancy be met.</i>	<i>Closed</i>	<i>N</i>	<i>HSS follow-up</i>

SSO- TA55-SCFSS-F-10-04	<i>The DSA FSS description and its TSR basis insufficiently describe the FSS's configuration during normal operating and accident conditions, including accidents caused by NPH events, to specify the capability of the SC FSS to perform its safety function.</i>	<i>Closed</i>	<i>N</i>	<i>HSS follow-up</i>
SSO- TA55-SCFSS-F-10-05	<i>The TA-55 Fire Protection Program's transient combustible loading program is not sufficiently defined or developed to support the 2008 DSA assumption for only requiring OH-2 sprinkler spray density requirements.</i>	<i>Closed</i>	<i>N</i>	<i>HSS follow-up</i>
Issues Follow-up from the 2011 HSS Inspection (report issued September 2011) for the Chemistry and Metallurgy Research Fire Suppression System				
FINDING VSS-CMR-FSS-F-11-01	Chapter 4 of the implemented DSA has conflicting design data for the FSS that brings into question the system performance criteria.	Closed	Y	Closure of the item was adequate.
FINDING VSS-CMR-FSS-F-11-09	The CMR valve alignment surveillance procedure used to validate unobstructed flow path from the water Tanks 4 and 4A to the CMR facility fire loop does not validate valves in the flow path outside the CMR facility boundary.	Closed	Y	Closure of the item was not adequate.
FINDING VSS-CMR-FSS-F-11-10	The surveillance for TSR 4.3.1.1 acceptance criteria for static gauge pressure at fire suppression system risers may be inadequate because: <ul style="list-style-type: none"> - The pressure required to deliver the water flow from the riser to the hydraulically most remote sprinkler head was not determined - The calculation assumptions are not conservative because the calculation is based on two tanks, instead of one. 	Closed	Y	Closure of the item was not adequate.

<i>FINDING VSS-CMR-FSS-F-11-04</i>	<i>Pressure maintenance pumps connected to the fire suppression system downstream of the alarm check valve 1) are not documented in the DSA, 2) are not shown on facility control drawings, and 3) are not documented in the Master Equipment List (MEL).</i>	<i>Closed</i>	<i>N</i>	<i>HSS follow-up</i>
<i>FINDING VSS-CMR-FSS-F-11-05</i>	<i>The Safety Significant Fire Suppression System is inappropriately supported from other CMR SSCs and is not in compliance with NFPA 13 and good engineering and construction practices.</i>	<i>Closed</i>	<i>N</i>	<i>HSS follow-up</i>
<i>FINDING VSS-CMR-FSS-F-11-06</i>	<i>Priority drawings and labeling of the fire suppression system are inadequate.</i>	<i>Closed</i>	<i>N</i>	<i>HSS follow-up</i>
<i>FINDING VSS-CMR-FSS-F-11-07</i>	<i>Wing 9 sprinkler head locations exceed 130 sq.ft. per head according to the CMR As-Built plans.</i>	<i>Closed</i>	<i>N</i>	<i>HSS follow-up</i>
<i>FINDING VSS-CMR-FSS-F-11-08</i>	<i>The maintenance of the fire suppression vital safety system does not fully comply with NFPA 25.</i>	<i>Closed</i>	<i>N</i>	<i>HSS follow-up</i>
Issues Follow-up from the 2011 HSS Inspection (report issued June 2011) for the Waste Characterization, Reduction, and Repackaging Facility (WCRRF) Fire Suppression System (FSS)				
SSO-F-4 WCRRF FSS	The hydraulic demand of the FSS and the water supply capability has not been thoroughly analyzed to account for system modifications, as-found conditions, water supply degradation, and DOE-STD-1066 design margins.	Closed	Y	Closure of the item was not adequate.
SSO-F-6 WCRRF FSS	The fire-water supply piping feeding the WCRRF FSS is preconditioned prior to the performance of the annual hydrant flow test surveillance. (Normal valve line-up changed.)	Closed	Y	Closure of the item was not adequate.
<i>FINDING SSO F-1 WCRRF FSS</i>	<i>The fire suppression system's safety function, functional requirements, and performance criteria are incorrectly described in Chapter 4 of the WCRRF BIO (ABD-WFM-005, R1.3). Basis for Interim Operation (BIO) Table 4-6: Functional Requirements for the Building TA-50-69 Fire Suppression System, states a different safety function than is otherwise described in the BIO.</i>	<i>Closed</i>	<i>N</i>	<i>HSS follow-up</i>

<i>FINDING SSO-F-2 WCRRF FSS</i>	<i>BIO Table 4-7 does not discuss the risk for fires during PC-2 or lower seismic events that the FSS is credited to withstand; the capability of the FSS to withstand a PC-2 or lower seismic event is stated to be uncertain in Table 4-7.</i>	<i>Closed</i>	<i>N</i>	<i>HSS follow-up</i>
<i>FINDING SSO-F-3 WCRRF FSS</i>	<i>Technical justification or exemption that permitted ER-FP-07-042, TA-50-69 (WCRRF) Sprinkler Hydraulic Calculation, to deviate from the DOE-STD-1066, Fire Protection Design Criteria, requirement of “supply pressure of at least 10% but not less than 10 psi below the supply curve” is not documented in the BIO.</i>	<i>Closed</i>	<i>N</i>	<i>HSS follow-up</i>
<i>FINDING SSO-F-9 WCRRF FSS</i>	<i>EP-WCRR-FP-DOP-0301, Rev. 5, Hydrant Flow Test, did not receive required reviews, has not been revised to correct identified performance concerns, inappropriately changes system configuration prior to testing (i.e., system preconditioning), and does not record data necessary to perform required calculations.</i>	<i>Closed</i>	<i>N</i>	<i>HSS follow-up</i>
<i>FINDING SSO-F-11 WCRRF FSS</i>	<i>The last completed EP-WCRR-FP-DOP-0304, Quarterly Combustible Loading Verification, dated 3/30/2011, reported a total quantity of combustibles as 1737.95 lbs, which exceeds the maximum safe combustible loading limit of 1163.6 lbs evaluated in the BIO hazards analysis.</i>	<i>Closed</i>	<i>N</i>	<i>HSS follow-up</i>
<i>FINDING SSO-F-12 WCRRF FSS</i>	<i>The EP-WCRR-FP-DOP-0303, Monthly FSS Valve Alignment Checklist, including its past and present implementation, does not validate monthly SR 4.2.4 - provide an unobstructed flow path from gravity tank to the BUILDING TA-50-69 sprinkler heads. (EP-WCRR-FP-DOP-0303 does not include all necessary valves specified by SR 4.2.4.)</i>	<i>Closed</i>	<i>N</i>	<i>HSS follow-up</i>

WETF-2010-FPS-F-001	WETF Control Room (Room 110) Fire Wall #1 was removed from the list of credited fire walls in October 2006 – requiring that the wet-pipe sprinkler system be reanalyzed to cover 1500 sq ft, or the area outside the fire barriers in Bldg 205.	Closed	Y	Closure of the item was adequate.
WETF-2010-FPS-F-006	The Bldg 205 riser supply gauge and the Bldg 450 riser supply gauge used for performance of WETF -FPS-SR-01 do not meet the NFPA 13-1999 Section 5-15.3.2 requirement for gauge range and listing/approval.	Closed	Y	Closure of the item was not adequate.

Appendix C

Criteria Review and Approach Documents

Criterion #1: Safety system issues are promptly entered into the LANL Performance Feedback and Improvement Tracking System (PFITS) per P322-4, *Lab Performance Feedback and Improvement Process*.

This criterion was met.

Criterion #2: Management Review Board (MRB) reviews of performance feedback appropriately characterize feedback and identify criteria for designation of “issues,” to include:

- a. Are appropriate system and process categories selected?
- b. When applicable, are non-compliances identified?
- c. When applicable, are safety basis violations identified?
- d. Are the most relevant QA criteria selected for issue applicability?

This criterion was not met.

Criterion #3: The risk level and performance improvement approaches used to manage safety system issues are compliant with Procedure 322-4, *Laboratory Performance Feedback and Improvement Process*, and DOE requirements.

This criterion was not met.

Criterion #4: Appropriate corrective actions for safety system issues are identified, entered into PFITS in a timely manner, and effectively managed by transparent management systems and CAS processes.

This criterion was not met.

Criterion #5: PFITS closure of safety system issues is appropriate and includes documentation to support review and validation of the corrective actions taken.

This criterion was not met.