



Department of Energy
Under Secretary for Nuclear Security
Administrator, National Nuclear Security Administration
Washington, DC 20585



August 25, 2015

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Dr. Charles McMillan
President and Laboratory Director
Los Alamos National Security, LLC
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Los Alamos, New Mexico 87545-1663

NEA-2015-02

Dear Dr. McMillan:

This letter refers to the Department of Energy's (DOE) investigation into the facts and circumstances associated with programmatic deficiencies in the nuclear criticality safety program at the Los Alamos National Laboratory. DOE's Office of Enterprise Assessments' Office of Enforcement provided the results of the investigation, which was conducted July 15 through 17, 2014, to Los Alamos National Security, LLC (LANS) in an investigation report dated January 20, 2015. An enforcement conference was convened on March 4, 2015, with members of your staff to discuss the report's findings and LANS' corrective action plan. A summary of the enforcement conference and list of attendees is enclosed.

The National Nuclear Security Administration (NNSA) considers the programmatic deficiencies in the LANS nuclear criticality safety program to be of high safety significance, because a fundamentally sound and functioning nuclear criticality safety program is an essential barrier in precluding the possibility of an inadvertent nuclear criticality. The investigation found deficiencies in work processes, training and qualification, and quality improvement.

Based on the evaluation of the evidence in this matter, including information presented at the enforcement conference, NNSA concludes that LANS violated requirements enforceable under 10 C.F.R. Part 820, *Procedural Rules for DOE Nuclear Activities*, including 10 C.F.R. Part 830, *Nuclear Safety Management*, Subpart A, *Quality Assurance Requirements*. Accordingly, NNSA hereby issues the enclosed Preliminary Notice of Violation (PNOV), which cites one Severity Level I violation and five Severity Level II violations with a total proposed base civil penalty, before mitigation, of \$560,000.



NNSA examined the potential application of mitigating factors and determined that no mitigation would be applied for identification and reporting due to the longstanding nature of these issues and the fact that they were largely identified through external reviews. However, some partial mitigation was merited for past corrective actions and those planned for future implementation.

NNSA further notes that as a result of numerous safety and operational issues, including deficiencies in the LANS nuclear criticality safety program identified in the fiscal year 2013 and 2014 performance evaluation reports, NNSA substantially reduced the contract fee that was awarded to LANS. In consideration of these adverse contract actions, NNSA proposes no civil penalty for violations cited in this PNOV.

Pursuant to 10 C.F.R. § 820.24, *Preliminary Notice of Violation*, you are obligated to file a written reply within 30 calendar days after the date of filing of the enclosed PNOV and to follow the instructions specified in the PNOV when preparing your response. If you fail to submit a reply within the 30 calendar days, then in accordance with 10 C.F.R. § 820.33, *Default order*, subsection (a), NNSA may pursue a Default Order.

After reviewing your reply to the PNOV, including any proposed additional corrective actions entered into DOE's Noncompliance Tracking System, NNSA will determine whether any further activity is necessary to ensure compliance with DOE nuclear safety requirements. NNSA will continue to monitor the completion of corrective actions until this matter is fully resolved.

Sincerely,



Frank G. Klotz

Enclosures: Preliminary Notice of Violation NEA-2015-02
Enforcement Conference Summary
Enforcement Conference List of Attendees

cc: Kimberly Davis Lebak, NA-LA
Tori George, LANS

Preliminary Notice of Violation

Los Alamos National Security, LLC
Los Alamos National Laboratory

NEA-2015-02

A U.S. Department of Energy (DOE) investigation was conducted into the facts and circumstances associated with the programmatic deficiencies in the nuclear criticality safety program (NCSP) at the Plutonium Facility (PF)-4 at Technical Area (TA)-55. These issues, which involved multiple violations of DOE nuclear safety requirements, were first identified in 2005, just prior to LANS contract transition in 2006, and continued through 2013. Violations committed by Los Alamos National Security, LLC (LANS) include the failure to: (1) develop adequate procedures and properly implement procedures; (2) train personnel to be capable of performing their assigned work; and (3) identify processes needing improvement and correct deficiencies to prevent recurrence.

Pursuant to Section 234A of the Atomic Energy Act of 1954, as amended, codified at 42 U.S.C. § 2282a and DOE regulations set forth at 10 C.F.R. Part 820, *Procedural Rules for DOE Nuclear Activities*, the National Nuclear Security Administration (NNSA) hereby issues this Preliminary Notice of Violation (PNOV) to LANS. NNSA has categorized the violations as one Severity Level I violation and five Severity Level II violations.

NNSA examined the potential application of mitigating factors and found merit for some mitigation based on current and planned corrective actions. NNSA also considered information from the fiscal year 2013 and 2014 LANS contract performance evaluation reports. NNSA substantially reduced the contract fee that was awarded to LANS in these fiscal years as a result of numerous safety and operational issues, including deficiencies in the LANS NCSP. In consideration of these adverse contract actions taken by NNSA against LANS, NNSA proposes no civil penalty for violations cited in this PNOV.

Severity Levels are explained in Part 820, Appendix A, *General Statement of Enforcement Policy*. Paragraph VI(b) states that: “[s]everity Level I is reserved for violations of DOE Nuclear Safety Requirements which involve actual or high potential for adverse impact on the safety of the public or workers at DOE facilities.” Paragraph VI(b) also states that “[s]everity Level II violations represent a significant lack of attention or carelessness toward responsibilities of DOE contractors for the protection of public or worker safety which could, if uncorrected, potentially lead to an adverse impact on public or worker safety at DOE facilities.”

As required by 10 C.F.R. § 820.24(a) and consistent with Part 820, appendix A, the violations are listed below. Citations specifically referencing the quality assurance criteria of 10 C.F.R. § 830.122 constitute a violation of § 830.121(a), which requires compliance with those quality assurance criteria.

I. VIOLATIONS

A. Work Processes

Title 10 C.F.R. § 830.122(e), *Performance/Work Processes*, at paragraph (1), requires contractors to “[p]erform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.”

1. Program Implementation

LANS’ requirements for work processes with respect to the nuclear criticality safety program (NCSP) implementation are documented in SD130, *Nuclear Criticality Program*, which states that “[e]ach of these elements: (1) written procedures, (2) formality of operations, and (3) NCS [nuclear criticality safety] controls, is required and while independent, fulfill specific non-overlapping functions in a correctly operating NCS program.” In addition, TA55-AP-522, *Nuclear Criticality Safety Program* states that TA-55 workers are responsible for “understanding and complying with the documented criticality requirements for their assigned process (e.g. procedures, CSLAs [criticality safety limit approvals], postings).”

Contrary to these requirements, LANS did not conduct operations in accordance with approved criticality safety evaluation documents (CSEDs), CSLAs, postings, and procedures, which resulted in numerous infractions and challenged the approved NCS controls. Specific examples include the following:

- On August 11, 2011, a worker moved multiple items into a glovebox to facilitate photography, thereby exceeding the allowable mass limits for that area. The worker’s actions were outside the scope of the CSED and photography had not been authorized by the first line manager. When the infraction was discovered, the workers attempted to recover from the situation and did not pause work or back away from the glovebox. These recovery efforts were contrary to procedure TA55-AP-522, Section 5.9, which contains the warning, “[d]o not attempt to recover from the situation” and states that the “worker shall pause work and back away from the situation at least 15 feet.” The recovery efforts were also contrary to SD130, Section 6.11.1, which states that “[w]hen a suspected or known infraction is discovered, the personnel discovering the event must be instructed to not attempt to recover from the situation, pause work in a safe manner, step away from the situation, and notify other personnel in the area of the situation.” When the first line manager was alerted to the infraction, he told the workers to continue the casting operation to completion, contrary to SD130, Section 6.11.1, which requires that “[m]anagement for the affected operation must be instructed to take no actions until the situation can be assessed with the aid of the NCSG [nuclear criticality safety group].”

- On March 8, 2012, a Vault Operator noticed and verified a criticality overmass, which was deemed to be a level 4 criticality infraction. Additional investigation by LANS revealed that four similar items in other vault locations had the same issue. An overmass condition exceeds the CSLA limits and is contrary to TA55-AP-522, Section 6.6.7, which states that “CSLAs must be used to document the establishment and approval of criticality safety limits and corresponding CSE [criticality safety evaluation] basis,” and TA-55-AP-522, Section 5.4, which states that “[t]he CSLA is a complete listing of all the required criticality safety controls; both the administrative and engineered feature requirements necessary to ensure that the required safety margin is established.”
- On July 19, 2013, at TA-55, during the critique of the use of the wrong size bags for contamination control during glovebox utility line installation, LANS determined that a CSED had not been performed before a new operation was started, as required by TA55-AP-522, Section 5.3, which states that “[t]he criticality safety margin requirement is [that] a criticality safety evaluation must be performed before a new operation is begun...”
- On August 1, 2013, misinterpretation of a CSLA requirement for quantities of material in a room supporting Pu-238 activities resulted in a level 3 NCS infraction. The discrepancy was related to the type and form of material that could be stored and comingled in a particular location. This condition is contrary to SD130, Section 6.6.7, which requires that “CSLAs must be used to document the establishment and approval of criticality safety limits and corresponding CSE basis,” and TA-55-AP-522, Section 5.4, which states that “[t]he CSLA is a complete listing of all the required criticality safety controls; both the administrative and engineered feature requirements necessary to ensure that the required safety margin is established.”

Collectively, these noncompliances constitute a Severity Level II violation.

Base Civil Penalty – \$80,000

Proposed Civil Penalty (as adjusted) – \$0

2. Program Development

LANS’ requirements for work processes with respect to the nuclear criticality safety program (NCSP) development are documented in SD130, which requires that “[t]he CSED must establish a set of administrative requirements and engineered features that constrain the relevant NCS parameters to provide the required safety margin,” “[t]he CSED must determine and explicitly identify the controlled parameters and their associated limits upon which NCS depends,” and “CSLAs must be issued to document the establishment and approval of NCS limits and the corresponding CSED basis.” In addition, Policy 06.06, *Los Alamos Nuclear Criticality Safety Group, Criticality Safety Evaluations*, requires that “CSE documentation must be technically correct and unambiguous in terms of application” and that “[p]rocess descriptions must contain sufficient detail such that an independent reviewer may evaluate the NCS of the operation

and determine whether the entire process will remain subcritical under both normal and credible abnormal conditions.”

Contrary to these requirements, LANS did not develop and maintain CSEDs that provided a sufficient basis for an independent reviewer to determine that processes will remain subcritical under both normal and credible abnormal conditions. In addition, fissile material operations (FMOs) were conducted with deficiencies in the CSEDs.

The investigation team reviewed assessments, such as the October 7, 2013, *External Review of the Los Alamos Nuclear Criticality Safety Program* (External Review) and conducted interviews of LANS personnel. Many of the interviews confirmed or substantiated CSED issues identified in the External Review, while other interviews raised additional issues or provided new information. Deficiencies identified include the following:

- LANS did not evaluate the possibility of fire and the subsequent introduction by firefighters of unlimited water into gloveboxes in any of the 16 CSEDs examined in the External Review.
- Several CSEDs had insufficient process descriptions (e.g., CSED-11-085, CSED-12-001).
- In some cases there was no documented evaluation of subcriticality of the reference operational configuration.
- Several CSEDs had no additional margin of subcriticality other than the bias and bias uncertainty derived in the validation studies.
- Some CSEDs had no statement of the basis for the upset conditions.
- NCS-CSED-11-085 does not adequately consider reflection, but instead models fissile material with no reflection at all.
- NCS-CSED-09-088 notes the presence of graphite powder for use in firefighting, but does not evaluate the additional reflection this powder provides.
- NCS-CSED-12-001 inappropriately models the reflection provided by a cylindrical furnace as a reflection on one side by a slab of aluminum nitride.
- NCS-CSED-09-088 identifies the need for an engineered design feature to provide spacing between a 6.0-kg pre-pour and 4.5-kg container and identifies, but does not evaluate the criticality safety of two 4.5-kg containers in close proximity. Similarly, it does not evaluate a 4.5-kg container in close proximity to a crucible with a 6.0-kg weight.

Collectively, these noncompliances constitute a Severity Level II violation.

Base Civil Penalty – \$80,000

Proposed Civil Penalty (as adjusted) – \$0

B. Training and Qualifications

Title 10 C.F.R. § 830.122(b), *Management/Personnel Training and Qualification*, at paragraph (1), requires management to “[t]rain and qualify personnel to be capable of performing their assigned work.”

LANS’ requirements for training and qualification are documented in SD130, which states that “[t]he ORS [Operations Responsible Supervisor] must provide training for authorized process operators: ensuring that they have understanding of the relevant procedures, safety considerations, and general good safety practices, that emphasizes that they are ultimately responsible, regardless of position, for the safety in their work area, including NCS, on the specific NCS controls, both the administrative requirements and engineered features as specified in the CSLA, and on the workstation postings, if any.” SD130 further states that “training to the requirements of this document is required for all personnel with responsibilities under the NCS program.” In addition, TA55-AP-522, states that “[t]he use of this procedure requires training to the TA-55 NCS Program. The level of required training is dependent on a participant’s level of involvement with nuclear materials.”

Contrary to these requirements, LANS did not establish and maintain an adequate and effective NCS training and qualification program for criticality safety officers (CSOs), managers, and other TA-55 workers. The program lacked key qualifications and criticality-specific training and was overly reliant on on-the-job training. The investigation reviewed several internal and external assessments, including the April 2012 CSSG [criticality safety support group] *Review of LANL Criticality Safety at PF-4*, LANS’ August 16, 2012, *Management Assessment (MA) Report For TA-55 Criticality Safety Plutonium Processing Facility*, and LANS’ April 4, 2013, *Review of the Los Alamos National Laboratory Criticality Safety Officer (CSO) Program in TA-55*, CMR [Chemical and Metallurgy Research Facility] and TA-54 Area G [CSO Program Review]. LANS’ CSO Program Review highlighted the importance of CSO training stating that “[t]he CSO is relied upon for many tasks and activities. As such, the CSO must be well versed in a variety of disciplines having an extensive knowledge base (i.e., considerable operations experience), as well as enhanced Criticality Safety training. A good CSO Program requires specialized Criticality Safety Training.” The investigation also interviewed current LANS NCS personnel. The investigation observed a number of deficiencies, including the following:

- Although the ORS position is responsible for leading the criticality evaluation process, several ORS had not been trained on managing that process prior to their appointment to the position.
- LANS craft personnel in TA-55 had no training for NCS and could not ensure that program requirements, such as when work packages require an NCS review or the appropriate response to an NCS event, were implemented.

- In April 2013, TA-55, CMR and TA-54, Area G personnel were found to have no established CSO qualification program and were not provided with any additional NCS training, or formal on-the-job mentoring.

Collectively, these noncompliances constitute a Severity Level II violation.

Base Civil Penalty – \$80,000

Proposed Civil Penalty (as adjusted) – \$0

C. Quality Improvement

1. Identification

Title 10 C.F.R. § 830.122(c), *Management/Quality Improvement*, at paragraph (1), requires management to “[e]stablish and implement processes to detect and prevent quality problems.”

LANS’ requirements for detecting and preventing quality problems are documented in TA55-AP-522, which requires that “[t]he NCSG conduct or participate in audits of NCS program implementation and compliance with procedures,” “[t]he ORS performs periodic NCS reviews for each operation under his/her authority,” and “[t]he ORM [operations responsible manager] and/or the ORS must review each operation frequently (at least annually) to ascertain that procedures are being followed and that process conditions have not been altered so as to impact the basis of the NCS evaluation.”

Contrary to these requirements, LANS did not effectively establish and implement processes to detect and prevent quality problems within the NCS program during the time frame from June 2006 to June 2013. Weaknesses in detecting quality problems in the NCS program were observed in the CSSG’s *Technical Evaluation of the Los Alamos National Laboratory Nuclear Criticality Safety Program*, dated October 2005, which found that management personnel were not conducting formal criticality assessments on a regular, auditable basis. It also observed that independent, management, and self-assessments were not conducted in compliance with requirements. These weaknesses in detecting quality issues were not corrected effectively as evidenced by the LANS Nuclear Criticality Safety Committee (NCSC) *June 2011 Assessment of TA-55* which identified continuing problems in self-assessment. As a result, LANS did not identify and prevent many of the quality issues raised in the NCSC assessment.

Furthermore, the use of annual walkdowns by LANS was not an effective means of detecting and preventing quality issues. LANS NCS walkdowns were not sufficiently rigorous, did not meet applicable requirements (e.g., SD130), and did not evaluate key aspects of the work. Key aspects included whether or not the CSED or CSLA provided an accurate technical basis for the current work activity or whether work processes were described properly or implemented as described.

In assessing contractor performance over this time period, the Office of Enforcement investigation team reviewed the documents cited above, as well as the November 2013 *LANL Criticality Safety Infractions Causal Analysis* (LANS causal analysis), which evaluated the quality issues in the NCS program, and conducted interviews with current LANS personnel. The investigation found that LANS did not have effective processes in place to detect and prevent quality issues related to NCS and did not conduct periodic audits to monitor the NCS program, measure its effectiveness, and confirm proper implementation. Management and independent assessment programs did not proactively identify issues in the NCS program.

Collectively, these noncompliances constitute a Severity Level II violation.

Base Civil Penalty – \$80,000

Proposed Civil Penalty (as adjusted) – \$0

2. Corrective Action

Title 10 C.F.R. § 830.122(c), *Management/Quality Improvement*, at paragraph (2), requires contractors to “[i]dentify, control, and correct items, services, and processes that do not meet established requirements.”

LANS requirements for corrective action are documented in IP 330, which requires that “[a]ll quality deficiencies must be documented, cause(s) determined, and corresponding corrective actions determined, corrected, verified, and closed out in accordance with a formal corrective action management system.” In addition, IP 330 requires that “[a]ll conditions adverse to quality must be identified promptly and immediate corrective action taken.”

Contrary to the above requirements, LANS did not take timely and effective action to correct deficiencies in regards to training and qualification, staffing, nitric acid backflow, and CSEDs and CSLAs.

a. Training and Qualification

LANS did not correct longstanding issues in the training and qualification of personnel involved in the NCS program. Multiple internal and external assessments identified these issues over an extended period. In addition, the nature and extent of these issues was confirmed and substantiated through interviews with current LANS personnel during the onsite investigation.

The assessments examined during the investigation include the CSSG’s *Technical Evaluation of the LANL Nuclear Criticality Safety Program (NCSP)*, dated October 2005, which found deficiencies in the process knowledge of key PF-4 operations staff, including incomplete knowledge of potential hazards and process upsets and the associated safety controls. Several years later, the CSSG’s *Nuclear Criticality Safety Assessment of the Los Alamos National Laboratory*, dated July 21-24, 2008, noted that many of these deficiencies still remained, in that nearly every group identified a

need for significant improvements in NCS training and the addition of a hands-on component. Several years after that, the LANS *Nuclear Criticality Safety Committee June 2011 Assessment of TA-55* dated September 20, 2011, still found that NCS training was less than satisfactory. A year later, LANS' August 16, 2012, *Management Assessment (MA) Report For TA-55 Criticality Safety Plutonium Processing Facility*, identified that "[c]raft working in TA-55, PF-4 had no training for NCS."

In one specific example of training deficiencies, LANS' September 20, 2011 *Nuclear Criticality Safety Committee June 2011 Assessment of TA-55*, found little or no formal training for CSOs. A follow-up evaluation of CSO training, the April 4, 2013, *Review of the Los Alamos National Laboratory Criticality Safety Officer (CSO) Program in TA-55, CMR and TA-54 Area G* still found that there was "no established CSO qualification" and "no CSO training."

Other reviews found similar deficiencies in the areas of NCS staff involvement in training, the training of emergency response personnel for a criticality event, and the capability of TA-55 operations management to lead effective change in the area of NCS.

After reviewing these documents and conducting interviews with current LANS personnel, which verified and validated the findings in these reports, the investigation team concluded that LANS did not effectively correct longstanding issues in the training and qualification of personnel involved in the NCS program from the period of June 2006 through June 2013.

b. Staffing

LANS did not take timely and effective corrective action to resolve deficiencies in NCS staffing, although these deficiencies had been identified by a number of external reviews since contract transition in 2006. NCS staffing was deficient in both numbers and experience. This resulted in NCS staff spending less time on the floor observing operations, which hampered their role in ensuring that operations staff maintained adequate conduct of operations and avoided the use of unauthorized workarounds. Deficiencies in NCS staffing also led to an increased backlog of CSEDs, a reduced ability to establish or modify work processes for operations with fissile material, and prevented NCS staff from proactively assessing performance through audits.

An early indication of these issues was found in the CSSG's *Technical Evaluation of the LANL Nuclear Criticality Safety Program (NCSP)*, dated October 2005, which noted that there were "strained HSR-6 [former NCS group at LANL] staff resources." NCS staffing issues were also observed in the CSSG's July 2008 *Nuclear Criticality Safety Assessment of the Los Alamos National Laboratory*, which found that NCS staff were spending little time in the facilities assisting operations personnel, because of competing time demands to update CSEDs. In May 2013, the *CSSG Assessment of the Scope of Operations and Criticality Safety Staff Capacity and Review of LANL*

CAP and Metrics for the NCSP expressed safety concerns related to staffing, including the impact on new or modified safe operations with fissile material, increased use of workarounds, and management concerns. Many of these concerns were repeated in the LANS causal analysis.

Related concerns about NCS staff attrition were discussed in a May 3, 2011, memorandum, NCS-MEMO-11-013, *SB-CS Potential Office Move*, and repeated in the April 13, 2012, *CSSG Review of LANL Criticality Safety at PF-4*. These concerns were also discussed in the August 16, 2012, *Management Assessment (MA) Report for TA-55 Criticality Safety Plutonium Processing Facility*, which chronicled previous concerns regarding staffing levels and noted the effects of the long-term and continuing staffing shortfall.

The Office of Enforcement investigation team reviewed the documentation, interviewed current LANS personnel, and concluded that LANS response to this staffing attrition issue was neither proactive nor timely. LANS was alerted to the issue and its potential impact multiple times over a number of years by both internal and external reports, however; LANS' corrective actions were insufficient to correct the problem.

c. Nitric Acid Backflow

LANS' response to the safety-significant nitric acid backflow issue was neither timely nor complete. In 2006, an NNSA program review of the LANL NCS program identified the possibility that plutonium solution from the anion exchange process could be transferred to a bulk nitric acid tank located outside of PF-4, which has a large volume and unfavorable geometry. In response to this observation, LANS took steps to reduce the likelihood of such an event to an acceptably low level by making a temporary change to operating procedures until long-term engineered controls could be implemented. In June 2009, LANL issued a CSED acknowledging this potential issue and reiterating that temporary changes to operating procedures were adequate until permanent engineering controls could be implemented. However, it was not until September 2009 that LANS prepared a calculation that evaluated the potential of plutonium solution backflow into the bulk nitric acid tank, and this calculation was not approved until September 2010. At that time, LANS determined that several liters of solution could backflow into the bulk nitric acid tank and recognized that this situation represented an NCS concern.

In September 16, 2011, NNSA issued a memorandum to LANS regarding the PF-4 NCS program, noting that "temporary" procedure changes had been in place for over 5 years while implementation of engineering controls were pending. It was also noted that the temporary "administrative controls may not be sufficiently independent to prevent a single event from resulting in an inadvertent criticality." Finally, it was noted that LANS did not promptly initiate the process for a potential inadequacy in the safety analysis (PISA) when new information was identified in 2009. Three days later, LANS declared a positive unreviewed safety question in response to this issue,

but it was not until early 2013 that LANS implemented engineering controls to address the issue.

The Office of Enforcement investigation team reviewed the documentation, interviewed current LANS personnel, and concluded that LANS response to this issue was neither timely nor complete. Over six years elapsed from when the issue was first identified by an NNSA review of the LANL NCS program until implementation of the necessary engineered controls in early 2013. LANS did not discover the associated PISA until three years after the safety basis was established in 2006 and was not timely in initiating the PISA process.

d. CSEDs/CSLAs

LANS did not take timely and effective corrective action to resolve deficiencies in its CSEDs and CSLAs, documents critical to ensuring criticality safety at TA-55. In response to the October 2005 NNSA *Technical Evaluation of the Los Alamos National Laboratory Nuclear Criticality Safety (NCS) Program*, the previous contractor at LANL issued a Program Improvement Plan (PIP) dated March 8, 2006, to address shortcomings in its NCS program. The PIP committed to developing CSEDs and CSLAs for operations that lacked them and revising those that were deficient. CSED deficiencies included inadequate analysis of credible accident scenarios/initiators or process upsets, absences of identified engineered controls, and absences of identified NCS controls.

However, many of these PIP commitments went unaddressed. After 8 years, CSEDs and CSLAs still did not exist for a large percentage of FMOs, and many others contained inadequacies that were left unaddressed. Corrective actions taken to date have proven insufficient in correcting CSED/CSLA-related issues.

Several internal and external assessments identified CSED/CSLA problems that continued to go unaddressed. LANS' March 2006 *Review of LANL Fissile Material Operations* documented the continued presence of many of these deficiencies. It found inadequate process descriptions and occasional mismatch between suggested limits and those in the CSLAs. It also found that some process changes were made without a documented NCS review. In summary, it documented 32 CSLAs and 115 CSEDs that were missing and 336 CSLAs and 235 CSEDs that were deficient.

An update to the PIP, issued in April 2008, noted numerous deficiencies in CSEDs and CSLAs. At that time, 34 CSLAs and 114 CSEDs were missing and 368 CSLAs and 228 CSEDs were deficient, representing a modest decrease in the issues with CSEDs and an actual increase in the number of CSLAs with deficiencies. The persistence of these issues led to delays in some programs while they awaited CSEDs. There was also a concern that this situation could lead to operations staff looking for ways to inappropriately authorize new operations under existing CSEDs.

Five years later, in 2013, many of these deficiencies remained. LANS' April 24, 2013, *Closure and Extent of Condition Review of Completed Nuclear Criticality Safety Actions (NCS-MEMO-13-008)* identified 10 examples of repetitive CSLA implementation deficiencies and incorrect CSLAs and/or postings derived from CSLAs. The May 30, 2013, AD-NHHO:13-144, *LANL Nuclear Criticality Safety Program – List of Fissile Material Operations and their Confidence Level Ranking; Request for Concurrence, Attachment 2*, noted that as of May 17, 2013, 131 of PF-4's 419 FMOs did not have an issued Level 1, 2 or 3 CSED or SB-CS ("Modern CSED"). Further, 29 of the 419 FMOs in PF-4 had potential safety issues in their CSEDs, and an additional 110 FMOs had potential compliance issues in their CSEDs. The External Review noted several deficiencies in CSED/CSLA process descriptions, margin of subcriticality, upset conditions, reflection, reactivity, failure mechanisms, and basis. The report noted that in general, "CSEDs need improvement, in some cases significant improvement." The LANS causal analysis, issued in November 2013, summarized many of these findings by noting continuing deficiencies in CSED/CSLA implementation, such as lack of alignment with current operations, ambiguity and confusion in requirements, and conflicting hazard control sets.

The Office of Enforcement investigation team reviewed these documents and interviewed current LANS personnel to verify their findings. These assessments portray a longstanding picture of missing or inadequate NCS documentation that is essential for ensuring a basis for safe operations in nuclear high hazard facilities. LANS identified many of these issues, but did not implement the actions necessary to prevent or correct the deficiencies.

Collectively, these noncompliances constitute a Severity Level I violation.

Base Civil Penalty – \$160,000

Proposed Civil Penalty (as adjusted) – \$0

3. Causal Analysis

Title 10 C.F.R. § 830.122(c), *Management/Quality Improvement*, at paragraph (3), requires that contractors "[i]dentify the causes of problems and work to prevent recurrence as a part of correcting the problem."

LANS requirements for identifying causes of problems and preventing recurrence are documented in IP 330, *Los Alamos National Laboratory Quality Assurance Program*, which requires that "[i]n the case of a significant condition adverse to quality, the cause of the condition must be determined and corrective action taken to preclude recurrence." In addition, SD330, *Los Alamos National Laboratory Quality Assurance Program*, states that "[c]onditions adverse to quality shall be identified promptly and corrected as soon as practicable. In the case of a significant condition adverse to quality, the cause of the condition shall be determined and corrective action taken to preclude recurrence. The identification, cause, and corrective action for significant conditions adverse to quality shall be documented and reported to appropriate levels of management. Completion of corrective actions shall be verified."

Contrary to the above requirements, LANS did not adequately identify the causes of problems and work to prevent recurrence as a part of correcting the problem. This was evidenced by deficiencies in its extent-of-condition reviews, root cause analyses, and effectiveness reviews. It also manifested itself in the fact that lessons learned were not shared and in the inability to sustain corrective action. The investigation team reviewed the many internal and external reviews that documented the inability to prevent recurrence of issues and discussed and validated these issues through interviews with LANS personnel.

These issues persisted throughout the time period from the start of the LANS contract in June 2006 to June 2013, but were especially noteworthy during the latter part of this time frame. In September 20, 2011, the *Nuclear Criticality Safety Committee June 2011 Assessment of TA-55* noted LANS' inability to look deeply at issues and to develop corrective actions that address root causes and prevent recurrence of similar issues. It stated that "management responses to issues typically involve band-aid solutions, additional paperwork, and/or no-value added training," and "many of the issues identified during this assessment have been also identified during previous DOE or LASO [Las Alamos Site Office] criticality-safety assessments performed at TA-55." Similar issues were repeated in a September 2011 memo from Kevin Smith to Charles McMillan, *Los Alamos National Laboratory - Improving Nuclear Safety Operations*, which noted that facility-specific issues included inadequate "processes for sustainably addressing issues" and "closure of issues." It also drew attention to "management/supervisory actions that rationalize the status quo rather than identifying and fixing problems."

In April 2012, the *CSSG Review of LANL Criticality Safety at PF-4* found that there is "no effective senior management response for fixing any overarching NCS issues" and that "LANL has demonstrated an inability to close outstanding criticality issues in a sustainable manner." It also found that corrective actions do not clearly relate to root causes and the training alone will not sustain desired changes.

The External Review found that "there is an issue associated with a pervasive culture within LANL of reactive management across multiple areas of the Laboratory" and there is an inability "to fully assess, understand and correct issues identified within the laboratory." The report also noted an overlap of issues identified in 2005 with current issues, the laboratory's delay in launching a causal analysis of either the attrition of the NCS staff or the PF-4 pause, and the laboratory's slow response in determining the extent of condition of the PF-4 issues in other parts of the laboratory outside of PF-4.

In the LANS causal analysis, the contractor acknowledged continuing deficiencies in the linkage between infractions, critique reports, corrective actions, and lessons learned in attempting to prevent recurrence. The report also highlighted issues related to corrective action specificity, focus, implementation, and sustainment.

After reviewing these documents, including the LANS causal analysis, and conducting interviews with current LANS personnel, the investigation team concluded that LANS

did not effectively identify the causes of problems or develop appropriate and sustainable corrective actions to prevent recurrence of longstanding issues.

Collectively, these noncompliances constitute a Severity Level II violation.

Base Civil Penalty – \$80,000

Proposed Civil Penalty (as adjusted) – \$0

II. REPLY

Pursuant to 10 C.F.R. § 820.24(b), LANS is hereby obligated to submit a written reply within 30 calendar days after the date of filing of this PNOV. The reply should be clearly marked as a “Reply to the Preliminary Notice of Violation” and must be signed by the person filing it.

If LANS’ reply specifically states that LANS waives any right to contest this PNOV, then, pursuant to 10 C.F.R. § 820.24(d), this PNOV will constitute a Final Order upon the filing of the reply.

If LANS disagrees with any aspect of this PNOV, then as applicable and in accordance with 10 C.F.R. § 820.24(c), the reply must: (1) state any facts, explanations, and arguments that support a denial of an alleged violation and (2) discuss the relevant authorities that support the position asserted, including rulings, regulations, interpretations, and previous decisions issued by DOE. In addition, 10 C.F.R. § 820.24(c) requires that the reply include copies of all relevant documents.

Please send the appropriate reply by overnight carrier to the following address:

Director, Office of Enforcement
Attention: Office of the Docketing Clerk
U.S. Department of Energy
19901 Germantown Road
Germantown, MD 20874-1290

A copy of the reply should also be sent to my office and the Manager of the Los Alamos Field Office.

Pursuant to 10 C.F.R. § 820.33, *Default order*, subsection (a), if LANS fails to submit a written reply within 30 calendar days after the date of filing of this PNOV, the NNSA Administrator may pursue a Default Order.

III. CORRECTIVE ACTIONS

Corrective actions that have been or will be taken to avoid further violations should be delineated with target and completion dates in DOE's Noncompliance Tracking System.



Frank G. Klotz
Under Secretary for Nuclear Security
Administrator, NNSA

Washington D.C.

This 25th day of August 2015