

Department of Energy
National Nuclear Security Administration
Washington DC 20585

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

April 15, 2011

OFFICE OF THE ADMINISTRATOR

Dr. Michael R. Anastasio, President
Los Alamos National Security, LLC
Los Alamos National Laboratory
Mailstop A100, Drop Point 03140071S
Bikini Atoll Road, TA-3
Los Alamos, New Mexico 87545-1663

NEA-2011-01

Dear Dr. Anastasio:

This letter refers to a U.S. Department of Energy (DOE) investigation into the facts and circumstances surrounding the unanticipated extremity exposures that occurred at Technical Area (TA)-48 and TA-53 on July 24, 2009, at the Los Alamos National Laboratory. The final special dose assessments documenting the details of these exposures were completed on January 26, 2010. The Office of Health, Safety, and Security's Office of Enforcement transmitted the results of the investigation to Los Alamos National Security, LLC (LANS), in an Investigation Report dated August 18, 2010. An enforcement conference was held on September 30, 2010, with you and members of your staff to discuss the report's findings and the LANS corrective action plan. A summary of the conference is enclosed.

The Investigation Report also discusses several glovebox events. Based on data provided by LANS during the enforcement conference, the National Nuclear Security Administration (NNSA) concludes that these types of events appear to be trending down because of actions taken by LANS to improve safety performance. As a result of the effectiveness of these corrective actions, NNSA has chosen not to continue enforcement activity in this area, but will continue to monitor performance.

However, NNSA considers the extremity exposure event and the associated violations to be of high safety significance. Personnel at TA-48 and TA-53 did not recognize the extremely high beta radiation dose rate associated with the arsenic 74 (As-74) sources during their review and planning activities. As a result, the engineering and administrative controls applied to the As-74 sample decontamination, transport, and ion chamber loading operations were not adequate to ensure that employee occupational exposure limits would not be exceeded. Further, LANS did not establish effective written authorizations or radiological work permits to monitor or reduce the dose rate or limit worker extremity exposure. NNSA believes that the As-74 event could have been averted if LANS personnel had followed established institutional procedures and regulatory requirements for hazard identification and radiological work controls.



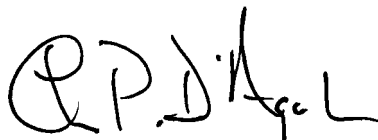
Based on an evaluation of the evidence in this matter, including information presented at the enforcement conference, NNSA has concluded that violations of Title 10 C.F.R. Part 835, *Occupational Radiation Protection*, have occurred. Accordingly, NNSA is issuing the enclosed Preliminary Notice of Violation (PNOV) to LANS with three Severity Level II violations and one Severity Level III violation and a total base civil penalty of \$165,000 (no civil penalty assigned to the Severity Level III violation). The civil penalty assessment reflects the maximum base civil penalty amounts authorized under 10 C.F.R. § 820.81 for Severity Level II violations at the time of the extremity exposure event.

NNSA has decided not to grant mitigation for timely self-identification and reporting of the violations because of the self-disclosing nature of this event. NNSA notes, however, that the performance of additional calculations and the ultimate reporting of the event by the on-call health physicist represent a positive aspect of this event. With respect to LANS' detailed and thorough investigation of this event and the ensuing corrective actions, NNSA has decided to award 50 percent mitigation of the base civil penalty for each of the Severity Level II violations. As a result, the total proposed civil penalty is reduced to \$82,500.

Pursuant to 10 C.F.R. § 820.24, *Preliminary Notice of Violation*, you are required to file a reply within 30 calendar days of the filing of the enclosed PNOV and to follow the instructions specified in the PNOV when preparing your response.

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

Sincerely,

A handwritten signature in black ink, appearing to read "T. P. D'Agostino". The signature is stylized and written in a cursive-like font.

Thomas P. D'Agostino
Administrator
National Nuclear Security Administration

Enclosure

cc: Kevin Smith, LASO
Marjorie Gavett, LANS
Richard Azzaro, DNFSB

Preliminary Notice of Violation

Los Alamos National Security, LLC
Los Alamos National Laboratory

NEA-2011-01

A U.S. Department of Energy (DOE) investigation into the facts and circumstances associated with the unanticipated extremity exposures that occurred at Technical Area (TA)-48 and TA-53, on July 24, 2009, at the Los Alamos National Laboratory (LANL), identified multiple violations of DOE occupational radiation protection requirements. Violations committed by Los Alamos National Security, LLC (LANS) involve deficiencies in As Low As Reasonably Achievable (ALARA) controls implementation, radiological work activities, radiological surveys, and individual radiation exposure monitoring.

DOE has categorized the violations as three Severity Level II violations and one Severity Level III violation, and in consideration of the mitigating factors, imposes a total proposed civil penalty of \$82,500. As explained in 10 C.F.R. Part 820, appendix A, *General Statement of Enforcement Policy*, section VI(b), "Severity 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. Severity level III violations are less serious but are of more than minor concern: i.e., if left uncorrected, they could lead to a more serious concern."

As required by 10 C.F.R. § 820.24(a) and consistent with Part 820, appendix A, the violations are listed below.

VIOLATIONS

A. Design and Control

Title 10 C.F.R. § 835.1001(a), requires that "measures shall be taken to maintain radiation exposure in controlled areas ALARA through engineered and administrative controls."

Contrary to this requirement, LANS failed to take measures to "maintain radiation exposure in controlled areas ALARA through engineered and administrative controls."

LANS document P121, rev 0.1, 2008, *Radiation Protection*, implements the requirements of 10 C.F.R. Part 835. The *Radiological Work Control Package Technical Basis* procedure, RP-1 TBD-01, dated July 30, 2008, is designed to implement the LANL radiation protection program (RPP) as required by P121, rev 0.1, 2008. Section 3 of this document requires that the radiological work analysis ensure that "controls and requirements are set to keep radiological risks ALARA." Although LANS personnel issued radiological work permits

(RWP) for the arsenic 74 (As-74) source work, the extremely high beta radiation dose rate associated with the As-74 sample (later estimated by LANS to be 37 rad/second on contact) was not adequately addressed as a hazard during the work review and planning activities performed by personnel at TA-48 and TA-53. As a result, effective controls to shield or reduce the dose rate or limit worker extremity exposure were not established in work procedures or RWPs. Worker extremity exposures (as estimated by LANS) resulting from the event ranged from 16 to 25 rem and were received during worker handling of the source for extremely limited time periods (< 1 minute). Although the resulting exposures did not exceed the DOE annual extremity exposure limit of 50 rem, the potential existed to greatly exceed that limit based on the high beta dose rates and the lack of effective controls.

This non-compliance constitutes a Severity Level II violation.

Base Civil Penalty - \$55,000

Proposed Civil Penalty (as adjusted) – \$27,500

B. Radiation Protection Programs

Title 10 C.F.R. § 835.101(a), requires that work “shall be conducted in compliance with a documented radiation protection program.”

Contrary to this requirement, LANS failed to conduct work “in compliance with a documented radiation protection program.” Specifically, LANS used RWPs that were inadequate to effectively control the intended activity, and failed to ensure that work was performed consistent with the administrative controls and other hazard controls identified in the RWP.

The *Radiological Work Control Package Technical Basis* procedure, RP-1 TBD-01, dated July 30, 2008, is designed to implement the LANL RPP, as required by P121, rev 0.1, 2008. This document requires RWPs for specific radiological work performed at LANL.

The RWP used for controlling the work at TA-48 (RWP number 2007-2045) specified that gross contamination levels were not to exceed 100,000 disintegrations per minute per hundred square centimeters (dpm/100 cm²) and that radiation levels were not to exceed 5 rem per hour at 30 centimeters. If these levels were exceeded work was to be stopped. The TA-48 RWP included specific instructions for decontaminating the source to <1000 dpm/100 cm² and also required the radiological control technician (RCT) to perform dose rate surveys of both the general area and the area in contact with the source. However, during decontamination of the As-74 sample on July 24, 2009, the maximum allowable contamination and radiation levels specified by the TA-48 RWP were exceeded. Contamination surveys performed during sample decontamination efforts identified final contamination levels in excess of 500,000 dpm/100 cm², exceeding the maximum permissible levels for the TA-48 RWP and violating the specific instructions for decontamination. In addition, and contrary to instruction 2 of the section of the RWP dealing with moving sources to/from hoods, no contact dose rate surveys of the sample were taken. A dose rate survey that was performed after the sample had been placed in a shielded container (pig) with the lid off was recorded as 30 R/hr at 30 centimeters, significantly

exceeding the maximum allowable radiation levels. Despite these violations of the controlling RWP, the work was not stopped; instead, the sample was packaged and shipped to TA-53 for further handling.

The RWP used to control the work at TA-53 (RWP number 2009-034-01) imposed controls that: (1) required that the loading of the As-74 sample into the detector chamber be performed in a glovebox; (2) specified minimum personal protective equipment for safely performing the work in the glovebox; and (3) required that the highest measured dose rates were not to exceed 5000 millirem/hour (on contact). However, during the work, these controls were not followed. Specifically, the work party decided to conduct the As-74 sample work outside a glovebox and to perform the work as an unauthorized radiological work activity (i.e., without the development of a new RWP). These decisions violated RP-1-TBD-01, rev. 01, and should have resulted in the development of a new RWP. Furthermore, the initial survey measurement of the As-74 sample on receipt at TA-53 indicated 5000 millirem/hour measured at 30 centimeters from the sample, clearly indicating that the highest allowable dose rate level of 5000 mrem/hour (on contact) had been exceeded. The RCTs neither recognized nor understood that this value exceeded the limit because they interpreted the “highest” value as the reading at 30 centimeters.

Collectively, these non-compliances constitute a Severity Level II violation.
Base Civil Penalty - \$55,000
Proposed Civil Penalty (as adjusted) – \$27,500

C. General Requirements

Title 10 C.F.R. § 835.401(a), requires that “[m]onitoring of individuals and areas shall be performed to ... (2) document radiological conditions.”

Contrary to these requirements, the surveys performed by LANS personnel did not adequately document the radiological conditions of the As-74 sample during purification, solidification, and transportation activities from TA-48 to TA-53.

Environmental Safety and Health document ESH-1-06-02.2, *Surveying for External Radiation*, dated August 1, 2003, requires shallow dose surveys be completed for beta sources. Specifically, Step 4.3.2 of the procedure requires that both open and closed window surveys of the source be completed. However, radiological surveys taken prior to worker handling of the As-74 sample at the TA-48 facility were limited to gamma (closed window) radiation surveys taken at a distance of 30 centimeters. These surveys were inadequate to control worker exposure because: (1) the primary radiation emanating from the As-74 source was beta radiation; and (2) the measurements taken at 30 centimeters significantly underestimated the contact dose rates experienced by the workers’ hands.

Following sample decontamination activities, a beta radiation (open window) survey measurement was finally taken after the sample was loaded into the pig at TA-48. Although these survey results were unexpectedly high (30 R/hr measured at 30 centimeters from the sample, with the pig lid off), the results were not effectively communicated or acted upon;

the radiological controls during subsequent work with the sample at TA-48 and TA-53 were not modified to protect workers from the higher dose. Radiation surveys of the sample at TA-53 were also inadequate to assess and control subsequent work activities because they were performed at 30 centimeters over the uncovered pig while the sample was still inside. Consequently, the survey results did not account for directionality of the sample dose rates and significantly underestimated the contact dose rates for the workers' hands.

Collectively, these non-compliances constitute a Severity Level II violation.

Base Civil Penalty - \$55,000

Proposed Civil Penalty (as adjusted) – \$27,500

D. Individual Monitoring

Title 10 C.F.R. § 835.402(a), requires the use of personnel dosimeters to monitor individual radiation exposure.

Contrary to this requirement, LANS personnel did not wear dosimeters to adequately monitor radiation exposure to the hands while handling the As-74 source.

LANS document P121, rev 0.1, 2008, *Radiation Protection, Part 2, Use of Dosimetry*, Article 521, *Wearing Dosimeters*, requires workers to “[w]ear extremity dosimeters on the extremity for which they are intended and oriented as instructed.” Also, Part 3, *Assignment of Dosimetry*, Article 531, *External Dosimetry*, requires that “dosimeters must be provided to and used by individuals ... [who] are likely to receive from external sources an effective dose of 0.1 Rem or more in a year or an equivalent dose to the extremities” However, because the controlling TA-53 RWP did not require extremity monitoring, the TA-53 radiological workers did not wear extremity dosimeters. At TA-48, the radiological workers wore extremity dosimeters during sample handling activities, but they wore them on their wrists (rather than their fingers), and the dosimeters were oriented so that the active elements of the dosimeter faced away from the source. The dosimeter location and orientation were therefore not appropriate for accurately monitoring extremity exposure.

This non-compliance constitutes a Severity Level III violation.

Proposed Civil Penalty – None

REPLY

Pursuant to 10 C.F.R. § 820.24(b), LANS is hereby obligated, within 30 calendar days after the date of filing of this Preliminary Notice of Violation (PNOV), to submit a written reply. 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, in its reply, LANS agrees to comply with the proposed penalty and waives any right to contest this PNOV or the proposed penalty, then, pursuant to 10 C.F.R. § 820.24(d), this PNOV will constitute a Final Order upon the filing of the reply. In such cases and in accordance with

10 C.F.R. § 820.32(c), the total civil penalty of \$82,500 must be remitted within 30 calendar days after the Final Order is filed. Payment of the civil penalty must be made by check, draft, or money order payable to the Treasurer of the United States (Account 891099) and mailed to the address provided below.

If LANS disagrees with any aspect of this PNOV or the proposed remedy, then, as applicable and in accordance with 10 C.F.R. § 820.24(c), the reply shall include: (1) any facts, explanations, and arguments which support a denial that a violation has occurred as alleged; (2) any extenuating circumstances or other reason why the proposed remedy should not be imposed or should be mitigated; (3) a discussion of the relevant authorities which 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 Site Office.

Pursuant to 10 C.F.R. § 820.33(a), if LANS does not submit a written reply within 30 calendar days after the date of filing of this PNOV, the NNSA Administrator will request that a Default Order be issued against LANS.

CORRECTIVE ACTION UPDATES

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.



Thomas P. D'Agostino
Administrator
National Nuclear Security Administration

Washington DC
This 15 day of April 2011