



Department of Energy
National Nuclear Security Administration
Washington, DC 20585

September 3, 2003

Dr. Michael R. Anastasio

[]

Lawrence Livermore National Laboratory

P.O. Box 808, L-001

Livermore, CA 94551-0808

EA-2003-04

Subject: Preliminary Notice of Violation and Proposed Civil Penalty \$137,500
(Waived by Statute)

Dear Dr. Anastasio:

This letter refers to the recent investigation by the Department of Energy's Office of Price-Anderson Enforcement (OE) of the June 2002 extremity radiological overexposure event in [].

An Investigation Summary Report describing the results of that review was issued to you on May 15, 2003. An Enforcement Conference was held on June 23, 2003, in Germantown, Maryland, with members of your staff to discuss these findings. A Conference Summary Report is enclosed.

Based on our evaluation of these issues and information presented by Lawrence Livermore National Laboratory (Laboratory/LLNL) during the Enforcement Conference, the National Nuclear Security Administration (NNSA) has concluded that violations of the Quality Assurance Rule (10 CFR 830.122) and the Occupational Radiation Protection Rule (10 CFR 835) have occurred. The violations are described in the enclosed Preliminary Notice of Violation (PNOV).

Section I of the PNOV describes radiation protection deficiencies associated with the June 2002 purification work conducted in B151. One violation was assessed for the significant radiological overexposure to the worker's hands of 111 and 62 rem respectively. The occupational dose assigned to one hand was more than twice the regulatory limit of 50 rem. Additionally, the deficiencies included the failure to adequately post the room to warn of radiation levels and the failure to effectively implement the As Low As Reasonably Achievable (ALARA) process to limit the worker's exposure. The enclosed PNOV includes a Severity Level II violation for the overexposure to the worker's hands and a separate Severity Level II violation for inadequate radiological controls.

Section II of the PNOV describes numerous work process violations associated with the June 2002 purification work. These violations included failure to notify the Environment,



Safety and Health (ES&H) personnel of radiological conditions as required by LLNL's nuclear safety documents and failure to implement a required hazard assessment and operational safety plan. The violations in Section II have been classified as a Severity Level II violation based on the numerous instances of failure to follow LLNL's established work controls to limit radiological exposures to the workers.

NNSA would have proposed a Civil Penalty in the amount of \$137,500 in this case. However, this civil penalty is currently waived by statute for LLNL. In determining the proposed penalty value, NNSA has concluded that no mitigation for timely self-identification or reporting is appropriate, since the overexposure was a self-disclosing event. Additionally, and consistent with enforcement precedent, no mitigation was considered for corrective actions associated with the overexposure violation.

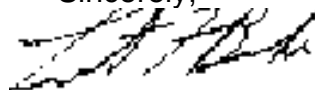
NNSA has concluded that twenty-five percent mitigation was warranted for the violations dealing with inadequate radiological controls and work process violations; this mitigation is based on the scope of corrective actions taken within the Chemistry and Materials Science (CMS) directorate. Full (i.e., 50%) mitigation for corrective actions was not provided for the following reasons:

1. LLNL's investigation failed to fully assess the extent of condition of the procedural compliance deficiencies outside of the CMS directorate, and
2. LLNL's evaluation of CMS and ES&H team interactions did not address the inadequacies in ES&H technician "technical inquisitiveness" described in both the NNSA Type B investigation and in the OE Investigation Summary Report.

NNSA will continue to closely follow implementation of the corrective actions with the expectation of seeing continuing improvements in radiological controls and in the integration of LLNL's ES&H program with line operations.

You are required to respond to this letter and to follow the instructions specified in the enclosed PNOV when preparing your response. Your response should document any additional specific actions taken to date. Corrective actions will be tracked in the NTS. You should enter into the NTS (1) any additional actions you plan to take to prevent recurrence and (2) the anticipated completion dates of such actions. After reviewing your response to the PNOV, including your proposed corrective actions entered into NTS, DOE/NNSA will determine whether further enforcement action is necessary to ensure compliance with DOE nuclear safety requirements.

Sincerely,



Linton F. Brooks

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National Nuclear Security Administration

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Enclosures:

Preliminary Notice of Violation
Enforcement Conference Summary
List of Attendees

cc: C. Yuan-Soo Hoo, LSO
R. Kopenhaver, LSO, PAAA Coordinator
K. Hoar, NV PAAA Coordinator
H. Hatayama, UC
A. Garcia, LLNL PAAA Coordinator
E. Beckner, NNSA
J. Mangeno, NNSA
D. Minnema, NNSA PAAA Coordinator
X. Ascanio, NNSA
R. Azzaro, DNFSB
B. Cook, EH-1
A. Kindrick, EH-1
S. Sohinki, EH-6
S. Adamovitz, EH-6
T. Weadock, EH-6
Docket Clerk, EH-6

PRELIMINARY NOTICE OF VIOLATION

University of California
Lawrence Livermore National Laboratory (LLNL)

EA 2003-04

As a result of a Department of Energy (DOE) evaluation of the June 2002 extremity overexposure event in [], several violations of DOE nuclear safety requirements were identified. In accordance with 10 CFR 820, Appendix A, "General Statement of Enforcement Policy," the violations are listed below.

I. Occupational Exposure Violation

10 CFR 835.202(a)(4) requires that the occupational exposure to general employees resulting from DOE activities be controlled so that the employee's extremity dose does not exceed the annual limit of 50 rem.

Contrary to the above, occupational exposure to a LLNL general employee was not controlled such that the employee received extremity exposures to his hands of 111 and 62 rem during calendar year 2002.

This is a Severity Level II violation.
Civil Penalty \$55,000 (Waived)

II. Radiological Control Violations

- A. 10 CFR 835.2 defines a Radiation Area as "...any area accessible to individuals in which radiation levels could result in an individual receiving a deep dose equivalent in excess of 0.005 rem in one hour at 30 centimeters from the source or from any surface that the radiation penetrates."

10 CFR 835.603(a) requires that each access point to a Radiation Area be conspicuously posted as such.

Contrary to the above, during the June 2002 purification work in [], Radiation Areas were not conspicuously posted as required in that survey measurements performed by the radiological worker identified occasions in which

the radiation levels arising from the sides of the glovebox were in excess of five millirem per hour (mrem/hr). For example, the radiological worker's notes for June 11, 2002, indicate radiation levels greater than 50 milliroentgen per hour at an estimated distance of 15 to 30 centimeters from the side of the glovebox. During the purification work period of June 10-21, 2002, [] was not posted as a Radiation Area.

- B. 10 CFR 835.1003 requires that "during routine operations, the combination of physical design features and administrative controls shall provide that (a) the anticipated occupational dose to general employees shall not exceed the limits established at §835.202; and (b) the ALARA process is utilized for personnel exposures to ionizing radiation."

Contrary to the above, the ALARA process was not utilized to evaluate and control the June 2002 purification work activity in []. Specifically, the radiological worker failed to notify the cognizant Environment, Safety and Health (ES&H) Health Physicist when dose rate thresholds established in the Integration Work Sheet (IWS) 2284 were exceeded. As a result, the required hazard assessment was not performed, which would have, in part, evaluated specific ALARA controls for the activity. Consequently, the failure to notify the Health Physicist represented a lost opportunity to formally evaluate the high specific activity processing work and identify potential ALARA controls. Additionally, the DOE Type B investigation report noted that several potential controls (leaded gloves, forceps, additional lead shielding) were either not used or were underutilized during the activity.

Collectively, these violations constitute a Severity Level II problem.
Civil Penalty - \$41,250 (waived)

III. Work Control Violations

10 CFR 830.122 (e), *Criterion 5 – Performance/Work Processes* requires that the Laboratory "(1) Perform 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."

10 CFR 835.104 requires that "Written procedures shall be developed and implemented as necessary to ensure compliance with this part, commensurate with the radiological hazards created by the activity and consistent with the education, training, and skills of the individuals exposed to those hazards."

Contrary to the above, work performed in conjunction with the June 2002 purification work in [] was not performed consistent with administrative controls including written procedures in that–

- A. ES&H Manual, Volume II, Part 20.1 *Occupational Radiation Protection*, approved April 30, 2001, Section 11.5 states that the Responsible Individual (RI) shall do the following: "...Maintain a radiologically safe work environment and take corrective actions if potentially hazardous conditions arise...Control operations so doses are

kept as low as reasonably achievable below the dose limits...Ensure procedures are implemented and used effectively. ...”

However, during the June 2002 purification work activity, the radiological worker, also the RI for the those operations, did not effectively implement procedures which required that the RI notify facility ES&H technicians and Health Physicist when work activities resulted in radiation fields greater than five mrem/hr. As a result, the required hazard assessment was not performed and additional radiological controls were not implemented to control exposure. Additionally, the radiological worker received an extremity dose, which exceeded the federal dose limit.

- B. ES&H Manual, Volume II, Part 20.4, *LLNL Occupational Radiation Protection ALARA Program*, dated April 1, 2001, Table 3 requires a formal ALARA review if an “individual dose from an operation is expected to exceed 0.1 rem/yr.”

However, for the June 2002 purification work activity, an ALARA review was not performed and the extremity dose to the radiological worker’s hands exceeded the annual federal limit of 50 rem.

- C. UCRL-AR-132791, *Integrated Safety Management System Description*, dated September 19, 2001, states that for Work Authorization Level 4, *Supplemental Controls*, “A Level B Operational Safety Plan (OSP) is required to be prepared when ... b) a work activity entails hazards not covered in the applicable Facility Safety Plan (FSP); c) the necessary controls for a work activity are beyond those defined in the applicable FSP; d) a work activity is beyond those commonly performed by the public and not covered by an FSP or direct reference to provisions of the ES&H Manual...” Further, Integration Work Sheet (IWS) 2284 specified that a Level B OSP was needed as additional ES&H documentation.

However, for the June 2002 californium purification work activity, a Level B OSP was not prepared and implemented specific to that activity.

- D. ES&H Manual, Volume 1, Part 2.1, *Laboratory & ES&H Policies, General Worker Responsibilities, and Integrated Safety Management* approved June 7, 2002, states: “The ES&H teams are responsible for: ... Independently performing ES&H surveillance of and feedback on planned and ongoing operations, facilities, equipment, and procedures and recommending corrective actions to the cognizant management... Monitoring the work environment to identify areas of noncompliance with applicable requirements in the ES&H Manual and Work Smart Standards.”

However, during the californium purification work activity, ES&H teams performed routine radiological surveys upon request by the radiological worker but did not provide independent surveillance and feedback on the activities nor monitor the work environment to identify areas of noncompliance such as the failure to have an OSP or hazard assessment for the californium purification. The lack of integration of ES&H team with line activities was identified in the DOE Type B Investigation which stated that the ES&H “team activities are not fully integrated with those of the line organization “ and that “the ES&H technicians.... are not informed by line management about all ongoing activities and therefore cannot be proactive.”

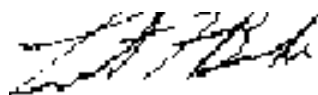
- E. Integration Work Sheet (IWS) 2284, dated January 19, 2000, stated that "Work with activities exceeding 100 microcuries or with material that can produce > 5 mrem/hr at 30 cm require a hazard assessment by the ES&H Team 3 Health Physicist."

However, during the californium purification work activity, the radiological worker was handling a total of 53.9 millicuries of californium 249, and these work activities resulted in intermittent exposure rates exceeding 5 mrem/hr at 30 cm. However, the ES&H Health Physicist was not notified when the IWS thresholds were exceeded, and a hazard assessment of these purification activities was not performed.

Collectively, these violations constitute a Severity Level II problem.

Civil Penalty - \$41,250 (waived)

Pursuant to the provisions of 10 CFR 820.24, Lawrence Livermore National Laboratory is hereby required within 30 days of the date of this Preliminary Notice of Violation (PNOV), to submit a written statement or explanation by U.S. Postal Service or overnight carrier to Linton F. Brooks, Administrator, National Nuclear Administration, 1000 Independence Avenue, SW, Washington, D.C. 20585-0270 and copies to the Director, Office of Price-Anderson Enforcement, Attention: Office of the Docketing Clerk, EH-6, 270 Corporate Square Building, U.S. Department of Energy, 1000 Independence Avenue, SW, Washington, D.C. 20585-0270 if sent by U.S. Postal Service. If sent by overnight carrier, the copies should be addressed to the Director, Office of Price-Anderson Enforcement, Attention: Office of the Docketing Clerk, EH-6, 270 Corporate Square Building, U.S. Department of Energy, 19901 Germantown Road, Germantown, MD 20874-12190. Copies should also be sent to the Director, Livermore Site Office as well as to my office. This reply should be clearly marked as a "Reply to a Preliminary Notice of Violation" and should include the following for each violation: (1) admission or denial of the alleged violations; (2) any facts set forth which are not correct; and (3) the reasons for the violations if admitted, or if denied, the basis for the denial. Corrective actions that have been or will be taken to avoid further violations will be delineated with target and completion dates in DOE's Noncompliance Tracking System. In the event the violations set forth in this PNOV are admitted, this Notice will constitute a Final Notice of Violation in compliance with the requirements of 10 CFR 820.24.



Linton F. Brooks
[]
National Nuclear Security Administration

Dated at Washington, DC,
this 3rd day of September 2003

LAWRENCE LIVERMORE NATIONAL LABORATORY EXTREMITY OVEREXPOSURE EVENT

ENFORCEMENT CONFERENCE SUMMARY

On June 23, 2003, representatives with the Department of Energy's (DOE) Office of Price-Anderson Enforcement (OE) and the National Nuclear Security Administration (NNSA) held an informal enforcement conference with representatives from the Lawrence Livermore National Laboratory (LLNL) and the University of California (UC). This conference was held to discuss potential noncompliances associated with the LLNL extremity overexposure identified in July 2002 and described in the OE Investigation Summary Report dated May 15, 2003. A list of the conference attendees is attached. Material provided by LLNL during the conference has been incorporated into the docket file.

The conference was opened by Mr. Stephen Sohinki, OE Director, who provided introductions and an overview of the conference's purpose and objectives.

LLNL presentations were opened by Mr. Dennis Fisher, the Associate Director for Safety and Environmental Protection. Mr. Fischer discussed the Laboratory's commitment to excellence in science, operations and safety and provided an overview of the role of the Environment, Safety and Health (ES&H) Teams. Mr. Fisher also noted that LLNL accepted the findings of the OE Investigation Summary Report.

Mr. Tomás Díaz de la Rubia, Associate Director for Chemistry and Materials Science (CMS), then discussed the overexposure event, LLNL's initial response, and CMS corrective actions for the event. This discussion summarized LLNL's lab-wide "extent of condition" review of operations in which the controlling Integration Work Sheet (IWS) contained threshold controls similar to those contained in the IWS violated during the extremity overexposure incident. Follow-up questioning identified this review involved three directorates (including CMS) and narrowly focused on consistency of IWS and Operational Safety Plan (OSP) controls, rather than general IWS/OSP compliance.

Mr. Fischer then discussed additional corrective actions taken in response to the overexposure event that had a laboratory-wide impact. These included issuance of lessons-learned, revision to ES&H procedures, and briefing of the ES&H Working Group. An evaluation was also conducted to review interactions and

communication between the ES&H and CMS groups, to determine whether such interactions are proactive. LLNL provided a copy of the report describing the evaluation to OE during the conference. The evaluation identified no deficiencies that may adversely impact an ES&H team's ability to act proactively. LLNL has established corrective actions for each of the concerns identified in the report. Follow-up questioning identified this evaluation did not specifically address whether ES&H technicians displayed appropriate technical inquisitiveness in their interactions with line personnel within the facilities. A potential deficiency in this area had been highlighted in both the OE Investigation Summary and the DOE/NNSA Type B Investigation.

Mr. Sohinki then concluded the conference by indicating that DOE and NNSA would consider the information and recommendations presented by LLNL in their enforcement deliberations.

**Lawrence Livermore National Laboratory
Enforcement Conference
List of Attendees**

Office of Price-Anderson Enforcement

Stephen M. Sohinki, Director
Susan Adamovitz, Senior Enforcement Officer
Tony Weadock, Enforcement Officer

National Nuclear Security Administration/Livermore Site Office

Camille Yuan-Soo Hoo, []
Ralph Kopenhaver, LSO PAAA Coordinator
Richard Crowe, NNSA, ES&H Department Manager
Robert Peterson, NNSA, Office of Facility Management & ES&H Support
Doug Minnema, NNSA PAAA Coordinator

Lawrence Livermore National Laboratory

Tomás Díaz de la Rubia, Associate Director, CMS Directorate
Dennis Fisher, Associate Director, Safety, Security & Environmental Protection
 Directorate
Howard Hall, CMS Associate Division Leader
Doug Marden, CMS Assurance Manager
Steve Carr, Hazards Control Department Head
Abel Garcia, PAAA Coordinator
Gary Holman, PAAA Coordinator

University of California

Howard Hatayama, []