March 9, 1998

Dr. Robert W. Kuckuck
[ ]
Lawrence Livermore National Laboratory
P.O. Box 8078, L-001
Livermore, CA 94551

EA 98-01

Subject: Preliminary Notice of Violation (NTS-SAN--LLNL-LLNL-1997-0001)

This letter refers to the Department of Energy's (DOE) evaluation of the facts and circumstances surrounding the unplanned personnel contaminations/intakes at [a building] of Lawrence Livermore National Laboratory's (LLNL) Hazardous Waste Management Facilities on July 2, 1997. [The building] houses a shredder facility which was intended to process (shred) only materials with low levels of radiological contamination. On July 2, 1997, a high efficiency particulate air (HEPA) filter was processed and was subsequently determined by LLNL to contain as much as [a specified amount] of [radioactive material], significantly exceeding (by more than 500 times) the permissible radiological activity limit [ ] established by your Operational Safety Procedure. The processing of this highly contaminated HEPA filter resulted in the unplanned intake of radiological material by five workers. The committed effective dose equivalent (CEDE) to one worker is estimated by LLNL to be [a specified range], at least [a multiple of] the regulatory limit established by 10 CFR 835, and the committed dose equivalent (CDE) to the worker's bone surface is estimated by LLNL to be [a specified range], at least [a multiple of] the regulatory limit.

The Office of Enforcement and Investigation, in coordination with the DOE Oakland Operations Office, conducted an investigation of this event and provided you with our Investigation Summary Report, dated January 12, 1998. Based on our evaluation of these matters, DOE has concluded that violations of DOE's nuclear safety requirements involving the Quality Assurance Rule (10 CFR 830.120) and the Occupational Radiation Protection Rule (10 CFR 835) likely occurred. An Enforcement Conference was held with members of your staff on February 4, 1998, to discuss the circumstances surrounding this incident, the safety significance, and the status of corrective actions. An Enforcement Conference Summary is enclosed.

The violations described in the enclosed Preliminary Notice of Violation (PNOV) involve numerous failures by your organization to implement established radiological protection requirements and quality controls necessary to protect the workers. These failures

occurred multiple times during the modification and use of equipment and tools involved in the shredding process and in the performance of this work. Even though waste characterization data were available for the suspect HEPA filter, these data were not accurately identified on the label of the 7A waste storage box containing the HEPA filter or the associated Radioactive Waste Disposal Requisition form. LLNL personnel did not confirm the accuracy of the 7A box's label, perform radiological surveys of the HEPA filter, or perform additional characterization of this filter prior to shredding at the [building] shredder facility. The 7A box was opened, the HEPA filter unwrapped from protective plastic, and the edges of the HEPA filter roughed up with a Sawzall by operators without any radiological surveys or swipes to assess contamination levels. The alarm of the sole continuous air monitor located in the shredder room, although required by procedure to be operational, was turned off and provided no warning to workers when airborne contamination reached high levels. The shredder ventilation system had been modified without implementing LLNL's required review and approval process and was found by the re-entry team after the July 2, 1997, event to have a significantly degraded ventilation performance. The results of these failures were unplanned intakes of radiological material to five workers, one who received an internal radiation dose considerably in excess of 10 CFR 835 limits, and significant [radioactive] contamination spread to the shredder and shredder room.

It is of particular concern to DOE that you identified significant and potentially widespread problems with workers not adhering to your Operational Safety Procedures in a Nuclear Facility Safety Appraisal entitled "Status of FSP and OSP Implementation," dated November 1996 and failed to take adequate corrective actions to prevent similar problems in the shredder occurrence. Your appraisal report stated that these problems (findings) were relevant to all nuclear facilities or relevant to those organizations providing support to nuclear facilities.

In accordance with the "General Statement of Enforcement Policy," 10 CFR 820, Appendix A, the violations described in the enclosed PNOV involving the occupational exposure to a worker, which has been estimated by LLNL to exceed [multiple of] the regulatory limit, has been classified as Severity Level I problem. The remaining violations described in the PNOV, involving inadequate work controls, inadequate workplace monitoring, and an inadequate quality improvement process have been separately classified as Severity Level II problems. In determining the Severity Level of these violations, DOE considered the magnitude of the exposure, the degradation of safety features for worker protection, and the failure to properly implement the requirements of LLNL's radiological control and operations procedures.

I am issuing the enclosed Preliminary Notice of Violation in response to these violations. Although LLNL is exempt from civil penalty by Statute, because of the safety significance of these violations, DOE would have issued a Proposed Imposition of Civil Penalty in the amount of $159,375 ($75,000 for the Severity Level I violation, and $28,125 for each of the three Severity Level II violations).

The Severity Level II violations could have been assessed a $37,500 for each violation, but in consideration of the progress LLNL has made since this event to evaluate the broader causes related to this event and to identify comprehensive corrective actions, DOE would have allowed a 25% mitigation in the base civil penalty for each of the Severity Level II violations. DOE would caution LLNL that although positive progress has been made in recognizing the causes and establishing comprehensive corrective actions, full and adequate implementation of these corrective actions to prevent recurrence of these violations will be monitored by DOE.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. After reviewing your response to this Notice, and the status of your corrective action plan, DOE will determine whether further action is necessary to ensure compliance with the applicable nuclear safety requirements.

Sincerely,

Peter N. Brush
Acting Assistant Secretary
Environment, Safety and Health

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Enclosures:
Preliminary Notice of Violation
Conference Summary Report
List of Attendees

cc: M. Zacherro, EH-1
K. Christopher, EH-10
S. Adamovitz, EH-10
S. Hosford, EH-10
G. Podonsky, EH-2
O. Pearson, EH-3
J. Fitzgerald, EH-5
M. Owendoff, EM-1
M. Gavrilas-Guinn, EM-4
L. Vaughan, EM-10
J. Turner, OAK

M. Cornell, OAK
R. Kopenhaver, OAK
H. Hatayama, UC
A. Garcia, LLNL
D. Thompson, DNFSB
J. Lieberman, NRC
Docket Clerk, EH-10

PRELIMINARY NOTICE OF VIOLATION

University of California
Lawrence Livermore National Laboratory
EA 98-01

As a result of a Department of Energy (DOE) evaluation of activities associated with the unplanned personnel contaminations/intakes at [building] of Lawrence Livermore National Laboratory (LLNL), violations of DOE requirements were identified. In accordance with the "General Statement of Enforcement Policy, " 10 CFR 820, Appendix A, the violations are described below.

A. 10 CFR 835.202(a)(1) requires that the occupational exposure to general employees resulting from DOE activities be controlled so that the annual limit of 5 rems is not exceeded for a total effective dose equivalent (TEDE).

   10 CFR 835.2 defines the TEDE as the sum of the effective dose equivalent (EDE) for external exposures and the committed effective dose equivalent (CEDE) for internal exposures.

   Contrary to the above, the occupational exposure to an LLNL general employee was not controlled during 1997 so that the annual limit of 5 rems for a TEDE was exceeded. On July 2, 1997, a LLNL general employee received [an] intake which resulted in a CEDE estimated by LLNL to be between [a specified range]. A final dose will be assigned.

B. 10 CFR 835.202(a)(2)) requires that the occupational exposure to general employees resulting from DOE activities be controlled so that the annual limit of 50 rems is not exceeded for the sum of the deep dose equivalent (DDE) for external exposures and the committed dose equivalent (CDE) to any organ or tissue.

   Contrary to the above, the occupational exposure to an LLNL general employee was not controlled during 1997 so that the annual limit of 50 rems was exceeded for the sum of the DDE and the CDE. On July 2, 1997, a LLNL general employee received [an] intake which resulted in a CDE estimated by LLNL to be between [a specified range]. A final dose will be assigned.

Collectively, these violations constitute a Severity Level I problem.
Civil Penalty - $75,000 (Waived)

C. 10 CFR 835.401(a) requires that monitoring of individuals and areas be performed to (2) document radiological conditions in the workplace; and (3) detect changes in radiological conditions.

10 CFR 835.401(b) requires that area monitoring in the workplace be routinely performed to identify and control potential sources of personnel exposure to radiation and/or radioactive material.

10 CFR 835.403(a)(2) requires that real-time air monitoring be performed in normally occupied areas where an individual is likely to be exposed to a concentration of airborne radioactivity exceeding 1 derived air concentration or where there is a need to alert potentially exposed individuals to unexpected increases in airborne radioactivity levels.

10 CFR 835.403(a)(3) requires that for the airborne radioactive material that could be encountered, real-time air monitors have alarm capability to alert potentially exposed individuals that immediate action is necessary in order to minimize or terminate inhalation exposures.

Contrary to the above, during shredding operations conducted July 2, 1997, monitoring of areas and real-time air monitoring with alarm capability in [the building] were not performed to document and detect changes in radiological conditions and to identify and control potential sources of personnel exposure to radioactive material in that

1. The alarm of the only continuous air monitor (CAM) located in the shredder area, the "hot area," of [the building] to alert workers to changes in radiological conditions, i.e., the unexpected increase in airborne radioactivity levels in the work area, was not turned on and, therefore, could not alert workers to the airborne release of radioactive material [ ] from the shredding operations of a radioactively contaminated high efficiency particulate air (HEPA) filter.

2. As HEPA filters were brought into [the building] and unwrapped, the filters were not monitored to determine radiation levels and/or surface contamination levels in the workplace. As a result, radioactive material [ ] was released initially undetected into the work area and resulted in a personnel exposure in excess of the permissible DOE regulatory annual limits.

Collectively, these violations constitute a Severity Level II problem.
Civil Penalty - $28,125 (Waived).

D. 10 CFR 830.120(c)(2)(i) requires that work be performed to established administrative controls using approved procedures.

10 CFR 835.1001(b) requires that where use of physical design features are

demonstrated to be impractical, administrative controls and procedural requirements be used to maintain radiation exposures as low as reasonably achievable (ALARA).

Contrary to the above, work was not performed in accordance with established administrative controls using approved procedures, and administrative controls and procedural requirements to maintain personnel radiation exposures ALARA were not implemented or adhered to in that

1. Operational Safety Procedure (OSP) No. 514.7, entitled "Shredder Operation," effective February 15, 1997, required the following:

   a. Portable radiation monitoring equipment be available in the shredder room whenever personnel are working the shredder room. However, on July 2, 1997, personnel were working in the shredder room processing radioactively contaminated HEPA filters, and portable radiation monitoring equipment was not available.

   b. Waste to be shredded contain less than 1 millicurie (mCi) alpha and beta activity per 7.5 cubic feet. However, on July 2, 1997, radioactive waste, a radioactively contaminated HEPA filter, was shredded that contained more than [the limit]. The HEPA filter was later estimated to contain greater than [a specified amount of radioactive material], more than 500 times the permissible activity for filter shredding.

   c. Environmental Safety & Health (ES&H) Team 4 review the waste disposal requisitions prior to container contents being shredded. However, Team 4 did not review the waste disposal requisitions (Radioactive Waste Disposal Requisition forms) for the group of HEPA filters which were shredded from June 26, 1997, to July 2, 1997.

   d. Any changes in operation that increase the hazard level, introduce additional hazards, or decrease safety not be made until a revision of or a supplement to this OSP has been reviewed and approved consistent with the review and approval process for the original OSP. However, periodically from June 26, 1997, to July 2, 1997, a change in operation occurred that increased the hazard level and decreased safety in that a power saw (Sawzall) was used to rough the edges of the HEPA filter surfaces prior to shredding. This action was not addressed in OSP 514.7, and a revision or supplement to the OSP had not been reviewed and approved.

2. Procedure AP 117, entitled "*Design and Engineering Control,*" Revision 1, dated June 29, 1996, required that design and engineering control levels be determined and implemented for modifications to Hazardous Waste Management (HWM)

systems and components. However, during May 1997 the HWM shredder's ventilation system in [the building] was modified by installation of a pre-filter, and the review and approval process (design and engineering control requirements and approvals) specified in AP 117 were not implemented for the modification.

3. The "Daily 'When-In-Use' Inspection Log for [the building] Shredding Unit" under the "Safety Precautions" section required verification that the air monitor was operational. However, on July 2, 1997, the Inspection Log was completed by a worker and reviewed by a supervisor indicating that the air monitor was operational when in fact the CAM's alarm was turned off and therefore the monitor did not have alarm capability, i.e., the CAM was not operational.

Collectively, these violations constitute a Severity Level II problem.
Civil Penalty - $28,125 (Waived).

E. 10 CFR 830.120(c)(1)(iii), *Quality Improvement*, requires that processes to detect and prevent quality problems be established and implemented. The section further requires that items, services and processes that do not meet established requirements be identified, controlled and corrected according to the importance of the problem and the work affected. Correction shall include identifying the causes of problems and working to prevent recurrence.

Contrary to the above, processes to detect and prevent quality problems were not adequately established and implemented, and effective corrective actions to prevent recurrence were not instituted in that

1. From October 27, 1994, and continuing until July 2, 1997, the radioisotopes of at least one Building [ ] waste HEPA filter were incorrectly identified and the isotopic amount significantly under-reported on Radioactive Waste Disposal Requisition form, R022844, even though gamma spectroscopy data were available which identified significant levels of [radioactive material] in the waste HEPA filter. Subsequent to this mischaracterization, LLNL did not have an adequate process in place to detect and correct this quality problem prior to HEPA filters being shredded on July 2, 1997.

2. Despite the identification of significant and potentially widespread problems with nuclear facility workers failing to comply with OSP requirements as documented in a Nuclear Facility Safety Appraisal issued in November 1996 LLNL failed to take appropriate steps to control and correct these problems. Subsequently, in June and July of 1997, workers failed to comply with multiple OSP requirements in the preparation and performance of shredding HEPA filters in a nuclear facility. These failures to comply with OSP requirements resulted in unplanned intakes to five workers. Specific examples of OSP violations are discussed in Section D of this PNOV.

F. 10 CFR 830.120(c)(1)(ii), *Personnel Training and Qualification*, requires that personnel be trained and qualified to ensure they are capable of performing their assigned work.

Contrary to the above, the HWM waste operators had not been trained and qualified in air monitor (CAM) operation and, during waste shredding operations conducted from March 1997 to July 1997 were required to complete a "Daily 'When-In-Use' Inspection Log for [the building] Shredding Unit" verifying that the CAM was operational. On July 2, 1997, the Inspection Log was completed by a worker and reviewed by a supervisor indicating that the air monitor was operational when in fact the CAM's alarm was turned off and therefore, the CAM was not operational.

Collectively, these violations constitute a Severity Level II problem.
Civil Penalty - $28,125 (Waived).

Pursuant to 10 CFR 820.24, LLNL is hereby required within 30 days of the date of this Notice to submit a written statement or explanation to the Director, Office of Enforcement and Investigation, Office of the Assistant Secretary for Environment, Safety and Health, U.S. Department of Energy, P.O. Box 2225 Germantown Road, Germantown, MD 20874-2225 Attention: Office of the Docketing Clerk, with copies to the Manager, DOE Oakland Operations Office and to the cognizant DOE Secretarial Office for the facilities that are the subject of this Notice. 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) the facts set forth above which are not correct and the reasons for the violations if admitted, and if denied, the reasons they are not correct, (3) the corrective steps that have been taken and the results achieved, (4) the corrective steps that will be taken to avoid further violations, and (5) the date when full compliance will be achieved.

This Preliminary Notice of Violation will become a Final Notice of Violation if the violation is not denied within 30 days and sufficiently justified.

Peter Brush,
Acting
Assistant
Secretary
Environment, Safety and Health

Dated at Washington, D.C.
this 9th day of March 1998