

November 16, 1998

Dr. Alvin Trivelpiece  
[ ]  
Lockheed Martin Energy Research Corporation  
Oak Ridge National Laboratory  
P.O. Box 2008  
Oak Ridge, TN 37831

EA 98-13

Subject: Preliminary Notice of Violation and Proposed Imposition of Civil Penalty-  
\$123,750 (NTS-ORO--ORNL-X10HFIR-1998-0001)

Dear Dr. Trivelpiece:

This letter refers to the Department of Energy's (DOE) evaluation of the circumstances surrounding a number of events that involved work process and quality improvement deficiencies in the High Flux Isotope Reactor (HFIR) at the Oak Ridge National Laboratory (ORNL). The deficiencies involved ongoing and repetitive failures to adhere to Lockheed Martin Energy Research (LMER) established operational controls. These controls ensure that reactor operations are conducted within appropriate safety margins and in accordance with your facility authorization bases.

DOE conducted an onsite evaluation of these occurrences on May 5-7, 1998. The Investigation Summary Report issued August 17, 1998, describes the results of the investigation. An Enforcement Conference was held with you and members of your staff on October 2, 1998. This conference included a discussion of the circumstances surrounding the potential violations, their safety significance and the status of corrective actions. A Conference Summary Report is enclosed.

DOE has concluded that violations of the Work Process and Quality Improvement provisions of 10 CFR 830.120 likely occurred. The violations described in the enclosed Preliminary Notice of Violation (PNOV) involve multiple failures to follow your Quality Assurance Program (QAP) work process controls and a long term quality improvement issue with the emergency backup reactor cooling pump motors.

DOE is concerned about these violations because they were not isolated incidents but occurred at multiple locations and involved several organizational elements (such as maintenance and reactor operations) within HFIR between May 1997 and January 1998. For example, on one occasion, operator error caused the dilution and

overflow of the [chemical] tank (which serves as a backup emergency reactor shutdown system). This resulted in a reduction in safety margin and operation of the reactor outside of the facility authorization basis requirements. Specifically, a Technical Safety Requirement (TSR) was not met in that the required amount of [chemical] was not present in the system thereby requiring a precautionary reactor shutdown. In a second event (when the reactor was not operating) the correct primary reactor cooling system temperature was not maintained while the system was under pressure as required by operating procedures. This condition can result in a significant failure of the reactor vessel resulting in an unplanned release of radioactive material. In the third event the seriously degraded emergency cooling pump motors were relied on for a period of time that extended over many reactor operating cycles. This condition was not documented, analyzed, or corrected in a timely manner as required by your procedures nor were compensatory actions taken. In addition to these events, four other incidents were identified that occurred due to failures to implement work process controls. The number and types of incidents also raise concerns regarding the adequacy of management oversight of the HFIR and brings into question the degree of commitment to implement the nuclear safety controls established for HFIR during this period.

Although no adverse nuclear safety consequence resulted from these violations, operating a DOE category A reactor outside of the parameters of its safety authorization basis can result in conditions that compromise worker and public safety, as well as cause damage to the environment. Such failures are serious because they significantly reduce the design and operational safety margins intended to prevent accidents from occurring. DOE is particularly concerned about these violations because there was a failure to recognize the programmatic safety significance of the issues. Contractor tracking and trending of such negative performance trends is important to assure senior management involvement so that effective quality improvement actions are taken. DOE depends on such contractor management actions to ensure the probability and consequences of analyzed accidents are kept acceptably low. Therefore, in accordance with the criteria set forth in 10 CFR 820 Appendix A, (Enforcement Policy), the violations described in the PNOV have each been classified as Severity Level II problems.

During the Enforcement Conference, your staff indicated that they believed the failure to maintain the required amount of [chemical] TSR noncompliance was not considered a significant nuclear safety issue because the system was not safety related. However, the investigation established that this system is a required emergency shutdown system, and the system forms, in part, the current approved authorization bases for the facilities in question. While the degree of conservatism of safety documentation weighs in the consideration of the safety significance of a regulatory violation, the fact remains that violations occurred from the approved and implemented safety authorization basis documents which form the basis of agreement as to how the facility will be operated. In any case, the safety significance of this action is driven by the collective significance of all of the events rather than a focus on a single issue.

DOE has also considered the supplemental information you provided by letter dated, October 29, 1998, regarding issues discussed during the Enforcement Conference. The letter will be placed in the docket file for this case. On the matter of the loss of [chemical] event, DOE does not agree with your assertion that this event did not result in a violation of the HFIR TSR. The reactor was operated at full power without the minimum [quantity] of [chemical] present in the tank as specifically required by the TSR. More importantly, the violation was caused by operator inattention to evolutions, the completion of which are necessary to ensure reactor operations are within your approved safety basis rather than by anticipated equipment reliability issues. Ample opportunity to anticipate the TSR related consequences of the operator actions, to apply proper controls, and to prevent the TSR violation existed. When this condition was found several hours later, DOE acknowledges appropriate steps were taken in accordance with the TSR action statements to reduce reactor power below 10MW. Although you undertook the appropriate actions, it does not deter the fact that for a period of hours the reactor was operated outside your established safety basis due to operator inattention. In assessing the safety significance of the violation DOE has taken into account your steps to correct the problem once it was discovered. Failure to implement the actions required when the TSR limit was exceeded would have likely resulted in further escalating the enforcement action.

To emphasize the need for (1) assuring the proper control and implementation of work processes, and (2) the management processes in place to proactively identify negative performance trends, I am issuing the enclosed Preliminary Notice of Violation and Proposed Imposition of Civil Penalties in the amount of \$123,750.

The base civil penalty for each Severity Level II violation is \$55,000. With respect to the violations described in the PNOV, the penalty adjustment factors set forth in the Enforcement Policy were considered and the base civil penalty for each violation was reduced by 25 percent. Full mitigation for identification and reporting was not considered appropriate because the violations were identified as the result of investigations in response to the events as opposed to identification of the programmatic problems through a comprehensive assessment program. Proactive assessments could have recognized the precursor conditions and underlying problems before they resulted in the events of this enforcement action. Partial (25 percent) mitigation for your corrective actions was considered appropriate in recognition of the breadth of your investigation to fully assess the problem at HFIR and its site-wide implications. DOE recognizes that there have been many significant actions taken to address the violations, such as (1) senior management changes, (2) technical staff enhancements, (3) substantial work planning and control process improvements, and (4) strengthened assessment and lessons learned processes. However, full mitigation (50 percent) for your corrective actions for each of these violations is not considered appropriate since their effectiveness has not been adequately demonstrated, particularly with respect to the personnel/organizational changes, lessons learned, trending of programmatic

deficiencies, and the assessment program. DOE expects that all of the actions described by you and your staff will be formally tracked and their implementation closely monitored by management in accordance with appropriate LMER procedures. DOE also expects LMER to determine the effectiveness of the actions through management assessments and independent assessments performed in accordance with the QAP.

You are required to respond to this letter and you should follow the instructions specified in the enclosed Preliminary Notice of Violation when preparing your response. In your response you should document the specific actions taken and any additional actions you plan to prevent recurrence. After reviewing your response to this Notice, including your proposed corrective action plan, DOE will determine whether further actions are necessary to ensure compliance with the applicable nuclear safety requirements.

Sincerely,



Acting Assistant Secretary  
Environment, Safety and Health

CERTIFIED MAIL  
RETURN RECEIPT REQUESTED

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

cc: M. Zacchero, EH-1  
K. Christopher, EH-10  
R. Trevillian, EH-10  
G. Podonsky, EH-2  
O. Pearson, EH-3  
G. Danielson, EH-31  
M. Krebs, ER-1  
R. Schwartz, ER-8  
W. Magwood, NE-1  
L. Miller, NE-40  
E. Cumesty, DOE-ORO  
M. McBride, DOE-ORO  
K. Rhyne, DOE-ORO

M. Walls, LMER PAAA Coordinator  
J. Lieberman, NRC  
D. Thompson, DNFSB  
Docket Clerk, EH-10

**PRELIMINARY NOTICE OF VIOLATION  
and  
PROPOSED IMPOSITION of CIVIL PENALTY**

Lockheed Martin Energy Research, Inc.  
Oak Ridge National Laboratory  
High Flux Isotope Reactor

EA 98-13

As a result of a Department of Energy (DOE) evaluation of a series of events from late 1995 through 1998 at the Oak Ridge National Laboratory (ORNL) High Flux Isotope Reactor (HFIR), violations of DOE requirements were identified. In accordance with the "General Statement of Enforcement Policy," 10 CFR 820, Appendix A (Amended October 8, 1997), DOE proposes to impose civil penalties pursuant to Section 234A of the Atomic Energy Act of 1954, as amended, 42 U.S.C. 2282a, and 10 CFR 820. The particular violations and associated civil penalties are set forth below.

I. Violations Related to the Gradual Deterioration of the Emergency Backup Reactor Cooling Pump Motors (Pony Motors)

A. 10 CFR Part 830.120(c)(1)(iii) requires that "processes to detect and prevent quality problems shall be established and implemented. Items, services and processes that do not meet established requirements shall 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."

Section 3.0 of the ORNL Quality Assurance Plan states managers' responsibilities for "... ensuring obtaining solutions to quality problems, detecting and preventing quality problems, and for ensuring quality improvement."

Contrary to the above, Lockheed Martin Energy Research, Inc. (LMER) personnel did not (1) initiate timely actions to identify the nonconforming condition, (2) determine the causes of the deteriorating pony motor electrical resistance, and (3) correct this problem that occurred over several years before resulting in a

quality problem, namely the multiple failures of pony motors during a test.

B. 10 CFR Part 830.120(2)(c)(i) requires that "work shall be performed to established technical standards and administrative controls using approved instructions, procedures, or other appropriate means."

Contrary to the above, LMER personnel did not perform work to established technical standards and administrative controls using approved instructions, procedures. On July 5, 1997, testing of the pony motors only occurred for three minutes, while the test specified a 10 minute duration. The change to the test was discussed with LMER engineering personnel prior to the test, and verbal approval given. No formally reviewed and approved test procedure authorized this alternative test duration.

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

## II. Violations Related to an Inadvertent Actuation of the Emergency Depressurization System (EDS)

10 CFR Part 830.120(2)(c)(i) requires that "work shall be performed to established technical standards and administrative controls using approved instructions, procedures, or other appropriate means."

Contrary to the above, LMER personnel did not perform work to established technical standards and administrative controls using approved instructions, procedures, or other appropriate means in that-

1. The July 5, 1997, insulation resistance tests included performing a sequence of starting and stopping the pony motors. However, personnel did not have a procedure for starting and stopping the pony motors in support of these tests.
2. The HFIR Technical Safety Requirement (TSR) and operating procedure NP 2102 for "Pressurizing the Primary Coolant System" include requirements for maintaining the primary coolant temperatures within specified limits while the primary system is pressurized. However, on July 5 1997, personnel failed to properly align the primary and secondary cooling systems to ensure coolant temperatures remained within specified limits, leading to the inadvertent actuation of the EDS.
3. LMER procedure ADM-0001, "Conduct of Operations," Rev. 1, establishes processes for authorizing status changes to plant systems and for

communications between operations personnel. However, communication between operators in the control room and the electrical equipment room regarding authorization to restart the pony motor did not occur. The Roving Operator energized the pony motor without notification of the Shift Supervisor and control room Console Operator. Moments later this unauthorized action pumped a cool slug of water into the vessel and triggered the EDS.

4. LMER procedure ADM-0001 requires the Console Operator to be alert and attentive to control panel indications. However, after flow through the primary cooling system had been stopped by shutting down all three pony motors, the console operator did not observe decreasing coolant temperature in the heat exchangers.
5. LMER procedure ADM-0001 requires all testing to be planned and approved by the Plan of the Day (POD) Chairman, Maintenance, and the Operations Shift Supervisor. The Shift Supervisor is required to review the POD as part of the shift turnover process prescribed by LMER procedure ADM-0112 and M-1.14.1. However, testing for MWP 33741 was performed on July 5, 1997, and continued into the next shift on July 6, 1997, after the test initiated an unintended EDS actuation, without management approval on the "Plan of the Day" (POD) written for July 3-6, 1997.

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

### III. Violations Related to a Loss of [Chemical] Event

10 CFR Part 830.120(2)(c)(i) requires that "work shall be performed to established technical standards and administrative controls using approved instructions, procedures, or other appropriate means."

Contrary to the above, LMER personnel did not perform work to established technical standards and administrative controls using approved instructions, procedures, or other appropriate means in that-

1. On January 4, 1998, an operator commenced filling of the [chemical] tank. However, no operating procedure existed to control the filling of the [chemical] tank. Such filling was periodically required to off-set evaporation from the tank, and had been performed on multiple prior occasions with no procedure.
2. An operator on January 4, 1998, did not use an existing, approved check sheet to perform his mid-shift rounds, relying instead on memory for the items that needed to be checked. Approximately 45 checks are required, about 13 of which require the recording of numerical values. The operator obtained and completed the check sheet only after completing the rounds and returning to the



control room.

3. Operating procedure NOP-2052, "Maintenance of the Poison Injection System," Rev. 0, December 29, 1994, requires that [chemical] tank level be maintained between [specified limits]. However, for a period of several hours between January 4 and January 5, 1998, the tank level exceeded the [specified limits].
4. TSR 3.10.3 required a minimum [amount] of [chemical] while the reactor is operating above 10 megawatts power. Additionally, procedure STP-5002, "Poison Injection System [Chemical] Test," Rev. 10, March 12, 1997, requires a minimum amount of [chemical] during reactor operation above 10 megawatts. However, for a period of several hours between January 4 and January 5, 1998, the inventory of [chemical] was less than the required [minimum] while the reactor was at full power.
5. The Conduct of Operations procedure ADM-001, Section 2.9, "Conduct of Operations" requires "Operations personnel must be alert and remain in their immediate areas of responsibility until properly relieved and shall be responsible for monitoring the instrumentation and controls located within their areas. They are responsible for taking timely and proper actions to ensure safe operations of the facility." However, on January 4, 1998, an operator left the [chemical] tank unattended while filling.

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

Pursuant to 10 CFR 820.24, Lockheed Martin Energy Research, Inc. is hereby required within 30 days of the date of this Notice and Proposed Imposition of Civil Penalty, to submit a written statement or explanation to the Director, Office of Enforcement and Investigation, Attention: Office of the Docketing Clerk, EH-10, P.O. Box 2225 Germantown, MD 20875-2225, with copies to the Manager, DOE Oak Ridge Operations Office, and to the Cognizant DOE Secretarial Office for the facility that is 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 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.

Any request for remission or mitigation of the civil penalty must be accompanied by a substantive justification demonstrating extenuating circumstances or other reasons why the assessed penalty should not be imposed in full. Unless the violations are denied, or remission or mitigation is requested within the 30 days after the issuance of the Preliminary Notice of Violation and Proposed Imposition of Civil Penalty, Lockheed

Martin Energy Research, Inc. shall pay the civil penalty of \$123,750 (imposed under Section 234a of the Act) by check, draft, or money order payable to the Treasurer of the United States (Account Number 891099) mailed to the Director, Office of Enforcement and Investigation, at the above address. Should the contractor fail to answer within the time specified, an order imposing the civil penalty will be issued.

If requesting mitigation of the proposed civil penalty, Lockheed Martin Energy Research, Inc., should address the adjustment factors described in Section VIII of 10 CFR 820, Appendix A.

A black rectangular box containing a white handwritten signature, which appears to be "P. Brush".

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

Dated at Washington, D.C.  
this 16th day of November 1998