



Department of Energy

Washington, DC 20585

September 21, 1998

Mr. Richard B. Wilkerson
President and General Manager
MK-Ferguson of Oak Ridge Company
P.O. Box 2011
Oak Ridge, TN 37831

EA 98-08

Subject: Preliminary Notice of Violation
NTS-ORO--MKFO-X10CONSTRM-1997-0001

Dear Mr. Wilkerson:

This letter refers to the Department of Energy's (DOE) evaluation of the facts and circumstances associated with deficiencies in the administration of the MK-Ferguson of Oak Ridge Company (MK-F) bioassay program, during the time period between 1996-1997 when it was a subcontractor to Lockheed Martin Energy Systems (LMES), the integrating contractor at the Oak Ridge site. The deficiencies in the bioassay program resulted in the failure, on multiple occasions over a period of close to two years, to identify significant intakes of radioactive material by two workers. The exposures occurred in 1995 when MK-F was the prime contractor for construction and construction management operations for the DOE Oak Ridge Operations Office (DOE-ORO). One worker exposure was determined to be 53.9 rems committed dose equivalent (CDE) (2.99 rems committed effective dose equivalent (CEDE)) to bone surfaces while the other worker exposure was determined to be 34.3 rems CDE (1.9 rems CEDE) to bone surfaces.

Based on our evaluation of these matters, DOE has concluded that violations of DOE's nuclear safety requirements involving 10 CFR 835 (Occupational Radiation Protection) likely occurred. An enforcement conference was held on July 9, 1998, with both LMES and MK-F, to discuss the circumstances surrounding these matters, their safety significance and the status of corrective actions. An Enforcement Conference Summary Report is enclosed.

These violations, which are described in the enclosed Preliminary Notice of Violation (PNOV), involve, among other things, the failure to implement an internal dose evaluation program to ensure that all occupational radiation exposure received by workers was considered when determining compliance with DOE's annual exposure limits. The elements of the internal dosimetry program had been identified as necessary and appropriate by MK-F with the concurrence of LMES. These violations are of particular concern to DOE because, for a period of almost two years, numerous opportunities existed to identify that significant intakes to the workers had occurred.

Further, after identifying problems with the bioassay program in October 1996, i.e., that approximately 100 positive bioassay results had been identified as positive that had previously been considered negative, results for these two workers were administratively invalidated without further evidence that uptakes had not occurred. These repeated failures resulted in additional 10 CFR 835 deficiencies in the areas of record keeping and issuance of accurate worker annual exposure reports. Other deficiencies identified during the investigation included (1) missed bioassay sampling, (2) failure to initiate special follow-up bioassay monitoring as required, (3) failures to notify workers of their exposures in a timely manner, and (4) failures to implement work restrictions in accordance with written procedures.

The violations described in the enclosed PNOV would normally be classified as Severity Level II violations for which civil penalties could be assessed. However, DOE has considered the comprehensive contractor response to resolve deficiencies in the site bioassay program initiated by LMES and MK-F once the problem was identified. DOE notes that all corrective actions were already completed at the time of the enforcement conference. Therefore, DOE has concluded it is appropriate to reduce these violations to Severity Level III with no civil penalty.

DOE has concluded that, in the factual circumstances of this case, it is appropriate to hold accountable both the prime contractor and the subcontractor. In particular, it was highly relevant that the subcontractor was the immediate past prime contractor and therefore had direct responsibility for the proper transitioning of the program to its successor.

Pursuant to 10 CFR 820.24 (Preliminary Notice of Violation), you are required to respond to this letter and Notice and should follow the instructions set forth in the enclosed Notice when preparing your response. Unless the violations are denied within 30 days after release of the Notice, it shall become a Final Notice of Violation.

Sincerely,



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

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Enclosures:

Preliminary Notice of Violation
Enforcement Conference Summary
Attachment A (List of Attendees)
Attachment B (Clarifications to Investigation
Summary Report)

cc: M. Zacchero, EH-1
R. Christopher, EH-10
H. Wilchins, EH-10
G. Podonsky, EH-2
O. Pearson, EH-3
J. Fitzgerald, EH-5
J. Owendoff, EM-1
L. Vaughan, EM-10
J. Hall, ORO
S. Richardson, ORO
M. McBride, ORO
K. Rhyne, ORO
C. Moseley, LMES
D. Thompson, DNFSB
J. Lieberman, NRC
Docket Clerk, EH-10

PRELIMINARY NOTICE OF VIOLATION

MK- Ferguson of Oak Ridge Company
Oak Ridge Facilities

EA 98-08

As a result of a Department of Energy (DOE) evaluation of activities associated with the implementation of the MK-Ferguson of Oak Ridge Company (MK-F), a subcontractor to Lockheed Martin Energy Systems (LMES) Internal Dosimetry Program, violations of DOE requirements were identified. The Internal Dosimetry Program deficiencies defined by these violations occurred between January 1, 1996, and October 1, 1997, and involved two workers designated Worker No.1 and Worker No. 5. These violations are described below in accordance with 10 CFR 820, Appendix A, "General Statement of Enforcement Policy."

- I. 10 CFR 835.402(d) requires that internal dose evaluation programs shall be adequate to demonstrate compliance with 10 CFR 835.202, the DOE annual exposure limits.

10 CFR 835.702(a) requires that records shall be maintained to document doses received by all individuals for whom monitoring was required by 10 CFR 835.402, i.e., radiological workers who, under normal conditions, are likely to receive 100 mrem or more CEDE from all occupational radionuclides intakes in a year.

10 CFR 835.702(c)(1) states that individual monitoring records required by 10 CFR 835.702 shall be sufficient to evaluate compliance with 10 CFR 835.202, i.e., DOE annual exposure limits.

10 CFR 835.702(c)(2) states that individual monitoring records required by 10 CFR 835.702 shall be sufficient to provide dose information necessary to complete reports required by 10 CFR 835, Subpart I, *Reports to Individuals*.

10 CFR 835.801(c) requires that each DOE-contractor-operated site or facility shall, on an annual basis, provide a radiation dose report to each individual monitored during the year at that site or facility in accordance with 10 CFR 835.402, i.e., radiological workers who, under typical conditions, are likely to receive 100 mrem or more CEDE.

Contrary to the above, the internal dose evaluation programs of MK-F were not adequate to demonstrate compliance with the annual DOE exposure limits and record keeping requirements in that

- A. Although multiple, positive urinalysis results were obtained throughout the calendar year 1996, indicating that Workers No. 1 and No. 5 had experienced intakes of plutonium and americium-241(Am), MK-F failed to recognize that internal intakes by the two workers had occurred. As a consequence, the internal dose evaluation program as implemented, was not adequate to ensure that personnel intakes of radioactive material were identified and evaluated in a manner to be able to ensure that all dose control requirements and annual dose limits specified by 10 CFR 835 were met.
- B. For 1996, adequate records of worker dose were not maintained nor were accurate, annual reports of radiation exposures to workers provided in that positive bioassay results for Workers No. 1 and No. 5 were treated as zero until December 1996. As a consequence, internal MK-F records, as well as accounts of worker radiation exposures to DOE and to individual workers in March 1996 and March 1997, failed to report doses received from internal intakes of plutonium-238 (Pu) and Am-241 for these two workers.

This is a Severity Level III violation.

- II. 10 CFR 835.1001(b) requires that for specific activities where use of physical design features are demonstrated to be impractical, administrative controls and procedural requirements shall be used to maintain radiation exposures as low as reasonably achievable (ALARA).

Contrary to the above, adequate administrative controls and procedural requirements to maintain personnel radiation exposures ALARA for employees of MK-F were not developed or not implemented in that

- A. *MK-Ferguson Technical Basis for Internal Dosimetry (TBD)* dated September 4, 1995:

1. Part I: *Special Bioassay Program*, p. 2, states that “a special bioassay program will be established for radiation workers when an intake through the skin, a wound, or ingestion capable of delivering a dose of 100 mrem CEDE may have occurred or when bioassay measurement results are significantly different than expected.” However, positive, routine bioassay sample results obtained for two workers on February 29, 1996, and May 29, 1996, had results significantly different than expected in that the bioassay results indicated that internal intakes of plutonium in excess of 100 mrem CEDE had occurred. Yet a special bioassay program was not established.
 2. Part III: *Bioassay Frequency and Type*, p. 28, states that the MK-F bioassay program focuses primarily on urinalysis. “The urinalysis program uses two 24-hour urine samples each quarter.” However, one worker with previous multiple positive urinalysis results, including a February 29, 1996, sample, failed to submit a bioassay sample for the second quarter 1996, while a second worker with a prior positive bioassay result failed to submit a bioassay sample for the first quarter 1996.
 3. Part III: *Annual Report to Workers*, p. 29, states that “on an annual basis and in accordance with 10 CFR 835, MK-F issues a report to each radiation worker containing that individual’s radiation exposure for the year.” However, radiation exposure reports issued for Workers No. 1 and No. 5 in 1996 for the 1995 calendar year were incomplete in that doses resulting from internal intakes of radioactive material, i.e., Pu-238, were not reported.
- III. Document 3A- ES&H Procedure No.4.123, *Internal Dosimetry*, Revision 0, dated May 12, 1994. This document was in effect when the intakes of radioactive material occurred in 1995 and during the first nine months of 1996 when positive bioassay samples for the two workers continued to be detected by the laboratory.
- A. Section 5.1.4 states that “MK-F employees, including subcontractors’ workers, who participate in the bioassay program submit their urinalysis samples on a quarterly basis.” However, during 1996, Worker No. 1 failed to submit a bioassay sample for the second quarter of 1996, and Worker No. 5 failed to submit a bioassay sample for the first quarter of 1996.

- B. Section 5.1.5 states that "personnel shall participate in follow-up bioassay monitoring when their routine bioassay results indicate an intake in the current year with a CEDE of 100 mrem or more." However, Workers No. 1 and No. 5 had multiple positive bioassay results in 1996 and follow-up bioassay monitoring was not initiated. Further, when potential intakes of plutonium in excess of 100 mrem CEDE were identified in October of 1996, more than one year after the intakes occurred, follow-up bioassay sampling was still not initiated for these individuals until additional routine bioassays samples also provided positive results.
- C. Section 5.1.6 states that "personnel shall be notified promptly of positive bioassay results and the results of dose assessments and subsequent refinements." During 1996 Workers No. 1 and No. 5 had positive bioassay results on February 29, 1996, and May 29, 1996, and were not promptly notified of these results in that notifications were not provided until 1998.
- D. Section 5.2.5 states that "bioassay monitoring of MK-F employees and those of MK-F subcontractors who enter radiological areas where an employee is likely to receive intakes, during the calendar year, resulting in a CEDE greater than 100 mrem is performed on a quarterly basis...." Section 5.2.9 states that "each employee who leaves the site without turning in his/her urine sample will be restricted from all future access to radiological areas and the access bar code on his/her identification card will be voided until written authorization from the MK-F Health Physics Manager is obtained." However, bioassay samples were not obtained from Worker No. 1 during the second quarter of 1996, and bioassay samples were not obtained from Worker No. 5 during the first quarter of 1996. Yet these workers were not restricted from entering radiological areas.
- E. Section 5.2.13 states that a "preliminary assessment of any intakes detected shall be conducted prior to permitting an employee to return to radiological work." However, during 1996, positive intakes of Pu-238 were detected during conduct of the routine bioassay program on February 29, 1996, and May 29, 1996, without preliminary assessment of the intakes being performed prior to permitting the employees to return to radiological work.
- F. Section 5.5.2.2 states that "any employee or individual [at X-10] whose internal monitoring results correspond to a detected CEDE of 100 mrem shall be required to submit additional urine samples for testing." However, bioassay results detected on February 29, 1996, and May 29, 1996, from Workers No. 1 and No. 5 were indicative of intakes in excess of 100 mrem, but additional urine samples were not required from these workers for testing.

This is a Severity Level III violation.

Pursuant to 10 CFR 820.24, (Preliminary Notice of Violation) Lockheed Martin Energy Systems is required within 30 days of the date of this Notice to submit a reply to the Director, Office of Enforcement and Investigation, Office of the Assistant Secretary of Environment, Safety and Health, P.O. Box 2225, Germantown, MD 20874-2225, Attention: Office of the Docketing Clerk, with copies to the Manager, DOE Oak Ridge Operations Office, and to the cognizant DOE Secretarial Office for the facilities and activities that are the subject of this Notice. Based on the information presented at the Enforcement Conference on July 9, 1998, which included (1) the admission of the alleged violations, (2) enumeration of the corrective actions that are being taken, and (3) the fact that all proposed corrective actions had been implemented as of July 9, 1998, a confirmation of the oral admission and agreements, as set forth in 10 CFR 820.24(d) will be sufficient to meet this requirement.

Unless the violations are denied within 30 days after the issuance of this Preliminary Notice of Violation in accordance with the requirements set forth in 10 CFR 820.24(c), this Notice shall become a Final Notice of Violation.



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

Dated at Washington, D. C.
this 21st day of September 1998

ENFORCEMENT CONFERENCE SUMMARY
NTS-ORO--LMES-LMESGEN-1997-0001
NTS-ORO--MKFO-X10CONSTRM-1997-0001

The Office of Enforcement and Investigation held an informal conference with Lockheed Martin Energy Systems (LMES) and MK-Ferguson of Oak Ridge Company (MK-F) on July 9, 1998, in Oak Ridge, Tennessee to discuss the concerns identified in the Noncompliance Tracking System (NTS) reports referenced above and in the Department of Energy (DOE) Investigation Report issued to LMES and MK-F on May 26, 1998. Although one of the personnel exposures was in excess of DOE's annual 50,000 millirem (mrem) limit for organs and tissues, the worker exposures identified by these reports and the work evolutions leading to the radiological exposures took place in the calendar year 1995, prior to the effective date of 10 CFR 835 on January 1, 1996. Consequently, the primary issues of concern for the Enforcement Conference were the delays associated with the identification of two personnel internal intakes of plutonium-238 (Pu) and one worker internal intake of thorium-228 (Th). In spite of numerous opportunities during 1995 and 1996 to recognize and identify that worker intakes had occurred, it was not until the latter part of December 1996 a delay of approximately 18 months, that the thorium and plutonium intakes were confirmed.

The purpose of the conference was to discuss the following: (1) corrective action taken, planned and/or completed by LMES and MK-F to address bioassay program deficiencies with regard to worker internal exposures, including methods being used or planned to be used for identification of positive bioassay samples and special bioassay sampling for employees, (2) corrective action(s) taken or planned to ensure adequate laboratory support for the MK-F bioassay program, (3) discussion of technology shortfalls and compensatory actions being taken or planned regarding assessment of personnel dose at activity levels equivalent to 100 mrem, (4) evaluation of effectiveness of corrective actions taken to date, and (5) date of completion of all remaining corrective actions. The conference provided a final opportunity for LMES and MK-F to offer any further information that should be considered by DOE in its enforcement deliberations for these noncompliances. An attendance list of personnel is included as Attachment A.

Keith Christopher, Director, Office of Enforcement and Investigation, opened the conference by providing a short discussion of the purpose of the conference. Opening remarks for LMES were provided by Robert I. Van Hook, Jr., president, and for MK-F, a LMES subcontractor, Richard Wilkerson, president. Both emphasized their respective company's commitment to safety, both radiological and occupational. Mr. Van Hook stated that LMES was responsible for and accepted the responsibility for the MK-F

bioassay program including programmatic as well as oversight aspects. Both LMES and MK-F emphasized the team-partnership approach being utilized by the two companies to address internal dosimetry issues at MK-F and the the LMES laboratory facility, Analytical Services Organization (ASO).

Mr. James East, Health Physics Manager for MK-F, addressed bioassay program initiatives that had been implemented to ensure that 10 CFR 835 (Occupational Radiation Protection) requirements were being met, particularly for the difficult-to-measure, transuranic radionuclides. The program improvements included (1) establishing a Memorandum of Understanding (MOU) between MK-F and ASO for the bioassay program that required the use of Decision Levels (DLs) for screening urinalysis samples being analyzed for transuranic radionuclides, (2) improved methods for communication between MK-F and ASO, and (3) enhanced computer capability that allows MK-F access to bioassay data easier. Mr. East also pointed out that the enhanced computer capability had increased their capability to ensure that Radiation Work Permit required bioassay samples, as well as routine bioassay samples, were submitted in a timely manner. Mr. East stated that all corrective actions being discussed had been fully implemented and appeared to be working well as of the July 1998 time frame.

Mr. Jeff Wade, LMES Bioassay Department Head, ASO, provided a summary of improvements implemented by ASO to more satisfactorily serve the needs of its customers, including MK-F. These improvements included automation of some laboratory operations, enhanced computer applications and capabilities that permitted improvements in ASO's chain of custody, changes in chemical separations laboratory procedures as well as count room quality controls measures, and formalization of communications between ASO and MK-F through a MOU and Project Summary.

Mr. James Baker, LMES Radiological Control Manager, discussed the LMES program for oversight of the MK-F biosassay program and stressed the importance of the field radiological monitoring program particularly for those radioisotopes with associated technology shortfalls.

Mr. Gustavson , Deputy to the President, concluded the LMES/MK-F input to the enforcement conference by providing the contractor perspective of mitigation considerations. The understanding of the seriousness of the internal dosimetry issues was reiterated, and Mr. Gustavson pointed out that LMES and MK-F had jointly taken effective actions to prevent recurrence of the bioassay concerns.

DOE closed the conference, indicating that DOE would consider the information presented at the conference in conjunction with other information obtained through its investigation, and would conclude over the next several weeks whether enforcement action should be taken in this case. DOE opened the floor for comments or clarification by LMES and MK-F on the enforcement conference or on the transmittal letters of May 26, 1998, and its enclosed Investigation Summary Report. Mr. Gustavson

indicated that LMES had several minor comments regarding the investigation report, none of which would alter the substance or impact of the report. These proposals have been considered and, to the extent accepted, are listed in Attachment B.

ATTACMENT A

**DOE ENFORCEMENT CONFERENCE ATTENDEES
LOCKHEED MARTIN ENERGY SYSTEMS (LMES)
MK-FERGUSON OF OAK RIDGE COMPANY (MK-F)**

July 9, 1998

LMES Attendees

Robert I. Van Hook, Jr.
F. P. (Gus) Gustavson
James H. Barker
Jeff Wade
Charles H. Moseley, Jr.
Harold Conner
Lew Felton
G. D. Robbins
W. L. Clonats
T. R. Brown
K. A. Fee
Todd Butz
Bill Altman
Rhonda Bogard
Alan Lewis
Roy E. Fenstermaher
Rebekah Bell

MK-F Attendees

Dick Wilkerson
James East
Donald K. Murano
E. Kelly Post
M. Brad Graves

Other Organizations Represented

J. H. Swanks, Oak Ridge National Laboratory (ORNL)
Crystal Schrof, ORNL
C. S. Sims, ORNL
Mike Walls, ORNL
Danny Whitaker-Sheppard, Bechtel Jacobs (BJ)
Steve Green, BJ
Jim Thiesing, BJ

DOE Attendees

R. Keith Christopher, Director, Office of Enforcement and Investigation, EH-10
Howard Wilchins, EH-10
Betty Revsin-Watson, EH-10
Maria Gavrillas-Guinn, EM-4
Martin McBride, Oak Ridge Operations (ORO)
Mike Henderson, ORO
Harold Monroe, ORO
Harry E. Peters, ORO
Brian Northcutt, ORO
Les Price, ORO
George Benedict, ORO
Ken Rhyne, ORO
Nancy Carnes, ORO
Marcee Myers Addington, ORO-EM
Tim Noe, ORO-EM
Carl Joseph Pily, ORO-EM
David M. Cardin, EM
R. D. Dempsey, Defense Programs
Brenda W. Holder, EH Resident
Mark Robinson, DOE, ORNL

ATTACHMENT B

Clarifications to Summary Investigation Report Bioassay Program Deficiencies Associated with the Identification of Significant Worker Exposures Issued May 26, 1998

Based on the information provided by LMES, the following clarifications to the Investigation Report issued on May 26, 1998, to LMES and to MK-F shall be considered final.

2. Cover letter, 2nd paragraph, 1st sentence

“ . . . discovered approximately 100 positive bioassay samples that had previously been considered negative.” This statement will remain unchanged. Since MK-F had not recognized these results to be positive, they had considered that the results indicated that no exposures had occurred, i.e., results were negative.

3. Cover letter, 2nd paragraph, last sentence should be revised to read:

“ . . . undetected significant exposures to three workers from 1995 to 1997.”

4. Investigation Report, page 1, 2nd paragraph

The Noncompliance Tracking System (NTS) and Occurrence Reporting (ORO) numbers should be identified as follows:

NTS-ORO--LMES-LMESGEN-1997-0001
NTS-ORO--MKFO-X10CONSTRM-1997-0001
ORO--MKF-X10CONSTRM-1995-0010
ORO--LMES-X10CM-1996-0004
ORO--LMES-X10CM-1997-0001

5. Investigation Report, page 1, 3rd paragraph, 1st sentence should be revised to read:

“ . . . two additional workers were *confirmed* to have had intakes of radioactive material during 1995.”

6. Investigation Report, page 3, 1st paragraph, 4th sentence should be revised to read:

“ . . . was identified as Pu-239. Beta/gamma emitting radionuclides were also found to be present.”

7. Investigation Report, page 3, 3rd paragraph, 3rd sentence should be revised to read:

“Although the new pipe line was discovered during the job evolution, further radiological characterization was inadequate to identify the magnitude of the alpha radiation hazard associated with the pipe line from Building 3038.”