70-1193

4/16/76

MEMORANDUM FOR: Acting Chairman Rowden
Commissioner Mason
Commissioner Gilinsky
Commissioner Kennedy

FROM: Lee V. Gossick, Executive Director for Operations

SUBJECT: NRC TESTIMONY BEFORE THE DINGELL HOUSE SUBCOMMITTEE

Attached is the proposed staff testimony for April 27, 1976.

It is anticipated that I will testify, supported by Mr. Chapman, Mr. Shapar and Mr. Thornburg.

Request your comments no later than April 19, 1976.

/s/
Lee V. Gossick
Executive Director
for Operations

Enclosure:
As stated

cc: B. Huberman
P. Strauss

Contact:
H. Thornburg
492-7265

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| DATE ➔ | | | | | | |

U. S. NUCLEAR REGULATORY COMMISSION

TESTIMONY

TESTIMONY
BEFORE
THE SUBCOMMITTE ON ENERGY AND ENVIRONMENT
OF
THE HOUSE SMALL BUSINESS COMMITTEE
DEALING WITH
ACCOUNTING METHODS AND SAFEGUARDS OF
SPECIAL NUCLEAR MATERIAL

The following information is presented in response to Chairman John P. Dingell's request that the NRC submit testimony concerning accounting methods and safeguards of special nuclear material and the incidents which occurred in conjunction with Kerr-McGee's Cimarron facility in the the fall of 1974, to the Subcommitte on Energy and Environment.

In order to best describe the conditions at the Kerr-McGee facility we have prepared a referenced chronology of significant operating events, inspections and investigations during the period March 1972 to the present. March 1972 was chosen as a starting date because this marks the beginning of the conversion of plutonium nitrate into mixed oxide fuel pellets for the Fast Flux Test Facility (FFTF) program.

The chronology which follows has been separated into two major sections; the first relating to Nuclear Criticality and Radiological Safety and the second relating to Physical Protection and Material Control. The first section has been sub-divided into three subsections - March 1972 to September 26, 1974 (on September 27, 1974, representative of the Oil Chemical and Atomic Workers Union met with representatives of the AEC for the purpose of presenting allegations of unsafe working practices at the Cimarron facility); September 27, 1974, to January 1975 (the reports of the investigations into the allegations and the contamination of Miss Karen Silkwood were released in January 1975); and, January 1975 to the present.

A description of the NRC's programs for accounting for and safeguarding special nuclear material are contained in the answers to Chairman Dingell's specific question which follow the chronology. These areas are addressed in the answers to questions No. 1), and No. 3). Reports and document referenced in this testimony are appended.

## I. RADIOLOGICAL AND NUCLEAR CRITICALITY SAFETY INSPECTION

### A. MARCH 1972 TO SEPTEMBER 26, 1974

During the twenty-nine month period, March 1972 to September 1974, nine inspections and one investigation were conducted.

As a result of these inspections and investigations, nineteen items of noncompliance with AEC regulatory requirements were found. Four of the nineteen items of noncompliance related to exposure of eleven Kerr-McGee personnel to airborne concentrations of plutonium above AEC permissible limits. (In addition, two airborne overexposures involving six employees, which occurred during this period, were examined and reported in a later AEC inspection report.) Results of bioassay analyses and whole body counting of the seventeen exposed employees indicated that no significant uptake of plutonium had occurred. Seven of the nineteen items of noncompliance found during this period resulted from the licensee's failure to carry out special conditions of the license, such as audits, inspections, equipment tests, or administrative reviews. Five of the nineteen items of noncompliance were caused by employees' failure to follow the licensee's written procedures. Three of the nineteen items of noncompliance resulted from the licensee's failure to notify licensing prior to making a change in facilities and organization structure. While none of the items by themselves were of great significance, collectively they indicated management controls being exercised should be strengthened. The Regional Director and members of his staff met with Kerr-McGee Corporate Management, including the Chairman of the Board, on November 2, 1973, to discuss these problems. Subsequent to this time, although additional violations of AEC regulations were found, continuing steady improvements in the licensee's program were observed.

In order to place the significance of all exposure to airborne plutonium reported in this section into perspective it should be noted that the the NRC's Office of Standards Developement has published a notice in the Federal Register that, in accordance with recommendations of national and international authoritative bodies, they intend to change the regulations as they pertain to exposure to airborne radioactive material. Had this change, which would allow exposures to be averaged over a period of 520 hours in a calendar quarter rather than 40 hours in 7 consecutive days, been in effect none of the exposures to airborne plutonium reported in this section would have constituted an exposure in excess of applicable limits.

A chronological, referenced list of operational occurrences and incidents and inspections and investigations follows:

| Date | Event |
|---|---|
| 3/72 | The Cimarron Plant received its first shipment of plutonium nitrate solution from Hanford for conversion into mixed oxide pellets for the FFTF program. |
| 6/14-16/72 | An inspection revealed no items of noncompliance. (Inspection Report No. 070-1193/72-02) |
| 6/21/72 | Four exposures to airborne plutonium in excess of applicable limits occurred during a glovebox window change. Corrective action, including use of an alarming air monitor for future changes, was reviewed. (Inspection Report No. 070-1193/72-03) |
| 8/2/72 | The Oil, Chemical and Atomic Workers International Union (OCAW) local chairman wrote to Occupational Safety and Health Administration (OSHA) to allege unsafe practices (not related to radiological or criticality control aspects of the operation). An OSHA inspection of the Cimarron facility in August 1972 did not substantiate the unsafe conditions, but did identify thirteen nonserious violations of OSHA regulations. |
| 10/19-20/72 | An inspection revealed no items of noncompliance. (Inspection Report No. 070-1193/72-03) |
| Fall 1972 | During the Fall of 1972, five key nuclear and radiological safety people terminated employment with Kerr-McGee. No noncompliance resulted from these terminations. Three of these people were replaced by promotion from within. The functions of the other two were performed by contracted consultants while replacements were being obtained. (Inspection Report No. 070-1193/72-03) |

| Date | Event |
|---|---|
| 11/20/72 | Two exposures to airborne plutonium in excess of applicable limits occurred when a glovebox was inadvertently punctured during a maintenance operation. Corrective action, including reinstruction on use of tools in gloveboxes, was reviewed. (Inspection Report No. 070-1193/73-02) |
| 11/30/72 | Oil Chemical and Atomic Workers International Union (OCAW) went on strike upon contract expiration on November 23, 1972. (Inspection Report No. 070-1193/73-02) |
| 2/9/73 | OCAW and Kerr-McGee signed a letter of agreement ending a ten-week strike. (Inspection Report No. 070-1193/73-02) |
| 2/12-16/73 | An inspection revealed two items of noncompliance:<br>1. Nuclear Criticality Safety Officer and Licensing and Regulation Officer did not audit monthly for compliance with license requirements and nuclear criticality safety.<br>2. A glovebox in plutonium waste recovery was not posted with hood inventory record.<br>Actions were taken to correct these items. (Inspection Report No. 070-1193/73-02) |
| 3/5, 7-9 13-14, 28-29/73 | Five exposures to airborne plutonium in excess of applicable limits resulted from a fire in a glovebox. Contaminated rooms were out of service for about two weeks. No plutonium was released to the environment. An inspection revealed no items of noncompliance; however, the following items were observed which required immediate attention:<br>1. Delay in collection of bioassay samples and additional delay between time samples submitted and analytical results received.<br>2. Medical consultant not notified until day following the fire.<br>3. Prior to the fire, procedures did not require respiratory protection during the removal of contaminated articles from a glovebox. This precaution would have reduced intake of radioactive materials by personnel involved.<br>4. Room Air Monitor Chart allowed to run out the day before the fire. Information to help evaluate concentrations of radioactivity in room air at time of fire was not available. |

| Date | Event |
|---|---|
| 3/5, 7-9, 13-14, 28-29/73 (Continued) | Action were taken to preclude a recurrence of these items. (Inspection Report No. 070-1193/73-04 and No.070-1193/74-01 |
| 6/18-22/73 | An inspection revealed the following items of noncompliance:<br>1. One glovebox in the Waste Processing Area, had no "Glovebox Status Sheet" indicating fissile material content.<br>2. One glovebox contained three one-liter containers, two of which were less than 12" apart in violation of posted Safety Operation Limit which limits glovebox storage to two one-liter containers and requires 12" spacing between containers.<br>Actions were taken to correct these items (Inspection Report No. 070-1193/73-05) |
| 7/3/73 | On July 18, 1973, Kerr-McGee notified the AEC that several air samples taken in a laboratory on July 3 and 4 appeared to be invalid. Autoradiographs of the air sample filter papers appeared to reveal fingerprint-shaped smudges of plutonium. Further analysis indicated that the plutonium was different from that being used in the laboratory. No noncompliance was identifed during a subsequent inspection. (Inspection Report No. 070-1193/73-06) |
| 7/10/73 | One exposure to airborne plutonium in excess of applicable limits occurred during use of a "slot box" (a modified chemical hood). Corrective action was taken to prevent future such incidents. (Inspection Report No. 070-1193/73-06) |
| 8/29 9/17-21, 26/73 | The AEC received anonymous allegations, through Ms. I. Younghein, regarding four instances of unsafe practices at the Cimarron facility.<br>The inspection and investigation of these allegations revealed the following items of noncompliance:<br>1. During the week of July 9-14, 1973, an employee was exposed to airborne concentrations of plutonium, which, when averaged over 40 hours, were 1.3 times the specified limit.<br>2. The required annual inspection of Raschig rings (a device installed in a vessel to prevent criticality) was not performed. |

| Date | Event |
|---|---|
| 8/29<br>9/17-21,<br>26/73<br>(continued) | 3. On two occasions liquid plutonium wastes were shipped in improper packages.<br><br>4. The licensee changed organizational structure. combining responsibilities of health and safety technical positions and eliminating certain positions. The position of License and Safety Officer was filled with an inexperienced employee.<br><br>5. No offsite survey was performed on April 17, 1972, to evaluate consequences of two departing contaminated employees.<br><br>6. On two occasions, required management appraisals were not documented following one hour tornado alerts received by the licensee.<br><br>7. Records were not maintained of the results of surveys for contamination on a solid waste storage trailer prior to painting.<br><br>Appropriate corrective action was taken. (Inspection Report No. 070-1193/73-01) |
| 10/19, 25<br>26 and<br>11/2/73 | An inspection revealed no items of noncompliance. (Inspection Report No. 070-1193/73-07) |
| 11/1/73 | Seven exposures to airborne plutonium in excess of applicable limits resulted from a leaking glovebox seam. Appropriate corrective action was taken. (Inspection Report No. 070-1193/74-01) |
| 11/2/73 | The Regional Director, Region III, and staff met with corporate management and staff to discuss problems attributed to a lack of adequate management controls, effectiveness of internal reviews and audits, and staffing considerations. The licensee submitted an updated organization to Licensing in late December. The Kerr-McGee Nuclear Corporation was formed at this time. Two criticality safety people were hired by the company. (Inspection Reports NO. 070-1193/73-07 and 070-1193/74-01) |
| 11/29/73 | One exposure to airborne plutonium in excess of applicable limits resulted during a survey of glovebox gloves. Appropriate corrective action was taken (Inspection Report No. 070-1193/74-01) |

| Date | Event |
|---|---|
| 2/10/74 | Two exposures to airborne plutonium in excess of applicable limits occurred when a vacuum gauge was blown from its retainer. Appropriate corrective action was taken. (Inspection Report No. 070-1193/74-01) |
| 2/11-15/74 | An inspection revealed the following items of noncompliance:<br><br>1. During the period October 28 to November 3, 1973, seven employees were exposed to airborne concentrations which, when averaged over 40 hours, were in excess by 1.2 to 1.6 times the specified limits.<br><br>2. During the period November 25 - December 1, 1973, one employee was exposed to airborne concentrations when averaged over 40 hours, of 1.5 time the specied limits.<br><br>3. During the week of February 10-16, 1974, two employees were exposed to airborne concentration when averaged over 40 hours of 1.4. times the specified limits.<br><br>Actions were taken to correct these items. (Inspection Report No. 070-1193/74-01) |
| 5/20-25/74 | An inspection revealed the following items of noncompliance:<br><br>1. Efficiency testing of the final effluent filters had not been performed annually.<br><br>2. The licensee, through its contracted nuclear safety consultant, used an unauthorized computer code in criticality safety analysis for a vault storage array. Use of this unauthorized code did not jeopardize safety.<br><br>3. Several nuclear safety analyses made prior to 1973 were not verified by the Licensing and Regulations Officer.<br><br>4. The physical inspections of several equipment and facility changes had not been made prior to usage.<br><br>5. The licensee used unauthorized sub-floor storage wells in the Inspection and Assembly Room and glovebox storage wells in the Fabrication Room.<br><br>Actions were taken to correct these items (Inspection Report No. 070-1193/74-05). |

| Date | Event |
|---|---|
| 5/21/74 | One exposure to airborne plutonium in excess of applicable limits resulted from a hole in a glovebox glove. Appropriate corrective aciton was taken. (Inspection Report No. 070-1193/75-02) |
| 7/31/74 | Two exposures to airborne plutonium in excess of the applicable limits may have resulted during routine work in a laboratory. As in a previous instance, (July 3, 1973) the air samples appeared to be invalid. Again, autoradiographs appeared to reveal odd-shaped smudges of plutonium. Initial bioassay results received in early October 1974 indicated that a minor exposure might have occurred. Appropriate corrective action was taken. (Investigation Report No. 070-1193/74-09) |
| 8/21/74 | Five exposures to airborne plutonium in excess of applicable limits resulted from a hole in a glovebox glove. Corrective action included the transfer of one employee to the Uranium plant, and the reinstruction of employees in procedures for inspection and surveys of gloves. (Inspection Report No. 070-1193/75-02) |
| 9/5/74 | The National Labor Relations Board notified Kerr-McGee of a petition to decertify the Oil, Chemical and Atomic Workers International Union local. |

B. SEPTEMBER 1974 TO JANUARY 1975

On September 27, 1974, representatives of the Oil, Chemical and Atomic Workers International Union met with Atomic Energy Commission representatives at AEC Headquarters to present allegations concerning working conditions at the Kerr-McGee Nuclear Corporation plant at Cimarron, Oklahoma. The allegations indicated six general areas of concern:

1. Failure of K-M to educate and train workers.

2. Failure of K-M to keep exposures as low as practicable.

3. Failure of K-M to take proper hygienic precautions.

4. Failure of K-M to monitor worker exposure adequately.

5. Practice of AEC inspectors with regard to accompaniment by worker representatives.

6. Relationship between OSHA and the AEC for control of hazardous conditions.

The allegations under the last two headings were answered to the OCAW representatives satisfaction by the AEC at the time of the September 27 meeting and were not investigated further

Thirty-nine separate incidents or situations referred to by the OCAW under the first four headings were investigated by the AEC during the period September, 1974 to January, 1975. Some of the allegations were substantiated or partially substantiated. Others could not be substantiated. The investigation identified three violations of AEC regulations.

On October 16, 1974, Kerr-McGee notified the Atomic Energy Commission, on the basis of recent urinalysis data, that an incident which occurred on July 31, 1974, might have resulted in two minor overexposures to airborne plutonium. (One of these persons - Karen Silkwood - was to become involved in another contamination incident on or about November 5, 1974.)

On November 7, 1974, Kerr-McGee notified the Atomic Energy Commission that Ms. Silkwood, her roommate, and their apartment had been found contaminated with plutonium. Ms. Silkwood died in an automobile accident five days later. An AEC investigation was conducted from November 8 through December 4. Nineteen man-months of Regional effort were expended in the investigations of the OCAW allegations and the Silkwood contamination occurrence. At least an equivalent amount of total manpower was expended by the AEC's, Health Services Laboratory, where independent analyses of biological and other samples was conducted; by the staff of the Los Alamos Scientific Laboratory where Ms. Silkwood, her roommate and a friend were whole body counted, whose staff participated in the autopsy and where biological samples were analysed; and, by an independent medical consultant. The investigation concluded that the contamination probably did not result from an accident or incident within the Kerr-McGee plutonium plant. The investigation also concluded that two urine samples submitted by the employee contained plutonium which was not present at the time of excretion. The incident received considerable public attention, centering around the following facts:

1. The employee was one of the Oil, Chemical and Atomic Workers International Union representatives who presented the allegations on September 27, 1974,

2. The employee died as a result of an automobile accident during the investigation, and

3. The incident involved offsite contamination.

The AEC investigation did not establish the source of the plutonium or the manner in which it became dispersed.

During and subsequent to the incident the NRC maintained a close liaison with the Department of Justice through the FBI, both by formal correspondence and day to day verbal contact. Copies of memoranda dated January 16, and 29, and February 20, 1975 are attached. The first contact with the FBI was on November 14, 1974, when the NRC investigator informed the Oklahoma City office of the FBI of the death of Ms. Silkwood.

Following is a chronology of events at the Kerr-McGee plutonium facility starting with OCAW - AEC meeting on September 27, 1974, through release of the AEC investigation reports during January, 1975, on the contamination incident and OCAW allegations.

| Date | Event |
|---|---|
| 9/27/74 | Oil, Chemical and Atomic Workers International Union representatives met with AEC staff, alleging unsafe practices at the Cimarron Facility in the areas of training; respirator fitting, use, and cleaning; health physics staffing and surveys; violation of procedures; and delay in counting air samples. The allegations covered six areas of concern, two of which were resolved by discussion during the meeting. |
| 10/10/74 | The decertification election was won by the Oil, Chemical and Atomic Workers International Union, which remained the employee bargaining representative at the Cimarron facility. |
| 11/5/74 | Oil, Chemical and Atomic Workers International Union contract negotiations started. |
| 11/5/74 | Karen G. Silkwood became slightly contaminated during normal laboratory operations. She again became contaminated the following day. On November 7, she, her roommate, and their apartment were found to be contaminated with plutonium.<br><br>An AEC investigation began on November 8, and ended on December 4. One item of noncompliance regarding identification of urine samples was found. Corrective action was initiated by the licensee. Ms. Silkwood died in an automobile accident on November 13. (Investigation Report No. 070-1193/74-09) |
| 11/14/74 | One exposure to airborne plutonium in excess of the applicable limits resulted from a glovebox glove failure. Appropriate corrective action was taken. (Inspection Report No. 070-1193/75-02) |
| 11/17/74 | Four exposures to airborne plutonium in excess of applicable limits resulted from overpressurization of a glovebox being purged with inert gas. Appropriate corrective action was taken. (Inspection Report No. 070-1193/75-02) |

| Date | Event |
|---|---|
| 11/21/74 | The investigation of OCAW health and safety allegations made on September 27, 1974, was begun. Thirty-nine items covering four areas of concern were investigated. Only two of those items, and a third which was not among the allegations, were found to be in apparent noncompliance with AEC requirements. Eighteen others found to have some substance were called to the attention of Kerr-McGee, but did not result in identification of noncompliance with AEC regulatory requirements. The three items of noncompliance, involving reporting and improper use of plutonium, did not pose a hazard to workers or the public. Proper corrective action was taken. (Investigation Report No. 070-1193/74-10 and Inspection Report No. 070-1193/75-02) |
| 11/21/74 to 12/10/74 | The AEC Division of Inspection conducted an investigation of four OCAW allegations concerning Kerr-McGee quality assurance in the manufacture of FFTF fuel. Although the investigation showed some evidence to support two of the allegations, there was no evidence that the quality of the fuel pins had been compromised. (Division of Inspection Report No. 44-2-339) |
| 12/1/74 | Oil, Chemical and Atomic Workers International Union and Kerr-McGee reached agreement in contract negotiations. |
| 12/7/74 | An AEC health physicist surveyed Ms. Silkwood's personal effects at the homes of her parents and sister in Nederland, Texas, and found them free of radioactive contamination. |
| 12/19 - 20/74 | An investigation was conducted into the December 17, 1974 report that four employees were exposed to airborne plutonium. In an unrelated occurrence, the hand of another employee had been contaminated. The following items of noncompliance were observed:<br><br>1. Four individuals working in a restricted area on December 17, 1974, were exposed to airborne concentrations of plutonium which, when averaged over 40 hours, exceeded the specified limits.<br><br>2. Respiratory equipment used on December 17 included respirator canisters which had not been approved under test schedules of the U. S. Bureau of Mines. |

| Date | Event |
|---|---|
| 12/19 - 20/74 (Continued) | Appropriate corrective action was taken. (Investigation Report No. 070-1193/74-11) |
| | An investigation was conducted into the report that a number of low-enriched uranium dioxide pellets and pellet fragments were found on the ground outside of the manufacturing building but within the perimeter fence. Investigators were unable to determine by whom or how the pellets were dispersed. (Investigation Report No. 070-925/74-06) |
| 1/6/75 and 1/7/75 | AEC representatives met with Kerr-McGee management, OCAW representatives, and the news media in Oklahoma City to discuss the results of the Silkwood and OCAW allegation investigations. |
| 1/8-13/75 | OSHA conducted an inspection of the Kerr-McGee Cimarron facility as a result of OCAW inquiries. |
| 1/30/75 | Two representatives of the AEC Region III Office and a representative of the AEC General Counsel's Office testified before a Committee of the Oklahoma State Legislature regarding the Silkwood and OCAW allegation investigations. |

C. JANUARY 1975 TO PRESENT

During the period following the contamination and OCAW investigations, seven health and safety inspections and one investigation have been conducted with three of these inspections utilizing IE personnel from outside Region III. These inspections were part of a special comprehensive accelerated program performed at the facility which are more fully described in the answer to Question 3. These inspections were unannounced and the initial "walk through" of four were conducted during off-normal hours.

In general, the overall findings were that measurable improvements had occurred in connection with the safety of operations at the Cimarron Plutonium facility since the beginning of 1975. The improvements could best be illustrated by the reduction in airborne overexposure incidents from eight in 1974 to two in 1975. Notwithstanding the above, there were a number of noncompliance items identified by the inspectors relating to two overexposure incidents involving seven employees, with no measurable uptake of plutonium, failure to carry out conditions of the license and failure to have or to follow certain written procedures.

The chronological referenced list of operational occurrences, inspections and investigations during this period follows:

| Date | Event |
|---|---|
| 2/3-7/75 | An inspection revealed that on three occasions employees were exposed to airborne plutonium concentrations greater than applicable limits as follows: (a) May 19-25, 1974, one employee, (b) August 18-24, 1974, five employees (c) November 17-23, 1974, four employees. Actions were taken to prevent recurrence of these exposures. (Inspection Report No. 070-1193/75-02) |
| 3/3-5/75 | An inspection revealed the following items of noncompliance:<br>1. On two occasions posted safe operating limits were exceeded.<br>2. On two occasions material was stored contrary to conditions used in the vault safety analyses.<br>These items were corrected. (Inspection Report No. 070-1193/75-03) |

| Date | Event |
|---|---|
| 3/23/75 | Three exposures to airborne plutonium in excess of applicable limits resulted from a hole in the double wrapping of a package of scrap. Appropriate corrective action was taken. (Inspection Report No. 070-1193/75-05) |
| 4/14-17/75 | An inspection revealed the following items of noncompliance:<br>1. A HEPA filter containing greater than a Type A quantity was shipped in a Type A package.<br>2. Required monthly team audits by the Criticality Specialist and License and Safety Officer were made by only the Criticality Specialist.<br>3. Four cases of not following approved operating procedures.<br>4. Air-balance between the laboratory and hall leading to the locker room permitted a reverse air flow<br>5. On March 23, 1975, three employees were exposed to air concentrations exceeding applicable limits.<br>Actions were taken to correct these items. (Inspection Report No. 070-1193/75-05) |
| 5/20-27/75 | An inspection revealed the following items of noncompliance:<br>1. The storage of material in the vault outside of approved locations.<br>2. Personnel were not required to wear finger ring monitors for extremity exposure evaluation.<br>These items were corrected. (Inspection Report No. 070-1193/75-06) |
| 6/2-5/75 | An inspection revealed the following items of noncompliance:<br>1. Physical inventories of SNM in some controlled areas were not maintained.<br>2. An approved written procedure was not available for a washing operation in one glovebox. |

| Date | Event |
|---|---|
| 6/2-5/75 (Continued) | 3. An approved written procedure was not available for the calcining of combustible waste in two gloveboxes.<br><br>4. Glovebox glove ports were not provided with inner sealing rings.<br><br>5. Licensee failed to notify NRC when a shipping container was received with greater than allowable removable contamination.<br><br>Actions were taken to correct these items. (Inspection Report No. 070-1193/75-08) |
| 6/30 to 7/14/75 | Nuclear Engineering Company notified Kerr-McGee and the NRC of the arrival at the NECO Nevada burial site of scorched HEPA filter in a waste shipment. The incident resulted in no plutonium contamination problems. An investigation revealed one item of noncompliance regarding improper packaging of the filter. Proper corrective action was taken by Kerr-McGee. (Investigation Report No. 070-1193/75-09 and Inspection Report No. 070-1193/75-15) |
| 9/75 to 10/75 | FFTF fuel pin shipments were completed. Scrap reprocessing and cleanout of the facility was begun. Work force being reduced for facility standby status. An informal license amendment application to put the facility on standby status was submitted to Licensing. (Inspection Report No. 070-1193/75-15) |
| 10/21/75 | Four potential exposures to airborne plutonium in excess of limits occurred when a bag of contaminated items fell and broke open during nondestructive analysis measurements. Exposure evaluation revealed that the limit had not been exceeded. Appropriate corrective action was taken. (Inspection Report No. 070-1193/75-15) |
| 11/3-7/75 | An inspection revealed that on October 21, 1975, four employees were exposed to airborne concentrations of plutonium in excess of limits. Actions were taken to prevent a recurrence of such exposure. (Inspection Report No. 070-1193/75-15) |

| Date | Event |
|---|---|
| 2/28/76 | The Cimarron Plutonium Plant cleanup had progressed to the point that no significant amounts of plutonium were being recovered. Combustibles and gloves were removed from gloveboxes, which were then sealed and tamper-proofed. The work force had been reduced to twenty-two people. (Inspection Report No. 070-1193/76-03) |
| 3/16-18/76 | An inspection revealed no items of noncompliance. (Inspection Report No. 070-1193/76-03) |

## II. PHYSICAL PROTECTION AND MATERIAL CONTROL INSPECTIONS

Since the start of FFTF production at Kerr-McGee, the Region III Safeguards Branch staff has conducted 18 material accountability and physical protection inspections to ascertain that specific Commission requirements to protect against, deter and detect the theft or diversion of nuclear materials that may be of importance to national security and to protect against industrial sabotage were being met.

During this period significant regulation changes designed to provide strengthened physical protection and material control for special nuclear material in plants and in transport and protection of plants in which the materials were used, became effective. Our inspections resulted in a total of 46 items of noncompliance and these were mainly associated with the implementation of these new requirements. Kerr-McGee has generally been responsive to the continually changing and upgrading of the safeguards programs and has taken proper corrective actions to the items of noncompliance.

The news media - press, radio and television - have reported some 44 pounds of plutonium as missing from the Kerr-McGee plant. Our inspection program revealed no such quantity of missing plutonium and the Company's required plutonium accountability records show no significant quantities as missing. A source of confusion concerning the Kerr-McGee plant may be related to the amount of plutonium approximating the above amount which was allocated to process holdup and was permitted to be carried on inventories as a constant value until May 1974. Subsequent to this date the Commission required the holdup to be measured. Kerr-McGee Corporation had some difficulty measuring the actual holdup quantity because of equipment accessibility and plant design, but reported that a large portion of the material had been measured. The recent inventory showed that the cumulative difference between the material to account for and the material accounted for including the measured holdup is since March 1972, less than 0.5% of throughput which is identified in Question 1) as the control point in the NRC regulations for inventory accountability uncertainties.

The referenced chronology follows:

| Date | Event |
|---|---|
| 3/72 | Plant received first shipment of plutonium nitrate solution from Hanford for conversion into mixed oxide pellets for FFTF program. |
| 1/14-16/73 | A physical protection inspection of the facility was conducted. Four items of noncompliance were identified pertaining to perimeter fences, vault storage, and testing of alarms. The items were corrected. |
| 2/73 and 3/73 | A material control inspection was conducted coincident with a plant inventory. Four items of noncompliance relating to management of the measurement system and inadequacy of records were found. These items were subsequently corrected. Plutonium samples were taken for analysis in government laboratory to confirm Kerr-McGee analyses. |
| 5/73 | A meeting between AEC and Kerr-McGee was held to discuss inventory problems, primarily the determination of inaccessible in-process plutonium, called "holdup". The large holdup uncertainty made accurate inventory and material-unaccounted for (MUF) quantities difficult. It was agreed that a constant "holdup" quantity would be determined by June 30, 1973. |
| 12/3-7/73 | A material control inspection was performed coincident with Kerr-McGee's monthly inventory. Kerr-McGee was subsequently cited for exceeding the license limit of LEMUF (Limit of Error of Material Unaccounted For) on five successive monthly inventories. |
| 1/5/74 | Kerr-McGee submitted Physical Security Plan for Pu Plant and indicated that Transportation Security Plan would be issued as a separate document after security arrangements and the security plan of their Carrier (Tri-State) were approved. |
| 2/74 | February monthly inventory resulted in excessive MUF quantity. Plant operation was stopped and Kerr-McGee performed another inventory with an AEC inspector present. Unaccounted-for-plutonium was found and the plant resumed operation after a ten day shutdown. |

| Date | Event |
|---|---|
| 2/27/74 | Kerr-McGee resubmitted its revised Physical Security Plan to Licensing tailored to regulatory requirements and to the suggested guidance provided by Licensing. |
| 3/6/74 | Licensing approved the Kerr-McGee Transportation Security Plan with certain exceptions and amended the license to add license conditions intended to strengthen the plan.<br><br>Licensing, in order to accept the revised Kerr McGee Physical Security Plan found it necessary to strengthen the Security Program in certain respects. An additional amendment was issued. |
| 3/11-13/74 | A physical protection inspection was conducted. Noncompliance items consisted of a faulty vault lock and an incomplete log of plant visitors. These conditions were corrected. |
| 3/21/74 | In a meeting at AEC Headquarters, Kerr-McGee management representatives informed AEC Licensing and Inspection staff of their inability to meet the LEMUF limit of their license. |
| 5/6/74 | New license conditions became effective. Principle features were that inventories could be bimonthly rather than monthly, and that all plutonium must be physically measured during inventory. |
| 5/6-9/74 | A physical protection inspection resulted in the identification of 15 noncompliance items. Most concerned required alarms that had not yet been installed or were not yet operable. The items were subsequently corrected. |
| 7/74 | The first inventory under the new license requirements was conducted. |
| 7/23-25/74 | A routine inspection for the purpose of auditing accountability records disclosed no items of noncompliance. |
| 8/21-23/74 | A material control inspection disclosed that Kerr-McGee had not physically measured all plutonium during the July inventory and was still assuming a constant holdup. The licensee stated an intention to develop a non-destructive assay method (NDA) for measuring holdup, but said that this would require several months. Kerr-McGee was cited for noncompliance. |

| Date | Event |
|---|---|
| 9/11/74 | A physical security inspection resulted in the finding of two noncompliance items concerning devices not yet installed or not operating as required. These items were corrected. |
| 10/74 | The biomonthly inventory resulted in a MUF that exceeded its limit of error. As in March 1973, the plant was shut down and another inventory conducted with an AEC inspector present, successfully accounted for the MUF. Operation was resumed. |
| 10/74 to 2/75 | Kerr-McGee continued to develop their NDA measurement system. Discussions between AEC Licensing and Kerr-McGee took place. Kerr-McGee requested an increase in the LEMUF limit of their license, because the new NDA measurement system was not considered precise enough to permit the existing limit. |
| 2/75 | New license conditions became effective which increased the LEMUF limit. To compensate for the larger limit, additional physical security requirements were imposed on Kerr-McGee. |
| 2/18-22/75 | A physical security inspection was made to inspect shipments in transit. Six deficiencies pertaining to records, auditing of records and driver qualifications were found. These were later corrected. |
| 2/23/75 | Licensing amended License SNM-1174 by adding new license conditions dealing with physical security constraints and material accountability requirements. |
| 3/6-12/75 | A material control inspection was accomplished during the licensee's bimonthly inventory. This was the first inventory since new license requirements became effective Three infractions of the new physical protection requirements were observed; the licensee was in process of complying by hiring additional employees and achieved compliance a short time after the inspection. Two deficiencies pertaining to measurement statistics were identified which were also subsequently corrected. Sample of the entire inventory were obtained by the inspectors for analysis by a government laboratory. Results of these analyses disclosed no major differences with licensee results. |

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| 5/20-22/75 | A physical protection inspection disclosed three infractions pertaining to changes made to the security plan without prior approval, use of a vault lock of an incorrect type, and inadequate frequency of security drills. These items were subsequently corrected. |
| 7/2/75 | A former Kerr-McGee employee, armed with a rifle, arrived at the main gate and demanded to talk with the facility manager. After she had climbed the outer perimeter fence she was disarmed by the manager and a guard. The rifle was found to be unloaded. The assailant was placed in the custody of the county sheriff. |
| 7/31 and 8/1/75 | A material control inspection was conducted to observe the Kerr-McGee non-destructive assay inventory. No items of noncompliance with any of the aspects of the method such as completeness or interpretation of data were found. |
| 10/9-10/75 | A material control inspection consisting primarily of an audit of the records and measurement system was performed. No noncompliance items were found.<br><br>Licensee management discussed their plan to place the plutonium plant in standby status. Contractual obligations to deliver approximately 18,000 fuel pins had been satisfied. There was to be no further production and efforts to convert the remaining plutonium in the plant to an oxide powder and cleanout the facility were underway. The work force was to be decreased gradually. Operations were to close December 31, 1975, after which time a small standby force would be retained. It was estimated that several kilograms of inaccessible plutonium would remain in the process even after cleanout. |
| 10/15-16/75 | A followup of the May 15-16, physical protection inspection was conducted. No noncompliance items were found.<br><br>Kerr-McGee's special security procedures were also inspected. There were no noncompliance items. This special inspection was conducted to ascertain the extent to which Kerr-McGee has conducted pre-employment screening of guard applicants, in general, and one Leonardo Crusher (Garland Buford), in particular. |

| Date | Event |
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| 11/3-7/75 | A material control inspection was performed during a bimonthly inventory. There were no noncompliance items. |
| 12/17/75 | Kerr-McGee proposed to Licensing changes in their physical security plan tailored to the planned stand-by mode of the plant. |
| 12/31/75 | Plutonium plant operations officially ceased. The number of employees was reduced to about twenty. |
| 1/5-9/76 | A physical security inspection was accomplished to observe protection of SNM in the final major shipment of plutonium from the plant. One deficiency was identified. |
| 1/13-14/76 | A material control inspection coinciding with a bimonthly inventory was conducted. No items of noncompliance were identified. It was observed that cleanout was virtually completed except for final cleanout in some gloveboxes. The cleanout work was expected to be completed by the few remaining employees within a month. |
| 2/9-13<br>2/23-27/76 | Facility cleanout was concluded. Removal of gloves from all glovebox ports was completed and all ports were sealed with tamper-safe devices.<br><br>A team of NDA specialist from Los Alamos and Brookhaven National Laboratories spent two weeks making an independent measurement of the inacessible plutonium remaining in the facility for comparison with Kerr-McGee's measurements. Results were not yet know as of April 8, 1976. |
| 3/15/75<br>4/1/76 | The licensee completed what is expected to be a final bi-monthly inventory under the FFTF license and reported inventory data to NRC. MUF was less than LEMUF. The final inventory is 11.475 kilograms of plutonium. |
| 3/20/76 | Licensing reviewed proposed changes in the modified Kerr-McGee security plan and amended the license by revising license conditions tailored to the stand-by mode of the plant. |

# RESPONSES TO QUESTIONS

Question 1 - "The effectiveness of past and existing procedures in detecting the possibility of diversion of special nuclear materials and the results of any investigation of such possibility."

Response: The prompt detection of the possibility of theft or diversion of Special Nuclear Material is generally provided by physical security searches and alarms, access and containment controls, process controls, item and seal checks, shipper-receiver checks, and checks and balances provided by separation of duties within a plant. The accounting system provides an overall check, with the timeliness defined by the frequency of physical inventory and the sensitivity determined to a great extent by measurement uncertainties.

Continuing safeguards improvements have been made by the Atomic Energy Commission and the Nuclear Regulatory Commission during the past nine years. Early in 1967, new accountability regulations were promulgated to require written procedures, annual physical inventories, improved recordkeeping and reporting, and the establishment of material control programs for licensees authorized to possess greater than 5000 grams of contained U-235, U-233 or plutonium, in any combination.

Thereafter, in recognition that accounting systems could not be depended on exclusively for adequate control of special nuclear material, the Atomic Energy Commission issued new physical protection regulations specifying requirements for protecting high enriched uranium and plutonium against theft and sabotage in-transit (1969) and subsequently at fixed sites (1970). The new regulations required use and storage of SNM within a protected area (surrounded by a protective barrier) and controlled access by employment of a security force of armed guards or unarmed watchmen.

Physical protection regulations for strategic quantities of plutonium and high enriched uranium at nuclear plants and in-transit were substantially strengthened in the fall of 1973 and implemented in early 1974. New protection requirements at nuclear installations included the preparation and implementation of security plans covering the use of armed guards, establishment of improved access and egress controls, use of perimeter intrusion alarms, arrangements for communication with response forces and establishment of response plans. New transportation requirements included preplanning to reduce risks in transit, provision of armed escorts, arrangements for continual communication with a control point, and

automatic response in the event that scheduled reports were not received. During 1975, new license conditions were added to provide improved access controls, exit search procedures, and a number of controls over emergency evacuations and drills.

Material control regulations were also substantially strengthened in 1973 and 1974. Bimonthly inventory frequencies were specified for plutonium and high enriched uranium, and controls on measurement uncertainties were set forth for accounting systems. Control measures were improved to provide better verification of the accuracy of material shipments, additional information concerning the location and quantity of material in items and containers, improvements in physical inventory procedures and internal control practices, and upgrading of the accounting and records systems. In August 1975, NRC regulations were further amended to set forth measurement control requirements for special nuclear material. Licensees were required to submit plans for compliance with the new requirements, and these plans are presently being evaluated.

There continue to be, however, basic and inherent limitations on the techniques for accurately accounting for special nuclear material. These limitations are caused by the uncertainties associated with the measurement of nuclear materials. Under present NRC regulations, these uncertainties must be controlled to 0.5% for fuel fabrication operations. For reprocessing plants, the control limit is 1% for plutonium and 0.7% for uranium. Because of these measurement uncertainties, inventory discrepancies will continue to occur in nuclear operations, particularly in plants where chemical processing is required. The inventory discrepancies, although a very small percentage of throughput may be sizable in absolute terms in plants where large quantities of special nuclear materials are processed. Whenever such discrepancies arise, a comprehensive analysis is performed, including reinventory in some cases. The detection capabilities of the material accounting system, coupled with those of the physical protection system, provide assurance that theft or diversion of significant quantities of licensed SNM have not occurred.

While some improvements in material accounting can be made in the future, sole reliance cannot be placed on this technique to detect diversion. Accordingly, NRC is working on in-depth protection systems to monitor, prevent, detect, or defeat any attempt to illicitly remove nuclear materials

from facilities. Reviews are underway to identify weaknesses and to initiate necessary improvements which will reduce to an absolute minimum any chance of theft or diversion.

Question 2 - "The problem of quality control falsification at the Cimarron facility of the Kerr-McGee corporation in Crescent, Oklahoma, and the failure of existing procedures to detect such falsification at this or other facilities and the actions taken to verify the adequacy of such material".

Response: At the time of the alleged falsification of quality control documents, the Kerr-McGee Corporation's Cimarron facility was manufacturing fuel for the FFTF under an AEC contract. The Director of Regulation of the AEC was not charged with the responsibility for auditing this contract. Offices within that portion of the AEC which is now a part of ERDA were. The allegations pertaining to the falsification of quality control documents were investigated by the Division of Inspection of the AEC; a report of the results of this investigation, a copy of which is attached, was released to the public by the AEC's General Manager, now ERDA, on January 7, 1975. Details of the quality control program for the FFTF fuel at the Cimarron facility should be obtained from ERDA.

The NRC inspects to assure that quality control procedures are properly implemented during the manufacture of fuel for licensed nuclear power plants - generally this fuel is low enriched. The quality control of fuel manufactured for ERDA or the U. S. Navy - generally containing highly enriched uranium or plutonium - is the responsibility of the contracting agency.

Question 3 - "The Commission's evaluation of the health, safety and security procedures at the Cimarron facility, and at other plants which have experienced such problems."

Response: During 1975, comprehensive accelerated inspections of the health and safety program at the Cimarron facility were conducted. A description of this inspection program and of the conclusion reached by the Regional Office staff are enclosed as Enclosure A. The inspections were conducted on an unannounced basis and included arriving at and touring the facility during off-hours. Similarly, an evaluation of the Physical Protection and Transportation Security Programs are attached as Enclosure B.

With respect to the latter part of the question, we know of only one plant that has experienced "problems" such as the Cimarron facility. In August, 1974, representatives of the OCAW met with the AEC to discuss unsafe health and safety practices at the Nuclear Fuel Services, Erwin, Tennessee facility. A summary of the allegations, the results of the investigation into these allegations and an evaluation of the present health and safety procedures at the Erwin facility are attached as Enclosure C.

Question 4 - "The Commission's conclusion and the reasons and evidence therefore of:

(a) Whether foul play was involved in the death of Karen Gay Silkwood on November 13, 1974."

Response: Investigations into the circumstances surrounding the death of Ms. Silkwood were conducted by local law enforcement authorities and the Department of Justice, not the NRC. On November 21, 1974, Dr. A. J. Chapman, Chief Medical Examiners Office, State of Oklahoma, issued a public statement concerning the death of Karen Silkwood that "...The manner of death in this case is certified as accidental." On May 1, 1975, a Department of Justice spokesman publicly announced that the death of Ms. Silkwood appeared to be an accident and that the case was closed. Inquiries regarding details of this investigation should be referred to the Department of Justice and local law enforcement authorities.

Question 4 - "The Commission's conclusion and the reasons and evidence therefore of:

(b) How special nuclear material was diverted from the Cimarron plant and by whom:"

Response: The only evidence the Special Nuclear Material was possibly removed from the Cimarron plant was the contamination of Miss Silkwood's body, body waste samples and apartment and objects therein (Investigation Report No. 070-1197/74-09). By memorandum dated January 16, 1975, a copy of which is attached, the FBI was requested to investigate this unauthorized possession of special nuclear material. Inquiries regarding the results of such an investigation should be referred to the Department of Justice.

Question 4 - "The Commission's conclusion and the reasons and evidence thereof:

(c) Whether special nuclear material was ever diverted from any other facility, and if so, by whom."

Response: The Commission has no direct evidence that there has been any diversion of significant quantities of special nuclear materal from licensed operations. However, there have been a few cases where unauthorized entry was gained to protected areas. In those cases, the entries were promptly detected and the intruders did not attempt to penetrate interior protective barriers.

These conclusions are based upon physical security and material control records and reports prepared by licensees, and upon announced and unannounced inspections and audits performed by the NRC. The effectiveness and performance of licensees' physical security and material control systems are monitored and tested by NRC inspection teams. Unusual incidents are investigated by the NRC staff. Inventory listings are verified by independent measurements performed by NRC inspectors and accounting records are periodically audited. In addition, licensees are required to conduct annual internal audits of their security and accounting programs.

Question 4 - "The Commission's conclusion and the reasons and evidence therefore of:

(d) Who was responsible for the scattering of uranium pellets around the grounds at the Cimarron facility."

Response: Details of the AEC's investigation into the scattering of the low enriched uranium dioxide pellets and pellet fragments are contained in Investigation Report No. 070-925/74-06, a copy of which is attached. The AEC investigation did not reveal who scattered the pellets; by memorandum dated January 29, 1975, copy attached, the report was transmitted to the FBI and they conducted an investigation into the circumstances surrounding this incident. Inquiries regarding the results of such an investigation should be directed to the Department of Justice.

Question 5 - "The adequacy of the Atomic Energy Commission's investigation of the circumstances surrounding Karen Silkwood's death."

Response: As noted in the answer to Question 4(a), the Atomic Energy Commission did not investigate the circumstances surrounding Karen Silkwood's death. Investigations were performed by the Department of Justice and local law enforcement authorities.

Question 6 - "The results of any investigation of the possibility of diversion of special nuclear material from the nuclear fuel services plant in Irwin, Tennessee, and from NUMEC plant in Apollo."

Response: On February 20, 1976, in response to broadcast allegations about intentional wrong-doing in connection with inventory discrepancies at the NFS-Erwin facility, a special NRC investigation team was dispatched to the site by chartered aircraft. While the team uncovered no information to support allegations of intentional wrong-doing, the investigative material developed as a result of this inquiry will be turned over to the FBI. Following FBI review and evaluation of the investigative material, a report of this investigation will be released to the public by the NRC.

The NRC has conducted no investigations into the possible diversion of licensed special nuclear material at the plants in Erwin, Tennessee, and Apollo, Pennsylvania.