RIALS SAFEGUARDS INSPECTION
OF SPECIAL NUCLEAR MATERIALS AT
KERR-McGEE CORPORATION
CRESCENT, OKLAHOMA
SNM-1174 DOCKET NO. 70-1193
RO INSPECTION REPORT NO. 070-1193/73-01
FINAL REPORT

I. Inspection dates: January 14, 1973 through January 16, 1973

II. AEC personnel participating in the inspection were:

A. G. Finley J. P. Patterson

III. Report prepared by A. G. Finley

IV. Date report prepared: February 16, 1973

V. SCOPE

The licensee's compliance with the safeguards requirements of Title 10 CER Part 73 and physical protection requirements contained in license conditions of SNM-1174, Amendment No. SG-2 were reviewed.

VI. SUMMARY OF FINDINGS

A. Items of Noncompliance

1. License Condition 9.4.1 - The licensee has a permanent cement structure housing transformers and the emergency power supply system located within 15 to 20 feet of the inside of the perimeter fence. There were also eight 55-gallon drums of liquid solvents approximately ten feet from the inside southwest corner of the fence.

2. License Condition 9.4.3 - The perimeter of the physical barrier surrounding the protected area is not inspected for evidence of breaching or intrusion during the normal work hours (8:00 a.m. to 4:30 p.m.).

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NUCLEAR MATERIALS SAFEGUARDS INSPECTION

OF SPECIAL NUCLEAR MATERIALS AT

KERR-McGEE CORPORATION

CRESCENT, OKLAHOMA

SNM-1174

Close-out Meeting notes with Management - Date: January 16, 1973

Facility Personnel	AEC Personnel
Morgan Moore - Cimarron Facility Manager	A. G. Finley
Ray Janka - Manager, Administration and Accountability	J. P. Patterson
Fred H. Welch - Plant Security Officer	

No significant comments were made by Licensee personnel regarding items of noncompliance.

About three quarters of the FFTF material is in liquid form and considered in use. This material is in wall storage re for the system and not readily accessible. For this inspec the remaining FFTF material was in vault storage in a locked building protected by watchmen, detectors, and intrusion ala with controlled access.

EX.

[redacted]

This storage vault is a windowless enclosure with the followi approximately wall, floor, and ceiling concrete thicknesses: east and north walls [redacted] floor - [redacted] ceiling - [redacted] south and west walls - [redacted] vault [redacted] The entrance to t Closing on this gate is [redacted] This gate covers the entire entrance

[redacted] It is the conclusion of the inspection team that the gate does not comply with 10 CFR 73.3(k) because requirements specify a steel door at least one inch thick and that the licensee's steel door that closes on the gate does not comply with 10 CFR 73.3(k) because it contains no locking mechanism.

Results of the licensee intrusion alarm inspections and tests are not consistently documented and contribute to noncompliance with License Condition 9.4.8.

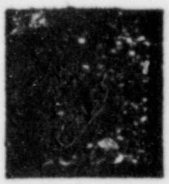
Records for controlling access to the protected area and to keys and locks are considered satisfactory.

B. Additional License Conditions

9.2.0 - Physical Protection Organization

The licensee has watchmen (not uniformed or armed) who man the Central Control Station and check access to the plutonium facility. In addition, at least one, sometimes two, utility people are utilized to conduct the two hour perimeter patrol and respond to problems. In addition, utility people observe the equipment systems, gauges, etc., but do no repair work.

The Cimarron Facility has a Health Physics Emergency Manual with documented procedures for the following emergencies:



"It is our current practice when terminating Plutonium Plant operations for a shutdown pe such as a weekend to remove all plutonium fr the processing areas into the vault prior to shutdown in order to meet those conditions re of a one hour tornado alert. In addition, si furnace loads are run out even though personn are required to work overtime, removed from th glove box and stored in the vault. It is our belief that no significantly accessible pluton remains in the processing area as a result of this practice. Plutonium remaining is that incidentally loaded onto ion columns and wettin the walls of equipment and glove boxes.

"Based upon this plant condition during a shut-down period, we, therefore, do not believe that during shutdown the plant processing area would be classified as an access area. With this interpretation, we believe it is within the intent of these security regulations that one man, i.e., the utility operator who surveys the building and ventilation equipment on a routine basis during shutdown periods, can freely move about the plutonium processing area without the assignment of a second man to remain with him.

"In the event that operations need to continue or overtime is required, it is our normal practice to assign two operators into any area for safety purposes.

"This interpretation will permit considerable additional flexibility in the assignment of personnel during plant shutdown periods."

In a letter dated June 21, 1972, from R. G. Page to W. J. Shelley, the AEC stated the following:

"We are in substantial agreement with the views set forth in your letter of May 22, 1972. When a plutonium access area is shut down temporarily in accordance with the one hour tornado alert criteria and contains no plutonium except that specified in your letter, a lone employee will be permitted to move freely about the area without

the assignment of a second man to remain with him. Accordingly, under the shutdown conditions specified above, the requirements of the first sentence in 9.3.3 of the amendment to SG-2, dated March 24, 1972, need not apply. In all other respects, however, such an area shall continue to be protected as a plutonium access area."

The storage vault area requires the presence of two authorized individuals for all receipts into and issues from the vault. The vault is locked when unmanned.

No personal vehicles are permitted within the protected area.

In addition to the requirements of the license conditions, Kerr-McGee's contract with Hanford Engineering Development Laboratory (HEDL) places an additional requirement for visitor control. This requirement is incorporated into Kerr-McGee's security program and states in part:

> "Except with prior written consent of Westinghouse Hanford and the Commission, contractor shall not permit any visitor to the contractor's plant, office or facility to view or examine the product specified to be delivered under this contract, or major sub-assemblies of such product, or to obtain information or data concerning such product."

Visitor means any person who visits contractor's plant, office or facility and does not represent either contractor, Westinghouse Hanford, or the Government in the performance of this contract.

All employees who have access to the plutonium plant have their names embossed on either a green tape, red tape or blue tape on a board mounted on the wall in the Central Control Station. With each name is a lateral switch and an embossed label indicating "in or out". A switch to the right indicates the employee to be out of the plant and if the switch is resting on the left side, the employee is in the plant. A letter U for uranium and P for plutonium after each name signifies where the individual keeps his film badge. It is the employee's responsibility to switch

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9.4.3 Non Compliance

1. No perimeter patrols conducted during normal working hours (8:00 a.m. - 4:00 p.m.).

   a. Our 3 month check (October thru December) revealed that 1 of the two other shifts (1600-2400-0000-0800) on 9 separate days showed no evidence that a perimeter patrol had been performed.

   b. Walkie - Talkie not always used (this does not give the KM employee continuous contact with central control station) when he is on perimeter patrol.

9.4.4 O.K. Pu detectors at point of entrance and exit.

9.4.5 O.K.

9.4.6 O.K.

9.4.7 Not verified - Alarms and detectors tested and proved satisfactory.

9.4.8 Non-Compliance

1. Records do not consistently document results of inspection and testing. Without documentation compliance can not be assured.

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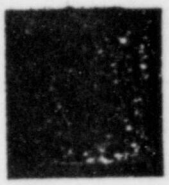
9.6.0 Communications



9.6.1 Each guard or watchman on duty shall have the capal communication with a manned central station. This the capability and authority to call for reinforcem

9.6.2 In addition to conventional telephone service, at l voice communication link shall be established betwe and the LLEA; this link shall utilize radio or some means capable of supporting two-way voice communica of offsite transmission lines.

9.6.3 All communication equipment shall have the capabili 24 hours from power sources independent of the prim the facility.

9.6.1 K.M. employee has capability of continuous communica station manned by watchman if Walkie-Talkie is utili

9.6.2 O.K. Mobile Radio Phone

9.6.3 O.K. Capability greater than requirement.

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NUCLEAR MATERIALS SAFEGUARDS INSPECTION

OF SPECIAL NUCLEAR MATERIALS AT

KERR-McGEE CORPORATION

CRESCENT, OKLAHOMA

RO INSPECTION REPORT NO. 070-1193/73-01

[redacted]

EX 3

safeguard info. →

3. License Conditions 9.4.5 and 10 CFR 73.3(k) - The plutonium vault storage area has been established as a separate plutonium access area [redacted] by a steel door at least one inch thick with a built-in lock.

4. License Condition 9.4.8 - Our review of the records indicate that testing of the intrusion alarms for operability and functional performance in all cases is not being accomplished as required.

B. Status of Prior Items of Noncompliance (reference letter to Kerr-McGee Corporation from C. D. W. Thornton dated March 6, 1972)

Contrary to 10 CFR 73.41(b), records of the results of all tests, inspections, and maintenance performed on security containers, intrusion alarms and protected areas utilized by the licensee pursuant to the requirements of 10 CFR Part 73 had not been maintained.

Status: The complete recording of intrusion alarm tests was not accomplished by the licensee, and is repeated as a current item of noncompliance with License Condition 9.4.8.

VII. DETAILS OF INSPECTION

A. 10 CFR 73

A total of three shipments of 5 kgs. plutonium were made for the inspection period for which the licensee has intransit protection responsibility. Two shipments were F. O. B. from Hanford by exclusive use truck. One of these shipments involved a custody change for which there was a hand-to-hand receipt. The third shipment was a truck shipment from the licensee to Hanford. Proper notification of ETD's and ETA's were executed with the carrier and quantity information was documented. Protective signature service was requested for all three shipments. No shipments were delayed that required a trace investigation.

The authorized individual list included the names, addresses, and telephone numbers for all authorized individuals but had not been signed by licensee management. The signature of the Facility Manager was obtained, and we requested that future listings be signed.

it was noted that the utility man did not have his "walkie-talkie" with him. He was informed that this is necessary equipment in order to have continuous communication with the manned Central Control Station during his patrol. He agreed.

The licensee has a mobile radio phone supplied by Pioneer Telephone Company tied-in with the town of Kingfisher (15 miles away). Once the operator is contacted, this back-up system has the same potential as any home or business phone.

A6R88

A six-week test period was conducted and documented by the licensee utilizing the mobile radio phone. The watchman called any of three employees daily to check out the phone. About 69 calls were completed and logged as to whom was called, date and delay experienced. These tests were discontinued in mid-December 1972. The inspection team observed a test of this phone which resulted in response from the Kingfisher operator 30 seconds after dialing.

Communication equipment dependent on the primary power source for the facility is supported by an emergency power system (diesel powered generator) capable of operating longer than 24 hours. This system is located within the protected area (15 to 20 feet within the perimeter fence).

VIII. ADDITIONAL INFORMATION

The Cimarron Facility went on strike November 30, 1972, and was still on strike during the inspection. The union on strike is the Oil Chemical and Atomic Workers Union (OCAWU). The licensee is aware that a few employees have taken other jobs and will not be returning if and when the strike is settled. As a result of the strike, the licensee has added a company pick-up truck equipped with a spot light and temporary workers to constantly patrol the licensee's property perimeter during the night hours.

J. A. Hind

J. A. Hind, Chief
Materials and Plant
Protection Branch

Enclosure:
Closeout Meeting Notes (2)

[redacted]

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FINAL MEETING NOTES

PLUTONIUM

10 CFR 73

73.31 A total of 3 shipments above 5 kgs. above 20% were made for the inspection period. Two were F.O.B shipments from Hanford by truck exclusive use. One of these shipments involved a custody change for which there was a hand receipt. The third shipment was from Kerr-McGee to Hanford with proper notifications of ETD's and ETA's, carrier and quantities documented. Protective signature service was requested for all 3 shipments.

No shipments were delayed that required a trace investigation.

73.31 Satisfactory

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PLUTONIUM

10 CFR 73

73.32 (a) Special nuclear material used only in protected area - access is controlled and authorized individuals listed for the entire Cimarron Facility (both plants) and separately for the plutonium facility.

1. The entire plant list was not signed. Signature of facility manager was obtained.

a. Suggested future lists for authorized individuals be signed.

(b) [The storage area (Vault) is in a locked building protected by intrusion alarms, detectors, and access control. [redacted]]

EX. 3

73.32 Satisfactory

Safeguards Info.

PLUTONIUM

10 CFR 73

73.33 (a) O.K. - Alarms and detectors were tested.

(b) Procedures call for intrusion alarms to be inspected and tested for performance at least every seven (7) days.

73.33 Satisfactory

73.41 (a) O.K.

(b) Non-compliance: (9-4-8)

1. Intrusion alarm inspections and tests not consistently documented.

a. Patrol log records were incomplete because perimeter patrols in some instances were not recorded for some shifts.

(c) Satisfactory records available for the 3 shipments of SNM above 5 kgs above 20% enrichment.

(d) Satisfactory procedure for access and control to keys and locks.

73.42 No unaccounted for shipments, suspected theft or unlawful diversion for period of inspection.

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9.1.0 Definitions applicable to Physical Protection Requirements

9.1.1 Except where specifically noted, the requirements contained in these license conditions are in addition to those specified in Part 73. In any case where inconsistencies may appear, the license conditions shall prevail.

9.1.2 The following terms shall have the meanings defined in 10 CFR Part 73: authorized individual, guard, lock, physical barrier, protected area, vault, and watchman.

9.1.3 "Intrusion alarm" means an electrical, electromechanical, electro-optical, electronic, or similar device capable of detecting intrusion by an individual, into a building, protected area, or plutonium access area, by means of actuated visible and audible signals.

9.1.4 "Plutonium access area" means any location within a protected area which is enclosed by a second physical barrier or substantial interior partitions, and which contains plutonium.

Non-Compliance:

9.4.3
9.4.8

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FINAL MEETING NOTES

9.3.0 Access Constraints

9.3.1 Plutonium shall be stored and/or processed only in a plutonium access area.

9.3.2 The licensee shall establish a separate plutonium access area for each vault or other location used primarily as a plutonium storage area.

9.3.3 When manned, a plutonium access area shall be manned by two or more authorized individuals shall be observed by another authorized individual. When unmanned, a plutonium access area shall be locked.

9.3.4 No personal vehicles shall be permitted within the protected area.

9.3.5 Personnel access to the protected area shall be controlled by a guard or watchman.

9.3.6 Packages entering a plutonium access area shall be searched for devices which could aid an individual in the theft or diversion of plutonium or in sabotage of a facility.

9.3.7 The licensee shall register visitors, vendors and other non-employees entering the protected area, recording name, date, time, purpose of visit, and person visited.

9.3.8 Visitors, vendors, and other non-employees shall be escorted by a guard, watchman, or authorized individual while within the protected area.

9.3.9 Access to each plutonium access area shall be under the control of an authorized individual and access shall be limited to individuals who require such access to perform their duties.

9.3.10 Keys, locks, combinations, related equipment information shall be promptly changed whenever there is a possibility of their having been compromised, and on termination of any employee having access to keys, locks and combinations, etc.

Comply plus combinations change monthly by maintenance and documented. Personnel on strike have no keys to Pu Bldg.

9.3.1 O.K.

9.3.2 O.K.

9.3.3 O.K.

9.3.4 O.K.

9.3.5 O.K.

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9.3.6 O.K.

9.3.7 O.K. logs reviewed

9.3.8 O.K.

9.3.9 O.K.

[redacted]

FINAL MEETING NOTES

9.6.0 Communications

9.6.1 Each guard or watchman on duty shall have the capability of continuous communication with a manned central station. This individual shall have the capability and authority to call for reinforcements.

9.6.2 In addition to conventional telephone service, at least one other two-way voice communication link shall be established between the central station and the LLEA; this link shall utilize radio or some other electromagnetic means capable of supporting two-way voice communication and must be independen of offsite transmission lines.

9.6.3 All communication equipment shall have the capability of operating for 24 hours from power sources independent of the primary power source for the facility.

9.6.1 K.M. employee has capability of continuous communication with control station manned by watchman if Walkie-Talkie is utilized on patrols.

9.6.2 O.K. Mobile Radio Phone

9.6.3 O.K. Capability greater than requirement.

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70-1193

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INSPECTION REPORT NO. 070-1193/73-01, PHYSICAL PROTECTION REPORT, KERR-McGEE CORPORATION, CRESCENT, OKLAHOMA, DOCKET NO. 70-1193

The inspection consisted of an examination of the licensee's compliance with the physical protection requirements of the safeguards amendment to License No. SNM-1174 and with the requirements of 10 CFR 73.

The Directorate of Licensing amended License Condition No. 9.4.1 on February 23, 1973, to permit the licensee's emergency power equipment to be located within the cleared area inside the perimeter fence. Hence, Item 2 of the subject report relating to the power equipment was not cited as an item of noncompliance.

There were no other substantive comments as a result of Headquarters M&PPOB staff review.

/S/

Erick L. May, Jr.
Chemist/Statistician
Materials and Plant Protection
Operations Branch
Directorate of Regulatory Operations

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NUCLEAR MATERIALS SAFEGUARDS INSPECTION

OF SPECIAL NUCLEAR MATERIALS AT

KERR-McGEE CORPORATION

CRESCENT, OKLAHOMA

RO INSPECTION REPORT NO. 070-1193/73-01

a. Fire

b. Criticality

c. Severe weather

d. Accidental release of hazardous material

e. Accident investigation and reporting

f. Electrical failures

The inspection team informed management that procedures documenting the command and responsibility structure during both normal and threat situations should be incorporated in this manual.

9.3.0 - Access Constraints

Plutonium is stored and processed only in plutonium access areas.

The plutonium facility has been divided into two access areas. One encompassing all production and laboratory areas and one including only the vault storage area.

The licensee's procedures state that the plutonium access areas are to be manned by two or more individuals at all times plutonium is not in locked storage. When plutonium process materials have been transferred to and locked in wall storage and vault storage during one hour alert weather status or shutdown conditions requiring no operating staff, a Safeguard Release for Single Occupancy in Plutonium Access Area is to be filled out by the supervisors of the wet process area, fabrication area, and laboratory areas. The completed form is then transmitted to the watchman to inform him that plutonium is in locked storage and one man may be allowed in the plutonium process area. The watchman is to keep in contact with the person in the process area on an hourly basis.

In a letter dated May 22, 1972, from W. J. Shelley, Director, Regulation and Control, Nuclear Division, Kerr-McGee Corporation to R. G. Page, Chief, Materials and Plant Protection Branch, DOL, the licensee stated the following:

"It is our current practice when terminating Plutonium Plant operations for a shutdown period such as a weekend to remove all plutonium from the processing areas into the vault prior to shutdown in order to meet those conditions required of a one hour tornado alert. In addition, sintering furnace loads are run out even though personnel are required to work overtime, removed from the glove box and stored in the vault. It is our belief that no significantly accessible plutonium remains in the processing area as a result of this practice. Plutonium remaining is that incidentally loaded onto ion columns and wetting the walls of equipment and glove boxes.

"Based upon this plant condition during a shutdown period, we, therefore, do not believe that during shutdown the plant processing area would be classified as an access area. With this interpretation, we believe it is within the intent of these security regulations that one man, i.e., the utility operator who surveys the building and ventilation equipment on a routine basis during shutdown periods, can freely move about the plutonium processing area without the assignment of a second man to remain with him.

"In the event that operations need to continue or overtime is required, it is our normal practice to assign two operators into any area for safety purposes.

"This interpretation will permit considerable additional flexibility in the assignment of personnel during plant shutdown periods."

In a letter dated June 21, 1972, from R. G. Page to W. J. Shelley, the AEC stated the following:

"We are in substantial agreement with the views set forth in your letter of May 22, 1972. When a plutonium access area is shut down temporarily in accordance with the one hour tornado alert criteria and contains no plutonium except that specified in your letter, a lone employee will be permitted to move freely about the area without

the assignment of a second man to remain with him. Accordingly, under the shutdown conditions specified above, the requirements of the first sentence in 9.3.3 of the amendment to SG-2, dated March 24, 1972, need not apply. In all other respects, however, such an area shall continue to be protected as a plutonium access area."

The storage vault area requires the presence of two authorized individuals for all receipts into and issues from the vault. The vault is locked when unmanned.

No personal vehicles are permitted within the protected area.

In addition to the requirements of the license conditions, Kerr-McGee's contract with Hanford Engineering Development Laboratory (HEDL) places an additional requirement for visitor control. This requirement is incorporated into Kerr-McGee's security program and states in part:

"Except with prior written consent of Westinghouse Hanford and the Commission, contractor shall not permit any visitor to the contractor's plant, office or facility to view or examine the product specified to be delivered under this contract, or major sub-assemblies of such product, or to obtain information or data concerning such product."

Visitor means any person who visits contractor's plant, office or facility and does not represent either contractor, Westinghouse Hanford, or the Government in the performance of this contract.

All employees who have access to the plutonium plant have their names embossed on either a green tape, red tape or blue tape on a board mounted on the wall in the Central Control Station. With each name is a lateral switch and an embossed label indicating "in or out". A switch to the right indicates the employee to be out of the plant and if the switch is resting on the left side, the employee is in the plant. A letter U for uranium and P for plutonium after each name signifies where the individual keeps his film badge. It is the employee's responsibility to switch

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himself in and out of the plant each time he enters or leaves while the guard observes his picture badge. At the end of the working day each day shift employee working in the plutonium building will have switched out and surrendered his film badge (if a plutonium plant worker). If normally a uranium employee, the film badge will be dropped off at the front reception desk at the uranium building, but his switch will be on the out position at the plutonium plant.

The green tape personnel have unlimited access and includes supervisory and management personnel who have completed the required health physics training and are the qualified escorts. The red tape personnel have also completed the necessary safety training and have access without escort only during duty hours. If a red taped employee was to work other than his normal work hours, he must notify the watchman, be escorted by a supervisor, sign the employee log book and switch in. The escort supervisor would also sign the employee log as escort and when the employee leaves, he would sign out and switch out. The blue tape personnel are licensee personnel with semi-limited access and are not regularly assigned to the plutonium plant. They must inform the watchman whom they wish to see and the watchman will inform that individual. If the blue taped individual has a V following his name (licensee employee who occasionally visits the site) he will be issued a visitor's badge, require an escort, switch in and sign the visitor's log. Another access category is licensee personnel whose names do not appear on the switchboard. These personnel are handled as visitors and must sign the visitor's log and be escorted. Plant employees who forget their badges are issued visitor badges and in addition to switching in, must sign employee's log.

Both vendors and visitors must first sign in at the receptionist's desk at the uranium plant before entry into the plutonium plant. Visitors and vendors are escorted and vendors are not permitted in the processing areas.

Plutonium is never removed from the plutonium plant unless it is being externally shipped or intended for burial. Material determined for burial is put in a

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locked burial van located at the loading dock (within the perimeter fence until there is enough to comprise a shipment).

A memo from the Facility Manager to all plutonium plant personnel requires all packages, lunchboxes and brief cases for all licensee employees and visitors to be opened and inspected by the watchman.

Vehicles entering the protected area are searched for devices which could aid in sabotage.

Combinations to locks on the change room and vault are changed monthly by maintenance personnel and recorded. With the inception of SG-2, lock tumblers for the front door lock and two gate padlocks (truck and sample window gates) were changed. Master keys to these locks are in the possession of the plant superintendent, process engineer, and the engineer maintenance man. The remaining three master keys are in the Security Vault. Locks will be changed if any employee holding a key should terminate. The inspection team was assured that none of the personnel now on strike have keys to either plant.

The inspection team observed access procedures, reviewed authorized individual lists, watchmen and visitor logs, key and lock controls and access constraints on the plutonium building and concluded them to be satisfactory.

9.4.0 - Detection Aids

A tour of the plutonium plant perimeter fence was conducted by the inspection team. The fence is constructed of No. 9 American wire gauge and has an overall height including three barbed wire strands of not less than eight feet. The top brackets angle outward.

The perimeter fence has six gates with the truck gate and laboratory gate being used more often. The remaining four gates are crash gates used only if there is a criticality alarm or practice criticality drill. The truck and laboratory gates are secured with a six point master key lock. The remaining four gates are secured with a horizontal lock bar attached to the gate latches and a vertical steel post about four feet inside

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the fence. This lock bar is hinged with a bolt containing a lead seal at the point it is attached to the vertical post.

The following objects were noted within the perimeter fence:

1. Permanent cement structure housing transformers and the emergency power supply system located within fifteen to twenty feet of the inside of the perimeter fence on the east side of the plutonium plant. The structure is approximately twenty feet long, seven feet high, and seven feet wide. The structure can not be seen from the watchman's Central Control Station and could easily conceal an individual. This is in noncompliance with License Condition 9.4.1.

   A letter from P. S. Dunn, Group Vice President, Kerr-McGee Corporation, to R. G. Page, Chief, Materials and Plant Protection Branch, AEC Headquarters, dated June 30, 1972, forwarded a pro forma statement and description of the revised security system for the licensee's Cimarron Plutonium Plant. In this security system description, the licensee recognizes that the only exception to the 50 foot clear space inside the fence is the location of emergency generator and transformers on the east side of the plant. This system description also indicates this problem was discussed with the AEC and that moving this fence would result it being located in a gulley and the perimeter would be out of line of sight.

   We discussed this problem with Mr. Carl B. Sawyer, Materials and Plant Protection Branch, Directorate of Licensing. Mr. Sawyer said that at this time, the licensee's position in this matter has been accepted in lieu of moving the fence and final resolution is being considered by Directorate of Licensing.

2. Eight 55-gallon drums of liquid solvents approximately ten feet from the inside southwest corner of the fence. The licensee was told by the inspection team that these drums should be removed

since they are objects that would aid in concealing an individual and are within 50 feet of the inside of the perimeter fence. At the time of writing this report, these drums had not been removed. This is in noncompliance with License Condition 9.4.1.

3. Pipe and metal along the west side of the perimeter fence. These items are low profile and would not conceal an individual.

Evidence of soil erosion was noted on the north and east side of the fence, but was not severe enough to permit entrance without digging. The bottom of the fence does not go into the ground (about a two inch space). This combined with easy digging could permit access. The inspection team suggested this be corrected.

The inspection team in conjunction with the plant security officer, participated in a night perimeter patrol to inspect perimeter lighting. The lighting is considered very satisfactory and capable of detecting an intruder in the adjacent as well as the fenced-in area.

No perimeter patrols are conducted by the licensee during the day shift. The licensee was cited for noncompliance with License Condition 9.4.3. Only perimeter patrols were being performed by the licensee for the period 1600 to 0800 hours (two shifts).

Results of the licensee's perimeter fence inspections are recorded on patrol check log sheets. We inspected the sheets generated during the October through December 1972 period to determine if the required number of inspections had been performed during the two off-hour shifts (1600 - 2400 and 0000 - 0800). Missing entries on nine separate days were noted. At two-hour intervals, four entries would be required for each shift or eight entries per two shifts. In 92 days (three months) there should have been 736 entries. We accounted for only 700 entries or 36 entries less. Thirty-two of these 36 missing entries occurred on eight days during the period November 30 through December 25, 1972. The plant was on strike during this period. The remaining four entries were missing on the patrol check log dated October 19, 1972.

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The plutonium building is equipped with [redacted] the laboratory window and the loading dock. In addition, plutonium detectors with a sensitivity of .1 gram plutonium are located at the point of personnel entrance and exit (Central Control Station) inside the air-locked doors of the do[redacted] and the laboratory sample window. Packages and vehicles are inspected by the watchmen before exiting the protected area.

Safeguards Info. EX 3

The [redacted] is in the on position at all times except when the watchman is notified of activation because of a receipt or shipment. In addition to the [redacted]

Safeguards Info. EX 3

The plutonium storage vault, required by License Condition 9.3.2 to be a separate plutonium access area, is not protected by an intrusion alarm. This is in noncompliance with License Condition 9.4.5.

The inspection team in conjunction with the plant security officer, tested all plutonium detectors and intrusion alarms. One member of the inspection team participated in the testing while the other member remained at the Central Control Station to confirm creditability of the alarm systems. Each alarm and detector annunciated loud and clear at the points checked and at the Central Control Station. In addition, respective lights flashed for the numbered alarms at the Central Control Station. The auditory alarm, with lights for location, in the administrative area also annunciated during the tests.

Our review of the watchman's log for three months revealed only two occasions when results of tests, inspections and maintenance on intrusion alarms were recorded. Therefore, the licensee was cited for noncompliance with License Condition 9.4.8. Review of such records is the only method by which the inspection team can ascertain that the required intrusion alarm tests and inspections are being performed.

9.5.0 - Response

The watchmen have procedures, and have had some individual instructions by the plant security officer, but have had no formal training. The primary action of the watchmen in a threat situation is to contact a supervisor (during normal work hours) and utility personnel (during off-hours) responsible for perimeter patrols, unauthorized removal and sabotage.

Protection of the plant against sabotage and unauthorized removal of SNM is a combined effort of watchmen, supervisors and utility personnel. It was suggested that periodic training be conducted for these personnel for familiarity of procedures and such training sessions be documented.

The licensee has established liaison with local law enforcement authorities. With normal telephone service Crescent, Oklahoma, can respond in five minutes; Guthrie, Oklahoma, in 10 minutes; and Kingfisher, Oklahoma, in 15 minutes. The Highway Patrol responsible for Logan County can respond as quickly as 10 minutes or as long as 42 minutes depending on their location.

During this inspection, the inspection team did not request the licensee to test these response times since prior attempts by the licensee to test the response times have not been successful. These local law enforcement agencies have assured response and cooperation if help is needed.

Watchmen at present have no access to the processing areas (health physics orientation planned), but through telephone, "walkie-talkie," and the public address system, the watchmen have continuous contact with supervisors and utility employees who are capable of responding to an alarm within five minutes.

9.6.0 - Communications

Watchmen continuously man the Central Control Station and have communication capability and authority to call for reinforcements. During the inspection team's participation in the licensee's night perimeter patrol,

This page can be released in its entirety

[redacted]

NUCLEAR MATERIALS SAFEGUARDS INSPECTION
OF SPECIAL NUCLEAR MATERIAL AT
KERR-McGEE CORPORATION
CIMARRON PLUTONIUM FACILITY
CRESCENT, OKLAHOMA

SNM-1174 DOCKET NO. 70-1193

RO INSPECTION REPORT NO. 73-03

SECTION I

I. Inspection dates: February 21 through February 23, 1973 and March 12 through March 16, 1973.

II. Inspection period: January 17, 1972 through March 12, 1973.

III. AEC personnel participating in the inspection were:

J. A. Hind
C. C. Peck
A. G. Finley
J. P. Patterson

IV. Report prepared by: J. A. Hind

V. Date report prepared: March 27, 1973

VI. SUMMARY OF FINDINGS

A. Items of Noncompliance:

1. License Condition 3.4 - A report, dated February 15, 1973, was issued by the licensee to comply with this license condition, but the report did not include a quantitative calculation of limits of error of the measurement system.

2. License Condition 3.7 - This license condition was effective on August 1, 1972. A report of the results of the licensee measurement evaluation within six months after commencing operations on the FFTF project has not been submitted to AEC, Headquarters.

[redacted]

3. License Condition 6.5 - The licensee has not closed a material balance around plutonium in process at intervals not to exceed thirty days.

4. License Condition 7.1 - Material balance area and plant records are not being reconciled at the end of each accounting period.

5. License Condition 8.1 - A report dated September 28, 1972, outlined the findings of an internal audit of the safeguards and measurement and limit of error program, but an internal review of the remaining parts of the special nuclear material control system has not been conducted during the inspection period. In fact, no such review has been conducted since the origination of the plutonium facility. The licensee stated this type of review will be conducted by the corporate internal auditing department within the next couple of months.

B. Status of Prior Items of Noncompliance (reference letter to Kerr-McGee Corporation from C. D. W. Thornton, dated March 6, 1972).

1. Contrary to Condition 8.1 an independent internal review of the nuclear materials control procedures and management of the overall system of special nuclear material control had not been conducted within the last 12 months following the last review.

   Status: The licensee is still not in full compliance with this license condition since the nontechnical portion of such a review had not been performed during the last 12 months. This noncompliance item is repeated.

2. It appears that certain of your activities were not in full compliance with the requirements of 10 CFR Part 70 in that contrary to 10 CFR 70.54 and the instructions for completing and distributing Form AEC-741:

   a. Limits of error were not included on the forms documenting receipts;

   b. Limits of error for shipments were not reflected on the licensee's record copy of the form; and

   c. All forms for receipts were not completed and distributed within the time period specified.

Status: These noncompliance items were corrected during the inspection period, and therefore, were not reported.

3. It was also noted that you had not followed the special instructions (letter R. G. Page, NMS, to G. E. Wuller, Kerr-McGee dated February 2, 1971) for maintaining records and reports under an assigned RIS (YUW) for nuclear material of Canadian origin.

Status: This situation was corrected prior to this inspection and therefore is not repeated. The licensee has no Canadian owned nuclear material at this time.

C. Licensee personnel furnishing information on the items of noncompliance were: Ray Janka, Gavin Mallet, Bill Shelley, Don Bristol, and Fred Welch.

J. A. Hind

J. A. Hind, Chief
Materials and Plant Protection Branch

MEASUREMENTS AND STATISTICAL CONTROLS

The licensee shall determine the U-235, U-233, and/or Pu content of all receipts, shipments, intentional discards and material inventoried, along with the limits of error associated with these quantities. The licensee shall make sufficient measurements to substantiate the stated quantities and associated limits of error. Measurements are not required on items which have been determined by other means to contain less than ten (10) grams U-235, U-233, and/or Pu each. Limits of error as used herein means the boundaries within which the true or best value of the parameter being measured lies with a probability of 95%.

A program of standarization and calibration of measurement equipment and analytical procedures shall be maintained to provide data to substantiate the limits of error associated with all measurements required for safeguards purposes.

All measurements required by this amendment shall be reviewed annually by the Manager, Administration and Accountability. This review shall include a quantitative calculation of limits of error of the measurement system. The Manager, Administration and Accountability, shall utilize data obtained through calibrations specified in Codition 3.2 to monitor performance of the measurement system to assure calculated limits of error are maintained between reviews. Records of reviews, calculations, and use of calibration data shall be kept by the Manager, Administration and Accountability.

After any physical inventory the material unaccounted for (MUF) and the limits of error associated with the material unaccounted for shall be computed promptly. The limits of error associated with MUF shall be calculated by statistically combining the limits of error determined for shipments, receipts, beginning inventory, ending inventory, and measured losses for the period since the last inventory.

If the quantity of MUF exceeds the associated limits of error, the licensee shall promptly notify the Atomic Energy Commission, Division of Nuclear Materials Safeguards, District II, Oak Ridge, Tennessee. The licensee shall investigate the MUF and notify the Division of Nuclear Materials Safeguards within thirty (30) days after the initial notice, specifying the probable reasons for the MUF and the corrective action taken or planned.

Loss Mechanisms Review - October 1972 selected for verification of back-up data for losses - review not complete.

ITS:

eral, we're satisfied with measurements being made on receipts, shipments, ds, and material on inventory except UF_6 receipts.

<u>full compliance (UF_6) - 3.1</u>

rs %U values being accepted without downstream correlation being made to the values. This has to be done in order to accept the %U values. Other tives: (1) set up own sampling station and analyze own samples (2) obtain ntative sampels from AEC and have them analyzed by independant lab and values on 741 and in control records.

<u>full compliance with 3.3</u> because annual review dated 2/15/73 made to comply 3 did not include quantitative calculation of LE of measurement system. as no validation or updating of LE values or factors used for receipts, ts, discards, and inventory LE calculations

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3.0 MEASUREMENTS AND STATISTICAL CONTROLS (cont'd)

during the inspection period. We think most of the data has been generated from various control programs, but as stated, the data has not been utilized in current LE calculations. In fact, for this inventory, same data generated by Heagerty last year for his inventory calculations will have to be utilized for this inspection period inventory. There has been extensive compositing of scrap during the inspection period and quite a bit of it is on this inventory. Some studies by Mallet are now beginning to determine uncertainites associated with this procedure.

Think that an extensive review of this system is needed to establish flow of measurement and standardization data to the end product of LE_{MUF} and this review should include the writing of necessary procedures to define the programs. Computerized system similar to the plutonium system is being planned for the uranium facility, but I don't think you can wait for this.

Emphasize: (1) the need for procedures outlining areas of responsibility (2) types of information needed for LE calculations (3) procedures by which 3.3 will be complied with (annual review, monthly, etc.).

3.4 - LE_{MUF} will be calculated. 2-3 weeks after Pu calculations which will take 1-1.5 months.

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4.0 SHIPPING AND RECEIVING

4.1 All shipper-receiver differences shall be brough to the attention of the Manager, Administration and Accountability, who shall evaluate these differences to determine whether they are statistically significant and of sufficient magnitude to warrant investigation. The Manager, Administration and Accountability, shall investigate all statistically significant differences which exceed $500 value. A shipper-receiver difference shall be considered statistically significant when (1) the difference exceeds the statistical combination of the limits of error of the shipper's and receiver's measurements, or (2) if the shipper's limit of error is unknow, the difference exceeds twice the limits of error for the receiver's measurement. Statistical analyses of past performance, measurement uncertainties, and other data shall be kept by the Manager, Administration and Accountability.

COMMENTS

S/R differences being evaluated by the above procedures. Our review indicates no significant S/R's that have not been investigated.

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5.0 STORAGE AND INTERNAL TRANSFERS

5.1 A documented system of control over special nuclear material stored and processed within the facility shall be maintained which will provide continuous knowledge of the location and quantity of all material contained in discrete, identificable items or containers.

5.2 All transfers of special nuclear material between MBA's shall be documented to show the identity, quantiy, and isotopic analysis of the material transferred. A system of controls shall be maintained by the licensee for the distribution and accounting of all transfer documents.

5.3 Each document supporting a transfer of material between MBA's shall be signed by the delegated individual.

COMMENTS:

5.1 - Check of production logs indicate the information in the logs will identify and locate discrete items if job identification and enrichment are know. Not stated in the license condition but implied (we think) is a method by which a system can be tested and records maintained of such test. Best time to test the system is at inventory time.

5.2 - Transfers between MBA's (75% U-235 and < 5% U-235) are practically nonexistent. During inspection period, seven transfers were made from the 75% U-235 to the <5% U-235 MBA. Six of these transfers were accomplished by journal entries and one by transfer document. Because of limited activity between MBA's, we have no significant problem with these six transfers being accomplished by means other than transfer documents. Internal transfer documents have been issued for possible use and were accounted for.

5.3 - Documents supporting the transfers were signed (initialed journal entires) by delegated individual.

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6.0 INVENTORY

6.1 A complete physical inventory of all special nuclear material subject to this license shall be conducted annually, but in no case shall more than fourteen months elapse between inventories.

6.2 Prior to each complete physical inventory, written procedures shall be prepared which:

6.2.1. specify the extent to which each MBA is to shut down and clean out process equipment;

6.2.2. specify the extent to which each MBA is to remain static during the inventory;

6.2.3. identify the basis for accepting for inventory purposes previously made measurements and their limits of error;

6.2.4. designate measurements to be made for inventory purposes to establish and demonstrate the limits of error associated with the quantity of material on inventory; and

6.2.5. identify the manner by which material on inventory will be listed to assure each item is inventoried and there are no duplications or omissions.

6.3 The book inventory shall be reconciled with and adjusted to the results of the physical inventory upon completion of the physical inventory.

6.4 Special physical inventories of an MBA shall be conducted whenever there is reason to believe that subsequent to the last prior physical inventory a particular MBA has experienced losses or gains that are different by a statistically significant amount from those expected.

6.5 Number of samples taken and results of gamma count and checkweighing.

CAT. I - 37 CAT. II - 34 CAT. III - 38
Total - 109 All to NBL.

COMMENTS:

6.1 - OK

6.2 - Written procedures covered outlined items.
Our checks indicate very satisfactory clean-up for inventory.

6.3 - book reconciled with and adjusted to results of physical

6.4 - no special inventories taken.

This page can be released in total

7.0 RECORDS AND REPORTS

7.1 The licensee shall establish and maintain a records system which will provide sufficient information to maintain a material balance around each MBA and the total plant. These records shall contain information pertaining to all receipts, shipments, measured discards, inventory, and MUF for each material balance. MBA and plant records shall be reconciled at the end of each accounting period. All entries in the records shall be supported by appropriate documents.

7.2 All measured discards and MUF shall be reported on a monthly basis by the Manager, Administration and Accountability, to the Cimarron Facility Manager.

7.3 The licensee shall report on a monthly basis all intentional discards and material unaccounted for. The MUF shall be that which has been determined during the month as a result of completing a material balance around a single operation, a number of operations or the entire plant. This report shall be made within fifteen (15) days after the end of the month in which the discard was made or the material unaccounted for was determined. Reports shall be sent to the U. S. Atomic Energy Commission, Division of Nuclear Materials Safeguards, District II, Oak Ridge, Tennessee. Each report shall be identified by the Reporting Identification Symbol(s) (RIS) assigned to the licensed operations and shall include a statement of the nature of the discards, the probable reasons for the MUF and any actions taken or planned with respect to the MUF.

7.4 (a) 70.42 - transfer to authorized recipients

~~(b) 70.51(a) - detailed control records~~
(b) 70.53 - status reports
(c) 70.54 - transfer documents

COMMENTS:

7.1 - total plant records - OK

5% U-235 MBA; approx. 14 kgs U-235
5% U-235 MBA: approx. 1338 kgs. U-235

MBA records can't be reconciled with control because losses and adjustments aren't in MBA records but since the 75% contains small amount of total inventory and limited activity, the isolation of losses can be accomplished and reported by use of job ledgers. Also this > 5% material in this MBA is becoming smaller and will probably eventually disappear. Therefore, the required reconciliation of MBA and total plant records that isn't being done will not be reported as noncompliance. If the > 5% U-235 account becomes active from the standpoint of activity other than downgrading, this will not be the case, and reconciliation will be expected; crosscheck would be necessary.

7.2 - OK
7.3 - OK
70.42 - OK
70.53 - OK
70.54 and special instructions for completing 741 documents:
Not in full compliance: Not all AEC-741's documenting receipts were dispatched within the required time limit; 18 documents (UF_6); ranged from 35 days to 6 mos. Material preordered and is in yard for varying periods of time before feeding and obtaining measurement values. If think necessary - ask for exception from Licensing.

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NUCLEAR MATERIALS SAFEGUARDS INSPECTION
OF SPECIAL NUCLEAR MATERIAL AT
KERR-McGEE CORPORATION
CIMARRON PLUTONIUM FACILITY
CRESCENT, OKLAHOMA
SNM-1174

Close-out Meeting notes with Management - Date: 3/16/73

Preliminary Meeting

K-M	AEC
R. Janka	J. Hind
F. Welch	C. Peck
G. Mallet	A. Finley
D. Cotham	J. Patterson
M. Hodo	

Final Meeting

K-M	AEC
W. Moore	J. Hind
W. Shelley	C. Peck
M. Binstock	A. Finley
D. Rhodes	
J. Marler	
D. Bristol	
R. Janka	
G. Mallet	
T. Clanton	

MISCELLANEOUS

Inspection Period: 1/17/72 - 3/12/73 Dates Field Work Performed: 2/21-23/73, 3/12-16/73

Inventory Date: 3/12/73

8.0 MANAGEMENT OF MATERIALS CONTROL SYSTEM

8.1 Licensee management, independent of the Manager, Administration and Accountability, shall conduct, at least once each year, an internal review of the nuclear materials control procedures and management of the overall system of special nuclear material control and report the findings to the Cimarron Facility Manager.

8.2 An estimate of anticipated losses (measured discards plus MUF) for each period of time between inventories shall be prepared for each MBA, with the concurrence of the Manager, Administration and Accountability, and shall be based on prior experience, throughout quantities and rates, etc. If losses exceed the estimate of those anticipated, they shall be investigated by the Manager, Administration and Accountability, and the results of his investigation shall be reported to the Cimarron Facility Manager.

8.3 Any apparent loss of a discrete item or container of special nuclear material which cannot be resolved by an immediate investigation shall be reported to the Manager, Administration and Accountability, who shall prompty notify the Atomic Energy Commission, Division of Nuclear Materials Safeguards, District II, Oak Ridge, Tennessee, and shall conduct an investigation of the loss. The Manager, Administration and Accountability, shall report the results of his investigation to the Cimarron Facility Manager.

COMMENTS:

8.1 - Internal review commenced 4/19/72 - report issued 6/9/72. Conducted by Internal Auditing Department, K-M Corp. This review did not indlude measurement & LE's. We consider audit performed by Heagerty and Mallet (report issued September 19, 1972) as completing the required internal review.

8.2 - OK

8.3 - No apparent loss of discrete item reported.

1.0 FACILITY ORGANIZATION

1.1 The Cimarron Plutonium Plant Manager shall develop, revise, implement, and enforce the nuclear material control procedures and manage an overall system of special nuclear material control.

1.2 Nuclear material control procedures and revisions thereto shall be approved by the Cimarron Plutonium Plant Manager, and the Manager, Administration and Accountability. A manual containing all current nuclear material control procedures shall be maintained by the Manager, Administration and Accountability.

1.3 The Manager, Administration and Accountability, shall assure that the nuclear material control procedures are appropriately reflected in process specifications, manufacturing instruction, standard operating procedures, or similar detailed management instructions.

1.4 All delegations of safeguards responsibilities by the Cimarron Plutonium Plant Manager shall be in writing.

COMMENTS:

1.1 OK when considering Manual, LE Manual (both being revised) and SOP's
1.2 issued by the Safeguards group

1.3 - Formalize method with document controlofficer by which he asks the preparer of SOP's what areas of responsibility are involved in the pertinent SOP's and if nuclear material control is involved, include Manager, Administration and Accountability in the list of necessary review and approval signatures.

1.4 - OK

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2.0 FACILITY OPERATION

2.1 Material Balance Areas (MBA's) shall be established by the Manager, Administration and Accountability.

2.2 Each MBA shall be an identifiable physical area into and out of which movement of special nuclear material can be measured.

2.3 Sufficient numbers of MBA's shall be established so that losses of special nuclear material can be identified and localized.

2.4 All operations within an MBA shall be the responsibility of a single employee who shall also be responsible for the custody of special nuclear material within his MBA.

2.5 All operations on FFTF material shall be performed completely independent of other operations such that no other special nuclear material becomes mixed with FFTF material.

2.6 Possession limits (10 CFR 70.41)

Authorized Limits	Possession
360 Kgs Pu	117.5 Kgs Pu (Book as of 3/12/73)
1.1 Kgs U-235	0

COMMENTS:

2.1 - For this inspection period, four MBA's including MBA for enriched uranium; planning 8 MBA's including enriched U as an MBA.

2.2 - OK

2.3 - OK

2.4 - OK

2.5 - Ok; only approximately 1 KG Pu in privalety owned.

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UREMENTS AND STATISTICAL CONTROLS

The licensee shall determine the U-235, U-233, and/or Pu content of all receipts, shipments, intentional discards and material inventoried, along with the limits of error associated with these quantities. The licensee shall make sufficient measurements to substantiate the stated quantities and associated limits of error. Measurements are not required on items which have been determined by other means to contain less than ten (10) grams U-235, U-233, and/or Pu each. Limits of error as used herein means the boundaries within which the true or best value of the parameter being measured lies with a probability of 95%.

3.2 The frequency and quality of the measurements made to comply with the license conditions shall be controlled so that the limits of error associated with the plutonium material unaccounted for (LE_{MUF}) for the 30-day period does not exceed the larger of (a) 200 grams plutonium or (b) 0.5% of either the additions to or removals from the plutonium in process for the month, whichever is greater.

3.3 A program of standardization and calibration of measurement equipment and analytical procedures shall be maintained to provide data to substantiate the limits of error associated with all measurements required for safeguards purposes.

3.4 All measurements required by this amendment shall be reviewed annually by the Manager, Administration and Accountability. This review shall include a quantitative calculation of limits of error of the measurement system. The Manager, Administration and Accountability, shall utilize data obtained through calibrations specified in Condition 3.2 to monitor performance of the measurement system to assure calculated limits of error are maintained between reviews. Records of reviews, calculations, and use of calibration data shall be kept by the Manager, Administration and Accountability.

3.5 After any physical inventory the material unaccounted for (MUF) and the limits of error associated with the material unaccounted for shall be computed promptly. The limits of error associated with MUF shall be calculated by statistically combining the limits of error determined for shipments, receipts, beginning inventory, ending inventory, and measured losses for the period since the last inventory.

3.6 If (i) the quantity of plutonium MUF exceed its associated limits of error, or (ii) the limits of error associated with the plutonium MUF (LE_{MUF}) exceed the limit specified in Condition 3.2, the licensee shall promtly notify the Atomic Energy Commission, Directorate of Regulatory Operations, Region III, Glen Ellyn, Illinois. The licensee shall conduct an investigation and notify the Directorate of Regulatory Operations, Washington, D. C., within thirty (30) days after the intital notice, specifying the probable reasons for the excessive values and the corrective action taken or planned.

3.7 The measurement review required by Condition 3.4 of the safeguards amendment to this license, shall be performed within six months after commencing operations on the FFTF project, insofar as this condition applies to measurements made on FFTF project plutonium. The licensee shall submit to the U. S. Atomic Energy Commission, Directorate of Regulatory Operations, Washington, D.C., within thirty (30) days after the evaluation, a report of the results of the evaluation.

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3.8 At the completion of the FFTF project the licensee shall submit to the U. S. Atomic Energy Commission, Directorate of Regulatory Operations, Washington, D.C., a report which summarizes all components of the material balance for the project; the limits of error for each component, the cumulative material unaccounted for and the cumulative limits of error for the material unaccounted for. This report shall be submitted within sixty (60) days after the last product shipment is made.

COMMENTS:

Comments on these sections pertained to the limited activity experienced by the licensee during this inspection period.

3.1 - For this inspection period activity we feel sufficient measurements have been made to substantiate stated quantities of material in different material balance elements (receipts, shipments, etc). The LE's on these receipts, shipments etc. were essentially calculated on a receipt by receipt basis, etc. The ending inventory LE calculations will be reviewed after submitted.

3.2 - No 30-day period balances reported on activity during the inspection period, therefore this LE_{MUF} criteria has not been applied. We did not evaluate your system to ascertain if it would meet this criteria. The "proof of the pudding" is when you start evaluating 30-day LE_{MUF} values against the criteria. K-M contends this criteria is too stringent and would require monthly investigations. New procedures being proposed by K-M to Directorate of Licensing.

3.3 - Program of standardization and calibration of measurement and analytical procedures involving material activity during this inspection period, we feel, is satisfactory. Questions we had concerning the LE manual (some of the same ones aked by Hdqts) are in general being answered with the submission of new LE procedures.

3.4 and 3.7 - Not in full compliance since the review dated 2/15/73 made to comply with 3.4 did not include a quantitative calculation of limits of error of measurement system and in connection with 3.7, the required measurement review report has not been submitted to Headquarters as required. Effective date of 3.7 was August 1, 1972.

3.5 - Applies to 30 day inventory period but no 30 day inventories taken. Since January 1972, physical inventories taken on March 18 and July 7, 1972. The resulting March 18 MUF was not booked but the MUF from the July 7 inventory was booked and LE_{MUF} calculations for the period January - July 7, 1972 were made. This period calculation will be for the period July 8, 1972 through March 12, 1973. We will review your calculations for this period after they have been made.

3.6 - Only criteri (i) will be applicable since no 30 day inventories reported. Discussion about the fact that a 6 month LE_{MUF} does not have to be calculated.

3.8 - Not applicable yet.

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4.0 SHIPPING AND RECEIVING

4.1 All shipper-receiver differences shall be brought to the attention of the Manager, Administration and Accountability, who shall evaluate these differences to determine whether they are statistically significant and of sufficient magnitude to warrant investigation. The Manager, Administration and Accountability, shall investigate all statistically significant differences which exceed $500 value. A shipper-receiver difference shall be considered statistically significant when (1) the difference exceeds the statistical combination of the limits of error of the shipper's and receiver's measurements, or (2) if the shipper's limit of error is unknown, the difference exceeds twice the limits of error for the receiver's measurement. Statistical analyses of past performance, measurement uncertainites and other data shall be kept by the Manager, Administration and Accountability.

4.2 The licensee shall retain a sample of pellets for the Directorate of Regulatory Operations from each shipment, identical to that taken for his measurements.

4.3 Except for ultimate products, no plutonium shall be transferred or disposed of until written approval of the controls and measurements involved is granted by the Directorate of Regulatory Operations, Washington, D.C.

COMMENTS:

4.1 - Two major shipments received on which LE of receiver's values calculated. The first receipt (HUA-YEC#2; S/R difference of 395 grams Pu; K-M LE was ± 189 grs Pu; doubling this LE - ± 378 grs Pu) indicated significant S/R difference. Subsequent licensee investigation indicated that K-M LE value was unrealistic. On second shipment received - no significant S/R difference. Third shipment received has not been fully analyzed and evaluated for LE calculations. For inspection period - procedures being followed.

4.2 - Pellet samples being retained

4.3 - Written approval from Headquarters (Ltr. of 5/16/72 from Page to Shelley) of controls and measurements for material to be disposed of.

5.0 STORAGE AND INTERNAL TRANSFERS

5.1 A doc mented system of control over special nuclear material stored and processed within the facility shall be maintained which will provide continuous knowledge of the location and quantity of all material contained in discrete, identifiable items or containers.

5.2 All transfers of special nuclear material between MBA's shall be documented to show the identity, quantity, and isotopic analysis of the material transferred. A system of controls shall be maintained by the licensee for the distribution and accounting of all transfer documents.

5.3 Each document supporting a transfer of material between MBA's shall be signed by the delegated individual.

COMMENTS:

5.1 - Check of vault material logs indicated no discrepancies. Initiation of computer system will strengthen the controls outlined in this license condition. Included in this system should be procedures to audit the printout for accuracy.

5.2 - System of controls maintained for the distribution and accounting of all transfer documents is satisfactory.

5.3 - OK

This page can be released in total

6.0 INVENTORY

6.1 A complete physical inventory of all special nuclear material subject to this license shall be conducted at approximately six-month intervals, but in no case shall more than eight months elapse between inventories.

6.2 Prior to each complete physical inventory, written procedures shall be prepared which:

6.2.1 specify the extent to which each MBA is to shut down and clean out process equipment;

6.2.2 specify the extent to which each MBA is to remain static during the inventory;

6.2.3 identify the basis for accepting for inventory purposes previously made measurements and their limits of error;

6.2.4 designate measurements to be made for inventory purposes to establish and demonstrate the limits of error associated with the quantity of material on inventory; and

6.2.5 identify the manner by which material on inventory will be listed to assure each item is inventoried and there are no duplications or omissions.

6.3 The book inventory shall be reconciled with and adjusted to the results of the physical inventory upon completion of the physical inventory.

6.4 Special physical inventories of an MBA shall be conducted whenever there is a reason to believe that subsequent to the last prior physical inventory a particular MBA has experienced losses or gains that are different by a statistically significant amount from those expected.

6.5 The licensee shall close a material balance around plutonium in process, (by algebraically combining data for receipts, shipments, discards, beginning and ending inventories) at intervals not to exceed thirty (30) days. Material in process means any plutonium possessed by the licensee, except in unopened receipts and ultimate product, where the ultimate product is maintained in a manner which ensures the integrity of previously made measurements. All components of the material balance (additions, removals, and material on inventory) shall be determined on the basis of measurement; limits of error shall be established for each component and for the material unaccounted for. The material unaccounted for shall be determined and the limits of error calculated within ten (10) days after the completion of the material balance.

COMMENTS:

6.1 - OK

6.2 - Written procedures covered requirements outlined.

6.3 - Reconciliation being made.

6.4 - No special inventories conducted under this criteria.

6.5 - Item of noncompliance - closing of material balance around plutonium in process at intervals not to exceed 30 days not being performed.

Verification Samples

3 pellet samples in duplicate
2 U-Pu solution samples > g/g Pu on all

239 & 241 1 pellet sample

This page can be released in total

7.0 RECORDS AND REPORTS

7.1 The licensee shall establish and maintain a record system which will provide sufficient information to maintain a material balance around each MBA and the total plant. These records shall contain information pertaining to all receipts, shipments, measured discards, inventory, and MUF for each material balance. MBA and plant records shall be reconciled at the end of each accounting period. All entries in the records shall be supported by appropriate documents.

7.2 All measured discards and MUF shall be reported on a monthly basis by the Manager, Administration and Accountability, to the Cimarron Plutonium Plant Manager.

7.3 The licensee shall submit Form AEC-742 Material Status Reports, completed in accordance with the printed instructions, as of the last day of each month for all plutonium. The reports shall be filed with the Commission within fifteen (15) days after the end of the period covered by the report, with a copy sent to the Directorate of Regulatory Operations, Region III, Glen Ellyn, Illinois.

7.4 (a) 70.42 transfer to authorized recipients.

~~(b) 70.51 (a) detailed control records~~

~~(c) 70.53 status reports~~

(d) 70.54 transaction reports

COMMENTS:

7.1 - Record system for total plant - OK
MBA records inadequate:
(1) Losses not posted
(2) Adjustments to external activity not entered.

Item of noncompliance - no reconciliation of MBA and plant records being made.

7.2 - OK

7.3 - Status reports being submitted.

70.42 - OK

70.54 - OK

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8.0 MANAGEMENT OF MATERIALS VONTROL SYSTEM

8.1 Licensee management, independent of the Manager, Admin-tration and Accountability, shall conduct, at least once each year, an internal review of the nuclear materials control procedures and management of the overall system of special nuclear material control and report findings to the Cimarron Plutonium Plant Manager.

8.2 An estimate of anticipated losses (measured discards plus MUF) for each period of time between inventories shall be prepared for each MBA, with the concurrence of the Manager, Adminstration and Accountability, and shall be based on prior experience, throughout quantities and rates, etc. If losses exceed the estimate of those anticipated, they shall be investigated by the Manager, Administration and Accountability, and the results of his investigation shall be reported to the Cimarron Plutonium Plant Manager.

8.3 Any apparent loss of a discrete item or container of special nuclear material which cannot be resolved by an immediate investigation shall be reported to the Manager, Administration and Accountability, who shall promptly notify the Atomic Energy Commission, Directorate of Regulatory Operations, Region III, Glen Ellyn, Illinois, and shall conduct an investigation of the loss. The Manager, Administration and Accountability, shall report the results of his investigation to the Cimarron Plutonium Plant Manager.

COMMENTS:

8.1 - Internal audit of Safeguards and Measurement and LE Program made and reported in letter of Sept. 28, 1972.

Not in full compliance because internal review on remaining parts of nuclear control system not performed during inspection period (actually none performed since origination of Pu plant). Internal review by corporate auditing staff planned within couple of months.

8.2 OK

8.3 - No apparent loss been reported.

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1.0 FACILITY ORGANIZATION

1.1 The Cimarron Facility Manager shall be responsible for developing, revising, implementing, and enforcing the nuclear material control procedures and managing an overall system of special nuclear material control.

1.2 Nuclear material control procedures and revisions thereto shall be approved by the Manager, Administration and Accountability, and the Manager, Cimarron Facility. A manual containing all current nuclear material control procedures shall be maintained by the Manager, Administration and Accountability.

1.3 The Manager, Administration and Accountability, shall assure that the nuclear material control procedures are appropriately reflected in process specifications, manufacturing instructions, standard operating procedures, or similar detailed management instructions.

1.4 All delegations of safeguards responsibilities by the Cimarron Facility Manager shall be in writing.

COMMENTS:

1.1
1.2 Reviewed the Manual and SOP's. Manual needs updating; sampling and LE program to incorporate either Heagerty's or Mallet's methods and also method by which annual reviews of measurement system are performed.

1.3 Formalize method with document control officer by which he asks the preparer of SOP's what areas of responsibility are involved in the pertinent SOP's, and if nuclear material control is involved, include Manager, administration and accountability in the list of necessary review and approval signatures.

1.4 OK

NUCLEAR MATERIALS SAFEGUARDS INSPECTION
OF SPECIAL NUCLEAR MATERIAL AT
KERR-McGEE CORPORATION
CIMARRON ENRICHED URANIUM FACILITY
CRESCENT, OKLAHOMA
SNM-928

Close-out Meeting notes with Management - Date: 3/16/73

Preliminary Meeting

K-M

R. Janka
. Welch
. Mallet
. Cotham
. Hodo

AEC

J. Hind
C. Pck
A. Finley
J. Patterson

Final Meeting

K-M

M. Moore
W. Shelley
M. Binstock
D. Rhodes
J. Marler
D. Bristol
R. Janka
G. Mallet
T. Clanton

AEC

J. Hind
C. Peck
A. Finley

MISCELLANEOUS

Inspection Period: 1/17/72 - 3/12/73 Dates Field Work Performed 2/21 - 23/73 3/12 - 16/73

Inventory Date 3/12/73

2.0 FACILITY OPERATION

2.1 Material Balance Areas (MBA's) shall be established by the Manager, Administration and Accountability.

2.2 Each MBA shall be an identifiable physical area into and out of which movement of special nuclear material can be measured.

2.3 Sufficient numbers of MBA's shall be established so that losses of special nuclear material can be identified and localized.

2.4 All oerpations within an MBA shall be the responsibility of a single employee who shall also be responsible for the custody of special nuclear material within his MBA.

2.5 Possession limits (10 CFR 70.41)

Authorized Limits	Possession
6000 kgs. U-235	1352.5 kgs. U-235 (Book as of 3/12/73)

COMMENTS:

2.1 - OK Two MBA's - <5% U-235 and > 5% U-235

2.2 - OK

2.3 - OK

2.4 - OK

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Material Control and Physical Protection (Pu)

#7

Dates of Inspection: 1/17-21/72
Report No. : SO-II-87 (Material Control and Security - Pu and U Plants)
Description of Violations:

1. No independent internal review. (U and Pu) (L.C.8.1).
2. LE's not included on shipping documents (U and Pu) (70.54).
3. Receipt forms not completed and distributed within required time (U and Pu) (70.54).
4. Enriched U (greater than 20% U-235) not in separate fenced area outside (U) (73.32(c)).
5. Security test of equipment records not maintained (U and Pu) (73.41(b)).

Dates of Inspection: 1/14-16/73
Report No.: 070-1193/73-01 (Physical Protection)
Violations:

1. Permanent structure within 20 ft. of inside of fence (L.C.9.4.1).
2. Perimeter fence not inspected during work hours (L.C.9.4.3).
3. Pu storage vault not protected by steel door or intrusion alarm (L.C.9.4.5 and 73.3(k)).
4. Intrusion alarms not being tested as required (L.C.9.4.8).

Dates of Inspection: 2/21-23 and 3/12-16/73
Report No.: 070-1193/73-03 (Material Control)
Violations:

1. Measurement review not complete (L.C.3.4).
2. Not closed a 30-day material balance (L.C.6.5).
3. MBA and plant records not reconciled (L.C.7.1).
4. Not in full compliance with independent audit requirements (L.C.8.1).

Dates of Inspection: 12/3-7/73
Report No.: 070-1193/73-08 (Material Control)
Violations:

LEMUF for five material balance periods exceed specification of 1.5 Kgs. Pu (L.C.3.2).

Dates of Inspection: 2/26-37/74
Report No.: 070-1193/74-03 (Material Control)
Violations: None

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Material Control and Physical Protection (Pu)

Dates of Inspection: 3/11-13/74
Report No.: 070-1193/74-02 (Physical Protection)
Violations:

1. Combination lock on vault broken (73.3(j) and 73.3(e)).
2. Visitors log information not complete (L.C.9.3.7 and 9.3.8).

Program Weakness:
[Spurious Pu monitor alarms at dock area.]

Dates of Inspection: 5/6-9/74
Report No.: 070-1193/74-04 (Physical Protection)
Violations:

1. [Failed to relocate TV camera at dock area] (73.60(a)(7)).
2. Not conducting communications check with LLEA; should be each shift rather than daily (Plan 10.4).
3. Levels of illumination not as required on all sections of physical barrier (Plan 2.1.2.2).
4. [Sample window not alarmed] (L.C.9.3.2).
5. [Metal detector for exit search not installed] (L.C.9.3.4).
6. [Installation of motion detector in vault not complete] (L.C.9.3.5).
7. Protective personnel were not armed or uniformed (73.50(a)(1)).
8. [Door between exhaust air fan room and supply air fan room not alarmed (L.C.9.5).]
9. [All required portals not installed with magnetic switch intrusion alarms rather than plunger types (L.C.9.7).]
10. Secondary alarm annunciator not installed or operable at Uranium Post No. 2 (L.C.9.18.1).
11. [Metal detector at entrance search installed but not operable and electric door lock not installed] (L.C.9.16.1 and 9.16.2 and 9.18.2).
12. Intrusion alarms not installed in storage areas in fabrication area and in the inspection and assembly area (L.C.9.17.2).
13. [Only one armed guard assigned to each shift rather than the required two and an armed shift supervisor] (L.C.9.18.3).
14. [All existing intrusion alarms did not meet Federal specifications] (L.C.9.18.4).
15. Log of individuals granted access to a normally unoccupied vital areas not being maintained (73.70(d)).

Dates of Inspection: 7/23-25/74
Report No.: 070-1193/74-06 (Material Control)
Violations:

On three occasions when delayed measurements were made, the 741 was not completed within 30-day period (70.54).

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Material Control and Physical Protection (Pu)

Dates of Inspection: 8/21-23/74
Report No.: 070-1193/74-07 (Material Control)
Violations:

1. Accounting data for biases which exceed 10% of their standard deviations (L.C.3.5).
2. Tamper-safing seals not being used (L.C.6.3).
3. All SNM on inventory not based on measurements (L.C.6.4.2).
4. Frequency of measurement of standards not being adhered to (L.C.3.3.2).

Date of Inspection: 9/11/74
Report No.: 070-1193/74-08 (Physical Security)
Violations:

1. Explosive detector not completely operable because of spurious alarms due to other types of material, i.e., perfume, smoke (73.50(f)(1)).
2. Of the 12 intrusion alarms to be converted from plunger type to magnetic switch types, all had been converted except one (L.C.9.7).

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Material Control and Physical Protection (U)

Dates of Inspection: 4/21-23 and 4/28-5/2/69
Report No.: SO-II-18 (Material Control)
Violations: None

Dates of Inspection: 1/7-15/70
Report No.: SO-II-33 (Material Control)
Violations:

LE's on measurement system and on receipts, shipments, discards and MUF have not been established (FMX 3.0 and subparts).

Dates of Inspection: 10/5-9/70
Report No.: SO-II-56 (Material Control and Physical Protection)
Violations:

1. No manual continuing current procedures (L.C.1.2).
2. No LE program on measurement system and on receipts, shipments, discards and MUF (L.C.3.0).
3. Not accounted for all internal transfer documents nor documented all internal transfers (L.C.5.2).
4. Stored material outside in an area not separately fenced (73.32(c)
5. No records designating authorized individuals (73.41(a)).

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Material Control and Physical Protection (U)

Dates of Inspection: 1/16-18/73
Report No.: 070-925/73-01 (Physical Protection)
Violations: None

Dates of Inspection: 2/21-23 and 3/12-16/73
Report No.: 070-925/73-03 (Material Control)
Violations:

1. No independent percent element measurement of UF-6 receipts (L.C.3.1).
2. Measurement review not complete (L.C.3.3).
3. Not all 741's on receipts being dispatched on time (70.54).

Dates of Inspection: 11/13-16/73
Report No.: 070-925/73-07 (Material Control)
Violations:

1. No independent percent element measurement of UF-6 receipts (L.C.3.1).
2. Not all 741's on receipts dispatched on time (70.54).

Dates of Inspection: 11/25-27/74
Report No.: 070-925/74-02 (material Control)
Violations:

1. No material control plan submitted to Licensing (70.51(g)).
2. Measurement review not complete (L.C.3.3).

Dates of Inspection: 9/22-26/74
Report No.: 070-925/74-04 (Material Control)
Violations:

1. Standards data not being accumulated (L.C.3.2.3).
2. Frequency of replicate sampling of process materials not complete (L.C.3.2.2).
3. All biases not being determined (L.C.3.3).
4. Material accounting data not adjusted for biases (L.C.3.4).
5. LE's do not include systematic errors (L.C.3.8).

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ENCLOSURE

Kerr-McGee Nuclear Corporation
License No. SNM-1174

The following apparent violation of AEC requirements is considered to be of Category II severity:

License Condition 3.2, Amendment No. MPP-1, License No. SNM-1174 states: "The frequency and quality of the measurements made to comply with the license conditions shall be controlled so that the limit of error associated with the material unaccounted for (LEMUF) for the 30-day material balance period does not exceed one and one half (1.5) kilograms of plutonium."

Contrary to the above, the LEMUF quantity reported to the Region III, Office of the Directorate of Regulatory Operations for the material balance period ending December 5, 1973, exceeded one and one half kilograms of plutonium. Further, the LEMUF quantities that you have reported to us for the four preceding inventory periods have similarly exceeded one and one half kilograms of plutonium.

Period	LEMUF (kgs)
7/1/73 - 8/10/73	6.299
8/11/73 - 9/11/73	6.127
9/12/73 - 10/10/73	6.337
10/11/73 - 11/9/73	6.542
11/10/73 - 12/5/73	6.802

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U. S. ATOMIC ENERGY COMMISSION
DIRECTORATE OF REGULATORY OPERATIONS

REGION III

RO Inspection Report No. 070-1193/73-08

Licensee: Kerr-McGee Corporation
Kerr-McGee Building
Oklahoma City, Oklahoma 73102

Cimarron Facility Plutonium Plant
Crescent, Oklahoma 73028

License No. SNM-1174
Priority: I
Category: A(1)

Type of Licensee: Plutonium Fuel Fabricator

Type of Inspection: Special Nuclear Materials, Announced
Observation of Plutonium Inventory

Dates of Inspection: December 3-7, 1973

Dates of Previous Inspection: October 19, 25, 26 and November 2, 1973

Lead Inspector: C. C. Peck C.C. Peck 2/13/74 (Date)

Other Accompanying Personnel: None

Reviewed By: J. A. Hind J.A. Hind, Chief
Materials and Plant
Protection Branch 2/13/74 (Date)

Attachment:
Findings (Exempt from Disclosure)

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SUMMARY OF FINDINGS

Enforcement Action

The following item of noncompliance was identified:

The licensee's limit of error of material unaccounted for (LEMUF) for the 30-day material balance period ending December 5, 1973, was 6.802 kilograms, and the LEMUF quantities for the four previous material balance periods were as follows:

Period Ending	LEMUF (kgs)
8/10/73	6.299
9/11/73	6.127
10/10/73	6.337
11/9/73	6.542

License Condition 3.2 states: "The frequency and quality of the measurements made to comply with the license conditions shall be controlled so that the limit of error associated with the material unaccounted for (LEMUF) for the 30-day material balance period does not exceed one and one half (1.5) kilograms of plutonium."

Licensee Action on Previously Identified Enforcement Items

Items of noncompliance identified in the previous inspection (February 21-23 and March 12-16, 1973) were not within the scope of this inspection. The status of these items will be investigated in a future inspection.

Unusual Occurrences: None

Other Significant Findings: None

Management Interview

A closeout meeting was held December 7, 1973, by C. C. Peck with R. A. Janka, Manager of Administration and Accountability and G. R. Mallett, Safeguards Specialist. The discussion centered on the physical plutonium inventory conducted by the licensee December 3-6 and witnessed by the inspector. The

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licensee representatives were advised that in the opinion of the inspector the observed portions of inventory had been conducted in accordance with the licensee's established inventory procedures. Instances were discussed in which minor violations of the procedures had occurred. It was concluded that these were occasioned by inadequate understanding of the inventory procedures on the part of individuals involved in conducting the inventory and could be corrected in the future by continued emphasis on personnel training.

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REPORT DETAILS

Persons Contacted

R. A. Janka, Manager of Administration and Accountability
W. J. Shelley, Director, Regulation and Control
G. R. Mallett, Safeguards Specialist
J. V. Marler, Plutonium Plant Superintendent
F. Welch, Accountability Analyst - Plutonium
T. Clanton, Auditor - Kerr-McGee Corporation
F. Garst, Safeguards Analyst
D. Oswald, Safeguards Clerk
C. Gender, Safeguards Clerk
J. V. Smith, Process Supervisor, Plutonium
R. Borgmier, Process Supervisor, Plutonium
R. J. Adkisson, Contract Relations Representative
R. Marshall, Manager - Laboratory

Scope of Inspection

The inspection was an observation of a plutonium physical inventory conducted by the licensee from December 3-6, 1973. Such inventories are required at intervals not exceeding thirty days by License Condition 6.0 of the Materials and Plant Protection Amendment to License No. SNM-1174. The reasons for observing the particular inventory of December 3-6 were: (1) the licensee had been unable in previous inventories to comply with License Condition 3.2 which states that the limit of error associated with the material unaccounted for (LEMUF) for the 30-day inventory periods shall not exceed 1.5 kilograms of plutonium, and (2) the material unaccounted for (MUF) quantity calculated from the material balance for the previous inventory conducted November 9 was 6.0 kgs; although within the LEMUF of 6.5 kgs, this absolute value is unusually high. Hence the circumstances called for an inspection and appraisal of the licensee's inventory performance.

The process of conducting the inventory which consists generally of counting, weighing, sampling, and listing all plutonium-containing items was observed from December 3 through 6. Some of the preparations of the material balance areas were also observed, although in some cases preparations had been made prior to the inspection. For any physical inventory it is necessary to use previously obtained measurement data for all items that are known to have been in an unchanged condition since the previous inventory, and to perform current measurements only on new items or those that may have changed during the inspection period. An attempt to perform current measurements on all

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inventory items, normally numbering over 2000, would be impossible. Thus, it is necessary in any inspection to accept many measurements that have been made at an earlier date.

Results of the inventory, that is, the construction of the material balance and calculation of the MUF and LEMUF quantities were not determined until several days after the end of the actual inventory process and were not witnessed as part of the inspection.

Compliance with license conditions other than 6.0, Inventory, was inspected only to the extent that certain other conditions are related to inventories and could be evaluated.

The following sections, whose titles correspond to license conditions, present the details of the inspection.

Facility Operation (License Condition 2.0)

As required by the license condition, the plutonium facility uses the material balance area (MBA) concept in controlling SNM. Seven MBA's have been established, each of which is the responsibility of an MBA custodian, in most instances the supervisor of the area. Custodians in some cases have responsibility for more than one MBA. Movement of SNM between MBA's is controlled, and the various points at which losses can occur are identified as required by the license condition.

MBA's and their custodians are listed below:

MBA	Number	Custodian
Scrap	11	Chem Process Supervisor
Laboratory	11	Lab Manager
Ceramic	13	Chem Process Supervisor
Vault	12	Records Clerk
Pellet Manufacture	21	Fabrication Supervisor
Pellet Storage, East	22	Fabrication Supervisor
Pellet Storage, West	23	Fabrication Supervisor
Fabrication	31	Fabrication Supervisor

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Measurements and Statistical Controls (License Condition 3.0)

Sufficient information was acquired during the inspection to confirm the fact that the licensee is making all the measurements required by 3.1 to determine the quantities of plutonium and the limits of error associated with receipts, shipments, discards, and inventories.

License Condition 3.2 requires the licensee to control the frequency and quality of his measurements so that the limit of error associated with the material unaccounted for (LEMUF) for each 30-day material balance period does not exceed 1.5 kilograms of plutonium.

The frequency of measurements is considered adequate. Each bottle of plutonium nitrate received and each lot of product pellets shipped is measured by weighing and assay of samples, liquid and solid discards are measured by radioassay and neutron counting respectively, and inventory items are measured by an appropriate method at the time of inventory or prior to the inventory. Quality of the measurements was not examined in detail during this inspection. Previous inspections have disclosed scale and balance accuracy to be acceptable and it has been observed that sufficient mixing and blending are performed to ensure representative samples for analysis. The current inspection disclosed no evidence of inadequacies in these aspects of the measurement system. One instance of inaccurate weighing was found by the licensee during the inspection when weighing errors of more than a hundred grams each were discovered while reweighing four cans of certified pellets containing an average of 2100 grams each. The corrected weights increased the plutonium inventory by 100 grams. The errors in the original weighings were attributed to insufficient understanding of the weighing procedures, specifically incorrect use of tare weights. Although these errors resulted in a change in the plutonium inventory, it was not of such a magnitude that weighing errors could be considered responsible for the large MUF quantities that the licensee has experienced. No other weighing errors of consequence were detected during the inventory.

Laboratory analyses of samples are the component of the measurement system that inherently produces the largest limits of error. The licensee uses amperometric titration as his basic method of analysis for plutonium nitrate solutions received, for product pellets, and for some intermediate materials with high plutonium concentrations and good purity. The method is widely used in industry for such materials and has good accuracy. Corrections must be made for the presence of chromium and manganese in the samples, and the licensee does make these corrections. A secondary assay method employed is radioassay, or alpha counting, an acceptable method when samples are impure

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and/or dilute and do not represent a large amount of plutonium. The accuracy of the method is not high; claims of 10% to 20% accuracy expressed as the coefficient of variation of a single analysis are common. This level of accuracy is acceptable, provided the samples analyzed do not represent major portions of the material balance.

To test the quality of licensee's analytical measurements, three solution samples were taken during the inspection for analysis by Los Alamos Scientific Laboratory. The samples chosen were from scrap area wall tanks containing several kilograms of plutonium. Two samples were solvent extraction feed, the other solvent extraction product. Scrap area samples were selected because this area has the largest variability of any of the MBA's and the wall tanks in the area contain large amounts of plutonium. The AEC samples were taken at the same time the licensee took replicate samples for his own analyses for inventory purposes.

The licensee stated during the inspection that the product sample would probably be analyzed by amperometric titration, and the feed samples by radioassay, because the large impurity content would make the more accurate amperometric method unreliable. Instead all three samples were analyzed by radioassay.

Arrangements were made with Los Alamos to analyze the AEC samples by isotopic dilution, with additional verification by amperometric analysis and/or radioassay.

Results of the AEC analyses were received February 5, 1974. A comparison of AEC and licensee results is tabulated below:

Sample	Wt Solution(g)	Conc (g/g)		PU (g)	
		L	AEC	L	AEC
6,7,8,9; Product	430400	0.00675	0.006719	2905	2892
16,18,20; Feed	296450	0.01926	0.008405	5710	2492
1t,17,19; Feed	306150	0.00905	0.008430	2771	2581
				11386	7965

Difference: 3421 grams

The licensee stated that the limit of error for each sample was 0.0034 g/g. Application of this limit of each of the three solution weights produces limits of 1463g, 1008g, and 1041g. These limits produce a combined limit

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of 2059g, which exceeds the one and a half kilogram limit of error imposed on the entire material balance without regard to any other inventory measurements made.

Agreement between licensee and AEC analyses ranged from excellent to very poor. Collectively the difference of 3421 grams represented by the differences between AEC and licensee results exceeds reasonable limits of error that could be established. The licensee has agreed to analyze replicate samples that were taken during the inspection in an effort to resolve the difference. If it can eventually be concluded that AEC analyses are correct, the licensee could be considered to be in violation of license condition 3.2 on the basis of the poor quality of his measurements.

After the physical inventory was completed, the plutonium MUF and limits of error associated with the MUF were completed promptly as required by License Condition 3.5. The period between conclusion of the inventory and completion of the material balance necessary to determine the MUF was about five days. This is the normal amount of time required to obtain analytical results on items that were sampled for inventory, calculate plutonium quantities for each item, and establish limits of error for each item. Calculations are accomplished manually and by computer, the manual calculations being considered necessary because the computer program has been in use only a short time and is considered not yet reliable.

Results of the inventory are presented in detail in the section Inventory.

Storage and Internal Transfers (License Condition 5.0)

The Safeguards group has continuous knowledge of all SNM transfers between MBA's through the use of internal transfer forms (IT's). The group issues serially numbered IT's to the various MBA custodians who are required to use them for each material transfer. Type and quantity of material transferred and initials of the custodians of the areas involved are required information to complete the forms. The completed forms are used by the Safeguards group to prepare the material balance for the inventory period around each MBA. It was noted that the licensee was able during the observed inventory to account for all internal transfer forms that had been used during the inventory period. There were over two thousand of these forms to account for.

Inventory (License Condition 6.0)

As required by License Condition 6.1, the licensee since July 1, 1973, has been closing material balances around the facility by material balance areas

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at intervals not exceeding thirty days. On the one occasion in which the interval exceeded thirty days, a request for an extension was approved by Licensing. Limits of error have been calculated for all components of these material balances, that is, receipts, shipments, and inventories as required, and these limits have been used to calculate the limit of error of the material unaccounted for (LEMUF). In none of the five material balance periods to date has the licensee's calculated LEMUF been within the 1.5 kilogram limit imposed by License Condition 3.2. The variability of the inventory component of the material balance has been too large to permit attainment of this limit. Since the licensee has an "inventory - dominated" system, since the inventory is of a much larger magnitude than the receipt or shipment components of the material balance, there is small probability that the 1.5 kilogram limit can be attained. The measurement methods for in-process materials do not have the precisions that would be required to achieve a 1.5 kg LEMUF.

In addition to receipts, shipments, and measurable materials in inventory, the licensee has a large quantity of unmeasurable plutonium in his system. This "holdup" is required to be a fixed quantity by License Condition 6.2 and accordingly has been set at 18.7 kilograms. A fixed limit of error is also required to be associated with this holdup. The limit of error that has been established is about five kgs. This quantity by itself is much larger than the 1.5 kg limit of License Condition 3.2. Combining this LE associated with the unmeasurable materials with the LE of the measurables, the overall LE of material unaccounted for has consistently exceeded six kilograms.

In the attachment to this report, the licensee's material balances for all five inventory periods are summarized in tabular form.

License Condition 6.3 sets forth requirements for inventory procedures. The licensee has such written procedures, approved by the responsible heads of the groups involved in the inventory. These are the facility manager, accountability manager, plutonium plant superintendent, and laboratory manager. The procedures meet the requirements of the license conditions and observations during the inspection disclosed that the inventory and inventory preparations were conducted in accordance with the procedures. In the ceramic area (MBA 13) all scrap powder had been swept up and removed to the vault. The precipitation equipment had been rinsed. There was no evidence of any unmeasurable solutions in glovebox sumps. In the pellet manufacturing area (MBA 21) the equipment appeared clean and all scrap powder and contaminated waste had been removed to the vault. In the pellet storage areas (MBA's 22 and 23), all pellets were in storage containers and gloveboxes appeared clean. To aid in the preparation of the MBA's for

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the inventory, a series of checksheets, one for each of the MBA's, are completed by the MBA custodians and approved by the Safeguards group. The checksheets require the custodians to affirm that the plutonium in each area is in a location and form amenable to inventory, that equipment has been cleaned, that logs and other paperwork are up to date, and that transfer forms have all been accounted for. After all areas have been prepared in accordance with the checksheets and have been approved by the Safeguards group, the inventory is conducted. MBA custodians in each area identify each inventory item observed by members of the safeguards group who prepare the inventory lists, one for each area.

Summary of Inspection Status

The tabulation below summarizes the status of the licensee with respect to each license condition and regulation at the conclusion of the inspection of December 3-7, 1973.

	Inspection (Note 1)		
License Condition	Previous 3/73	Present 12/73	Future
1.0 Organization			
1.1	OK	Inspect-OK	Routine Check
1.2	Unsatisfactory	Inspect-OK	Routine Check
1.3	OK	Inspect-OK	Routine Check
1.4	OK	Inspect-OK	Routine Check
2.0 Operation			
2.1	OK	Inspect-OK	Routine Check
2.2	OK	Inspect-OK	Routine Check
2.3	OK	Inspect-OK	Routine Check
2.4	OK	Inspect-OK	Routine Check
2.5	OK	Inspect-OK	Routine Check
3.0 Measurements and Statistical Controls			
3.1	OK	Routine Check	Inspect
3.2	OK	Noncompliance (Note 2)	Inspect
3.3	Unsatisfactory	Routine Check (Note 3)	Inspect
3.4	Noncompliance (Note 4)	Omitted	Inspect
3.5	OK	Inspect-OK	Routine Check
3.6	NA (Note 5)	(Note 6)	Inspect
3.7	NA	NA	Inspect
3.8	NA	NA	NA

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Inspection (Note 1) cont.

License Condition	Previous 3/73	Present 12/73	Future
4.0 Shipping and Receiving			
4.1	OK	Omitted	Inspect
4.2	OK	NA	NA
5.0 Storage and Internal Controls			
5.1	OK	Inspect-OK	Omit
5.2	OK	Inspect-OK	Routine Check
5.3	OK	Inspect-OK	Routine Check
6.0 Inventory			
6.1	OK	Inspect-OK	Routine Check
6.2	NA	Inspect-OK (Note 7)	Inspect
6.3	OK	Inspect-OK	Routine Check
6.4	OK	Inspect-OK	Routine Check
6.5	OK	Inspect-OK	Inspect
6.6	NA	NA	NA
7.0 Records and Reports			
7.1	Noncompliance (Note 8)	Routine Check-OK	Inspect
7.2	OK	Omitted	Inspect
7.3	OK	Inspect-OK	Routine Check
8.0 Management of Materials Control System			
8.1	Noncompliance (Note 9)	Omitted	Inspect
8.2	OK	Omitted	Inspect
8.3	OK	Omitted	Routine Check
9.0 Physical Protection			
9.1 - 9.6	OK (1/73)	Omitted	Inspect
Part 70			
70.54	OK	Omitted	Inspect

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Note 1. Definitions of terms used in table: "OK" or "Inspect-OK." Item was inspected and licensee found to be in compliance.

"Routine check." A general investigation to determine compliance with no effort to collect detailed information or data.

"Inspect." A complete investigation, consisting of examination of all data and procedures.

"Unsatisfactory." Indicates that licensee was in compliance, but that quality of effort was less than desirable.

"NA." Not applicable.

Note 2. Licensee has consistently been unable to meet 1.5 kg LEMUF limit.

Note 3. Standardization and calibration data were in early phase of development in 3/73. A general check 12/73 indicated that efforts were satisfactory.

Note 4. No measurement review had been made as of 3/73. Measurement review must be made by 3/74 to avoid repeat item of noncompliance.

Note 5. No MUF or LEMUF data as of 3/73. Licensee was in process of determining holdup quantity.

Note 6. Licensee's notifications of corrective actions to reduce LEMUF considered insufficient during period prior to inspection. Licensee response considered satisfactory in December 1973.

Note 7. LE for holdup varies slightly around 5 kgs Pu.

Note 8. Material balance and plant records were not being reconciled prior to 3/73.

Note 9. No review of the SNM control system was made prior to 3/73. Review required prior to 3/74 to avoid repeat noncompliance item.

Attachment:
Plutonium Plant Inventory Summary

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EXEMPT FROM DISCLOSURE

ATTACHMENT

PLUTONIUM PLANT INVENTORY SUMMARY

INVENTORY DATE	8/10/73	9/11/73	10/10/73	11/9/73	12/5/73	NET FOR 5 PERIODS
INVENTORY DATE (GRAMS)						
BEGINNING INVENTORY	77449	98804	97072	120694	140813	77449
RECEIPTS	19223	7	24478	39918	39114	122740
*SHIPMENTS	187	3864	49	13763	403	18266
ENDING INVENTORY	98804	97072	120694	140813	186171	186171
HOLDUP	18700	18700	18700	18700	18700	18700
MUF	(2319)	(2125)	806	6036	(6648)	(4238)
LIMIT OF ERROR DATA (GRAMS)						
BEGINNING INVENTORY	1618	714	324	2469	2453	1618
RECEIPTS	43	0	197	272	282	441
SHIPMENTS	15	22	11	205	20	208
ENDING INVENTORY	714	324	2469	2453	2825	2825
LEMUF (EXCLUDING HOLDUP)	1769	784	2498	3497	3752	3292
LEMUF (INCLUDING HOLDUP)	6299	6127	6337	6542	6802	
LE (HOLDUP ONLY)	4399	5094	3372	4612	6016	6016

*SHIPMENTS INCLUDE MEASURED LOSSES

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