

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 70-925/82-01(DETP); 70-1193/82-01(DETP)

Docket Nos. 70-925; 70-1193

Licenses No. SNM-928; SNM-1174

Licensee: Kerr-McGee Nuclear Corporation
Kerr-McGee Center
Oklahoma City, OK 73102

Facility Name: Cimarron Facility

Inspection At: Cimarron Facility, Crescent, OK

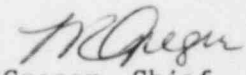
Inspection Conducted: March 9-12, 1982

Inspector: C. C. Peck



4/5/82
Date

Approved By: L. R. Greger, Chief
Facilities Radiation
Protection Section



4/5/82
Date

Inspection Summary:

Inspection on March 9-12, 1982 (Reports No. 70-925/82-01(DETP);
70-1193/82-01(DETP))

Areas Inspected: Routine, unannounced safety inspection, including:
organization, operations review, radiation protection, radioactive waste
management, internal audits, training, emergency planning, and environmental
monitoring. The inspection required 28 inspector-hours onsite by one NRC
inspector.

Results: No items of noncompliance were identified.

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DETAILS

1. Persons Contacted

Licensee Representatives

*A. W. Norwood, Standby Operations Manager
G. J. Sinke, Corporate Health Physicist
*V. D. Richards, Plutonium Plant Decontamination Supervisor
M. H. Binstock, Director of Contract Management/Cimarron Operations
*J. L. Kegin, Maintenance and Utilities Supervisor
*R. L. Fine, Health Physics Supervisor
*R. C. Borgmeier, Plutonium Plant Decontamination Supervisor
*M. W. Hodo, Administration and Accountability Clerk
*W. J. Rhodes, Uranium Plant Decontamination Supervisor
W. A. Rogers, Health Physics Technician

NRC

W. Burkhardt, Nuclear Material Safety and Safeguards

*Denotes those present at exit interview.

2. General

The inspection began at 8:00 a.m. on March 9, 1982, and was concluded on March 12. Normal decontamination activities were in progress in both the uranium and plutonium plants.

Mr. Winston Burkhardt, NMSS, Project Manager for the plutonium plant license, visited the facility on March 11 for discussions with licensee management on the renewal of NRC License SNM-1174 for the plutonium plant and on a license amendment that would permit use of existing ion exchange facilities in the plant (Section 4).

3. Organization

Mr. M. H. Binstock has assumed the position of Director of Contract Management/Cimarron Operations. In this capacity Mr. Binstock replaces Mr. B. E. Brown.

Since the health and safety inspection in May 1981 (Reports No. 70-925/81-02 and 70-1192/81-02), the work force has been increased. A second four-person decontamination crew was added in the plutonium plant, and two new health physics technicians were hired. Currently, there are 38 employees at the Cimarron Facility.

4. Operations Review

a. Plutonium Plant

Removal of the solvent extraction system continues as authorized by Amendment 3 to the license. Equipment has all been removed except for the glovebox base and some of the glovebox support structure. The removed equipment, after volume reduction using a plasma arc torch and nibblers, has been packaged in 55-gallon drums. Packaging is in accordance with Department of Energy requirements for twenty year retrievable storage or with Department of Transportation requirements for low specific activity waste, depending on whether the plutonium concentration in the waste exceeds ten nanocuries per gram. The plutonium content of each item of equipment removed from the system is measured by non-destructive analysis, and a record is maintained of the plutonium in each stored drum. The licensee said the total plutonium removed from solvent extraction to date is within about 15 percent of the total for the solvent extraction system measured by NDA in 1976.

Work is in progress on removal of other equipment in the plant, authorized by Amendment 4 to the license. Equipment has been dismantled, packaged, and removed from Room 123, formerly the fuel fabrication area, providing additional storage space for waste drums.

In discussions with licensee representatives and examination of routine inspection records and internal audits, the inspector acquired sufficient information to conclude that the licensee is in compliance with the license conditions of Amendments 3 and 4. These conditions pertain to criticality controls and alarms, fire prevention, liquid level alarms in gloveboxes, and adequacy of ventilation in work areas.

A recent request for a license amendment to permit the use of existing ion exchange equipment was discussed in a meeting and tour of the plant. The licensee plans to use the columns to remove the plutonium from mop water and glovebox cleaning solutions generated in plant decontamination. The raffinate from the columns will be collected in existing tanks, analyzed for plutonium content, pumped to a tank outside the building, and then to the sanitary lagoon, which is within the restricted area. The ion exchange resins containing the plutonium will be packaged for disposal at a DOE site. The use of ion exchange to dispose of contaminated water will result in a substantial reduction in the volume of solid waste generated.

The licensee pointed out that the ion exchange procedure will be safe from a criticality standpoint because vessels used are geometrically safe and the plutonium loadings on the columns will be less than those when the plant was in operation. Sodium carbonate will be added to the solutions before ion exchange to

eliminate possible fire and explosion hazards associated with ion exchange resins and acid solutions. Radioactivity concentrations in solutions released to the sanitary lagoon will be less than 10 percent of the MPC for release to an unrestricted area. Solutions with concentrations above this limit are to be recycled before release.

b. Uranium Plant

Dismantling and decontamination of equipment continue to be the principal activities. Decontaminated equipment is packaged and stored in a clean surplus equipment store room, available for transfer to other plants which may have use for the items. The licensee maintains material transfer records and radiation survey records for all items released. The inspector examined survey records for about 20 percent of the several hundred items released since 1975. The records showed that levels were well within the limits for fixed and removable contamination imposed by Annex C to the uranium and the plutonium plant licenses. Most equipment transfers have been to the licensee's other nuclear facilities or to nuclear facilities of other companies. A few transfers have been to non-nuclear facilities.

5. Radiation Protection

a. External Exposure Control

Film badges, supplied by a contractor, are changed monthly. The measured exposure to one employee for 1981 was 2.46 rems, but most of this total was apparently the result of a defect in a badge that was worn in alternate months. The badge supplier has confirmed that the badge was biased high and is attempting to quantify the bias. The highest whole body exposure to any other Cimarron facility employee for all of 1981 was 0.35 rems.

Badges contain indium foils and sulfur pellets to detect exposures to thermal and fast neutrons.

b. Air Sampling

Uranium Plant - The inspector observed that the number of fixed air samplers has more than doubled since the inspection in May 1981 (Reports No. 70-925/81-02 and 70-1193/81-02). There are about 50 stationary air samplers. Flow rates are maintained at 15 LPM according to records of monthly checks. The rate was increased from 10 LPM in September 1981. Some of the sampling stations are moveable to permit their use at various job sites. Work assignments cover large areas and the increased number of samplers is an effort to better control airborne exposure problems. Lapel samplers were being worn by at least 50 percent of the employees, as required by the license.

Daily exposure records are maintained for each employee based on the airborne concentration in the work area or on his lapel sampler concentration, whichever is higher. Weekly and monthly MPC-hour totals are kept. Examinations of records since the last inspection disclosed that all exposures have been well within regulatory limits. Most air samples were less than 10 percent of MPC ($1E-10$ uCi/ml) and none exceeded MPC.

Plutonium Plant - There are over a hundred stationary samplers in the plant. The established flow rate of 1 CFM is checked monthly.

The system for determining MPC-hour exposures for each employee is similar to that for the uranium plant. Individual exposures based on either stationary or lapel samplers are calculated daily based on an MPC of $2E-12$ uCi/ml. All exposures in 1981 were within regulatory limits. Records disclosed that concentrations are generally within MPC, although concentrations in plastic greenhouses during decontamination work sometimes exceeds MPC.

c. Respiratory Protection

Half-face respirators are generally used in the uranium plant for precautionary purposes, although full-face respirators are available. In the plutonium plant, only full-face protection is permitted. These are assigned to individuals and are routinely monitored by HP technicians and cleaned.

Annual quantitative fit tests are required for each employee whose work involves potential exposure to airborne activity. Such tests were last completed in December 1981.

The licensee's respiratory protection program meets the requirements of 10 CFR Part 20 necessary for the use of protection factors. These are applied in the plutonium plant in calculating individual exposures when records indicate that respirators were used. Factors are generally not needed in the uranium plant to establish compliance with regulatory limits because of the low airborne concentrations. Regulatory Guide 8.15 requires that an irritant smoke test be made before each use of a half-face respirator if a protector factor is to be employed in calculating the exposure. However, a smoke test is not required if no protection factor is to be used in the calculation. This matter was discussed during the exit interview.

d. Urinalysis

Workers in the uranium plant submit biweekly urine samples analysis at the licensee's Technical Center. An examination of records accumulated since the inspection in May 1981 (Reports No. 70-925/81-02 and 70-1193/81-02) disclosed that the elapsed time between sampling and the report of the result generally has not

exceeded two weeks, a shorter time period than was previously achieved. Except for the exposures to two workers described in the report of the special inspection in July 1981 (Report No. 70-925/81-03), no problems were noted with the urinalysis results. Several samples from employees engaged in decontamination work had concentrations somewhat above the minimum detectable concentration of 10 dpm/l, but these detectable concentrations did not persist in subsequent samples. One sample result, 94 dpm/l, exceeded the action point of 65 dpm/l. Followup samples declined within a few days to 32, 17, and less than 10 dpm/l, indicating an exposure to soluble uranium within the permissible limits. An investigation was unsuccessful in identifying the cause. Samples from two other individuals contained elevated uranium concentrations, 65 and 37 dpm/l, which were attributed to a bag rupture and a liquid splash. Followup samples contained no measurable uranium.

Quarterly urine samples are required from all plutonium plant employees. Samples are normally 1000 to 1500 ml, consisting of four voidings collected at home. A contractor laboratory analyzes the samples. Records for the inspection period indicated that no results exceeded the minimum detectable concentration of 0.1 dpm/sample.

e. In Vivo Counting

The licensee engages a mobile counting service to conduct annual counts for uranium and plutonium in the lung. An effort is made to count all workers subject to possible exposure. Counting for 1981 was accomplished in August.

Of the 22 counts for micrograms of uranium-235 in the lung, twelve were zero, four in the 1-50 ug range, four in the 50-100 ug range, one was 103 ug and one showed 188 ug. The licensee imposes work restrictions on employees who have 80 percent of a lung burden. A lung burden is 17 nanocuries of uranium, equivalent to about 260 ug of uranium-235 enriched 3 percent. The employee may return to normal work when his count is 50 percent of a lung burden, or about 130 ug U-235. The employee whose count was 188 ug has been restricted for several years.

Fourteen employees were counted for plutonium and americium-241, the daughter of plutonium-241. All counts indicated no plutonium. Seven counts showed no americium and seven indicated trace amounts of americium from 0.24 to 0.54 uCi.

6. Radioactive Waste Management

Solid uranium wastes, and plutonium wastes containing less than 10 nanocuries per gram of plutonium, are shipped to licensed burial sites as low specific activity wastes. New 55-gallon drums are used which meet the DOT 17-H specification. Records for the 13 shipments in 1981

indicated that all packaging, marking, and radiation and contamination limits of the DOT and the waste burial sites were met. The licensee has current waste packaging and shipment procedures and conducts periodic internal audits of the system.

Liquid radioactive wastes are limited to discharges from the uranium and plutonium facilities to the sanitary lagoon located within the fenced area. Non-radioactive water from the onsite coal liquefaction plant is also discharged to the lagoon. Procedures require that radioactive discharges be sampled and analyzed before release. The established disposal limits are $3E-5$ uCi/ml for uranium and $4E-7$ uCi/ml for plutonium. The uranium limit is the MPC for disposal of uranium to an unrestricted area, and the plutonium limit is 10 percent of MPC for release to an unrestricted area. Records disclosed that recent releases were within these limits.

Gaseous effluent from the plutonium plant exits through a single continuously monitored and alarmed stack after passing through systems of intermediate and final HEPA filters. The filters are DOP tested annually to ensure that they meet efficiency requirements of 99.95 percent for final filters and 99.0 percent for intermediate filters. Records showed that all filters were tested in 1981 and that 21 of the 26 filters were tested in January 1982. The licensee reported that the plutonium concentration of the effluent measured at the stack in the second half of 1981 was about $4E-15$ uCi/ml. This is less than 10 percent of the MPC for release of soluble plutonium to an unrestricted area.

Stacks associated with systems in use at the uranium plant are continuously sampled. Currently, three stacks are sampled. The maximum effluent concentration permitted is $5E-12$ uCi/ml, the MPC for an unrestricted area. The licensee reported that the average effluent concentration measured at the stacks in the second half of 1981 was $1E-12$ uCi/ml.

7. Internal Audits

The Health Physics Supervisor submits monthly reports to facility management. These summarize radioactive release data, individual exposures, employee training, and call attention to problems in these areas.

Several periodic audits are performed by representatives from corporate headquarters. The corporate Health Physicist documents quarterly ALARA inspections which review health physics performance and recommend changes to improve the system. A recent audit recommended formal training for health physics technicians and a procedure covering the calibration of health physics instruments. The criticality specialist conducts a monthly audit of the criticality alarm systems and of compliance with the conditions in the plutonium plant license that pertain to criticality control. The senior compliance specialist conducts quarterly audits of compliance with regulatory requirements including radiation protection and radioactive materials and transportation.

The inspector reviewed these audits for the second half of 1981 and concluded that the findings and recommendations in the audits are being given adequate attention.

8. Training

The inspector did not examine individual training records in detail. However, information obtained from an examination of audits and other records and in discussions with licensee representatives indicated that training of new employees and annual retraining are being accomplished. Indoctrination for new employees includes explanations of radiation and contamination control, use of film badges, the bioassay program, air sampling, respiratory protection, special work permits, protective clothing, emergencies, etc. The new employees are then scheduled for 20 hours of more detailed training in industrial and radiation safety and emergency procedures. Monthly safety meetings are a requirement for all employees. The meetings cover aspects of radiation or criticality safety at least quarterly.

9. Emergency Planning

a. Drills

Quarterly evacuation drills, initiated by sounding of criticality alarms, are conducted separately for uranium and plutonium plant workers. Employees evacuate to the emergency building, located just outside the fenced area of the plant. During 1981, coal plant workers were incorporated into the evacuation system, and criticality alarms were installed in their work area.

b. Equipment

SCBA and resuscitator equipment are located in plant work areas, the health physics office, and in the emergency building. Their condition is inspected monthly. The emergency building contains an adequate supply of conventional emergency equipment, a wound counter for injuries that might involve plutonium, and equipment for administering DTPA (trisodium calcium pentamil) to enhance the removal of inhaled plutonium.

The licensee maintains an onsite ambulance.

c. Training

In addition to the emergency training provided by drills and regular safety meetings, the licensee retains the services of the Director of Radiation Therapy in the Department of Radiological Sciences at the University of Oklahoma. The physician visits the facility frequently, and provides training in radiological health, particularly in the administration of the DTPA treatment. Several employees have been trained in this technique.

d. Fire Protection

The condition of fire extinguishers is checked monthly. Annual maintenance and inspection is provided by a professional fire equipment company.

The licensee maintains a fire brigade. All nuclear facility employees and some coal plant employees are members. The Maintenance and Utilities Supervisor, as Fire Marshall, is responsible for the scheduling of brigade drills and periodic training sessions. Annual training by professional fire fighters is provided.

e. Agreements with Offsite Organizations

The licensee possesses letters of agreement, to provide emergency aid in 1982, with the Oklahoma City Police, the Oklahoma High Patrol, the Logan County Sheriff's Office, and the Crescent Volunteer Fire Department.

10. Environmental Monitoring

The licensee has a long established program for sampling air, surface water, well water, soil, and vegetation at established locations on and off the licensee's property. The offsite air samples are collected weekly and the sanitary lagoons samples monthly. Other samples are collected annually. Samples are analyzed by the corporation's Technical Center.

The analytical results for 1981 were available, but had not been assembled into summary form and were not examined by the inspector. The licensee stated results were similar to those of earlier years, which indicated no significant radioactivity.

11. Exit Interview

The inspector met with the licensee representatives identified in Section 1 at the conclusion of the inspection on March 20. The inspector summarized the scope of the inspection and said no violations had been identified.

There was a discussion as to whether an irritant smoke test is required before routine use of half face respirators when protection factors are to be used (Section 5.c). The licensee uses irritant smoke in fit testing but not before routine use. Subsequently, the inspector informed the licensee that Regulatory Guide 8.15 states that an irritant smoke test must be made before each use of a half-face respirator if protection factors are to be used in calculating the MPC-hours of exposure.