

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 70-0036/90005(DRSS)

Docket No. 70-0036

License No. SNM-33

Licensee: Combustion Engineering, Inc.
Nuclear Power Systems
Windsor, CT 06095

Facility Name: Hematite

Inspection At: Hematite, Missouri

Inspection Conducted: November 5-9, 1990

Inspector: G. M. France, III
G. M. France, III

12/13/90
Date

Reviewed By: John A. Grobe
for B. J. Sreniawski, Project Manager
Fuels Facilities and
Contaminated Sites

12-14-90
Date

Approved By: John A. Grobe
John A. Grobe, Chief
Nuclear Materials Safety Branch

12-14-90
Date

Inspection Summary

Inspection on November 5-9, 1990 (Report No. 70-0036/90005(DRSS))

Areas Inspected: Routine, unannounced safety inspection including: management and organization controls (IP 88005); transportation activities (IP 86740); radiation protection (IP 83822); criticality safety (IP 88015); operations review (IP 88020); environmental protection (IP 88045); training (IP 88010); and radioactive waste management (IP 88035).

Results: The licensee was found to be in compliance with NRC requirements within the areas examined. The licensee initiated a campaign to survey all materials stored in the two barns for ultimate reuse/disposal.

DETAILS

1. Persons Contacted

- *E. W. Criddle, Health Physics Supervisor
- *L. F. Deul, Manufacturing Engineer
- *H. E. Eskridge, Manager Nuclear Licensing, Safety and Accountability Supervisor
- *R. W. Griscom, Manager, Plant Engineering
- *R. C. Miller, Manager, Administration and Production Control
- *A. J. Noack, Production Superintendent
- *J. A. Rode, Plant Manager

*Denotes those in attendance during the exit meeting which was held at 8:30 a.m. on November 9, 1990.

2. General

During the week of November 5-9, 1990, the inspector made daily tours of the facilities and observed that normal production activities were in progress. Only minor infractions of good safety practices were observed (temporary storage of mop water bucket in an unauthorized storage area; see Section 7. Criticality Safety).

3. Management Organization and Controls (IP 88005)

Since the previous health and safety inspection performed in August, 1990 (Report No. 70-0036/S0003) there were no significant changes in the structure of the organizations that provided health and safety services. Radiological safety services are performed by a staff consisting of a Manager, Nuclear Licensing and Safety, Supervisor, Health Physics and six Health Physics Technicians. In addition, corporate staff personnel are available to make independent dose assessment and provide input to matters that require regulatory guidance.

No violations or deviations were identified.

4. Radiation Protection (IP 83822)

The inspector reviewed the licensee's internal and external exposure control programs, including bioassay, whole body counting and dosimetry records.

a. Internal Exposure

Monthly urinalysis records for the July-September period indicated that the maximum concentration for all samples (108 samples) was near the detection limit of less than 5.0 µg U/liter.

In vivo counts for uranium are made twice a year. Production and maintenance workers are counted at least once during the year. Workers who infrequently visit production areas are counted every two years. The most recent series of counts in July 1990 showed

no indication above the action level of 130 ug uranium-235. The data also indicated that 17 infrequent visitors and 2 guards were counted. Highest value reported among 49 determinations was 77 +/-47 ug uranium-235. No discrepancies were noted in the data.

b. External Exposure

A review of the licensee's film badge data for the operating period April through September 1990, disclosed that individual exposure was less than the limits allowed under 10 CFR 20.101. Results of an extremity dose study (4 weeks-April, 1990) of press operators and plant QA technicians indicated that shielding by rubber gloves prevented penetration of weak beta radiation. The highest exposure reported was about 50 mrem. Workers engaged in the removal of uranium hexafluoride from 2.5-ton cylinders (heel removal) were protected from beta exposure with plexiglass shielding. The highest reported exposure for these workers was less than 100 mrem, a weekly limit set by the licensee. The inspector concluded that the shielding devices limited the exposure to workers and demonstrated good ALARA practices.

No violations or deviations were identified.

5. Operations (IP 88020)

The inspector made daily tours of the facility and observed operations and activities in progress and examined the general status of facility housekeeping.

In accordance with the standard ANSI N14.1-1982. "Packaging of Uranium Hexafluoride For Transport", licensees are required to recertify cylinders every 5 years. CE Hematite is licensed to handle 2.5-ton cylinders. Cylinders packaged for routine shipments are considered empty, when quantities (residual/heel levels) do not exceed 25 pounds for 5% enriched material. These heel quantities are removed from cylinders scheduled for recertification prior to transport.

The licensee indicated that during the month of October 1990, 7 cylinders were prepared for recertification. Each cylinder was washed, inspected and hydrostatically tested. As reported in Section 4 (Radiation Protection) of this report, temporary shielding was installed to protect the workers from beta exposure. No problems were reported.

The inspector noted that installation of the two new rotary pellet presses was completed. An access window on the line No. 2 press was modified to facilitate operator maintenance while limiting the operators exposure to resuspended uranium oxide particles. Airborne levels in the vicinity of the presses will be reviewed during future inspections. No problems were identified.

The inspector observed that housekeeping had improved in the change room (men's locker room/contaminated side) since the August 1990 inspection.

In general, housekeeping arrangements throughout the production area were adequate enough to keep evacuation routes open. A tour of the storage barns indicated that the licensee has initiated a major campaign to perform radiological surveys on the equipment in storage. Ultimately, this equipment will be reused or shipped to a licensed disposal site. A review of the survey records indicated that airborne contamination levels (measured in the storage barns) caused by resuspended radioactive particles were less than 10 CFR 20 limits for uranium-235 ($1 \text{ E-}10 \text{ uCi/ml}$).

The inspector also observed that the accumulation of fiberglass prefilters removed from oxide preparation hoods and stored in the vicinity of the old pellet production lines have temporarily altered the appearance of good housekeeping. A campaign to remove these filters requires the licensee to perform a criticality evaluation and a radiological survey (both of which have been completed). Chemical leaching of the prefilters for uranium recovery and/or offsite disposal is also being considered. Region III will review this data and monitor the licensee's progress in disposing of the prefilters during future inspections.

No violations or deviations were identified.

6. Training (IP 88010)

During the October 1990 visit of CE Hematite operations, the Corporate Criticality Specialist conducted criticality safety training for the radiation protection staff. The training consisted of touring facility production and storage operations with emphasis on nuclear safety requirements for the various plant operations. The training was designed to familiarize the Supervisor, Health Physics with criticality safety practices in the storage and control of fissile material. No items of noncompliance were identified.

No violations or deviations were identified.

7. Criticality Safety (IP 88015)

The inspector examined areas of the plant to observe the nuclear criticality safety aspect of uranium oxide pellet production and storage operations.

Facility modifications are reviewed by the Nuclear Licensing Safety and Accountability Manager and the Corporate Criticality Specialist before implementation. The inspector examined the following changes which were approved during the July-October 1990 operating period:

0133 - Provide additional drying capacity for grinder sludge.

0134 - (Incinerator Heat Exchanger) Replace shell and tube heat exchanger with plate and frame heat exchanger.

0135 - Add 2200 liter tank in the evaporator tank area for uranium hexafluoride cylinder wash and filtrate concentration.

- 0136 - Add 8 additional safe volume floor storage rings to an existing storage array of uranium hexafluoride cylinder washings (5 gallon containers).
- 0137 - Provide storage of uranium hexafluoride cylinders w/wo heel quantities (up to 25 pounds for 5% enriched uranium-235) in clear area south of buildings 253 and 256, to reduce handling in washing operations.
- 0138 - Install Hammermill hood and vacuum in building 254 pellet press area.

The inspector determined that appropriate criticality parameters involving mass, geometry of storage vessels, and the interaction of vessels bearing fissile material were considered in the nuclear safety analyses performed by the licensee.

No violations or deviations were identified.

8. Transportation of Radioactive Materials (IP 86740)

The inspector reviewed the licensee's transportation activities to determine whether the licensee is maintaining an adequate program to assure radiological safety in the receipt, packaging, and delivery of licensed radioactive materials.

Records were examined for 4 shipments which contained either uranium oxide pellets or solidified waste. Radiation levels external to the shipping packages were significantly less (10 millirem/hour) than the 200 millirem/hour level allowed by 10CFR 71.47. The level of non-fixed (removable) radioactive contamination on the external surfaces of each package (100 dpm/100 cm²) was far below the 2200 dpm/100 cm² limit allowed by 10 CFR 71.87 for packages ready for transport.

No violations or deviations were identified.

9. Radioactive Waste Management (IP 88035)

Radioactive waste is mostly comprised of contaminated soil and/or insoluble residues left over from uranium wet recovery operations. Contaminated liquid waste associated with these residues is normally reduced in volume by evaporation and solidified with cement. A recent waste reduction campaign resulted in the evaporation of 11,000 liters of liquid waste to about 1200 liters. The ensuing material was solidified, packaged, and shipped to a licensed disposal site. Waste management operations are apparently conducted in accordance with staff review and approval of written procedures.

No violations or deviations were identified.

10. Environmental Protection (IF 88045)

The inspector accompanied by the Health Physics Supervisor toured the site and identified the installation of new wells for monitoring groundwater in the vicinity of the burial site and the Building 240/253 location. The licensee has scheduled the wells for monthly sampling. Results of the November samples were not available during this inspection.

During the August 1990, inspection the licensee and NRC Region III split 5 soil samples obtained from the restricted area. The licensee's results ranged from 4 to 16 pCi/g, while an independent analysis performed by the Idaho National Research Laboratories reported 1.3 to 2.2 pCi/g. The results from both laboratories appear to be in agreement. Region III contracted the Oak Ridge Associated University survey team to conduct an independent (11/26-28/90) study/measurement of contamination levels in the limestone rock used in the licensee's hydrogen fluoride scrubber operations. The scrubber is used to capture the off gases expelled during steam hydrolyzation of uranium hexafluoride. The licensee has previously reported contamination levels of less than 10 pCi/g. In addition, the Oak Ridge team will determine if the licensee's method for obtaining and counting spent limestone samples is adequate. The results of the Oak Ridge findings will be discussed during a future inspection report.

No violations or deviations were identified.

11. Exit Meeting

On November 9, 1990, the inspector met with those licensee representatives identified in Section 1 to present the preliminary inspection findings. The inspector provided his evaluation that the licensee's radiation protection and criticality safety review of plant operations was being adequately maintained.

During the course of the inspection and the exit meeting, the licensee did not identify any documents or inspector concerns or references to specific processes as proprietary information.