

March 27, 1984

Docket No. 70-36

Combustion Engineering, Inc.  
ATTN: Mr. H. V. Lichtenberger  
Vice President  
Manufacturing  
Nuclear Power Systems  
Windsor, CT 06095

Gentlemen:

This refers to the routine safety inspection conducted by Messrs. G. M. France III and W. B. Grant of this office on March 6-9, 1984, of activities at your Hematite facility authorized by NRC Special Nuclear Material License No. SNM-33 and to the discussion of our findings with Mr. J. A. Rode and members of his staff at the conclusion of the inspection.

The enclosed copy of our inspection report identifies areas examined during the inspection. Within these areas, the inspection consisted of a selective examination of procedures and representative records, observations, independent measurements and interviews with personnel.

No items of noncompliance with NRC requirements were identified during the course of this inspection.

In accordance with 10 CFR 2.790 of the Commission's regulations, a copy of this letter and the enclosed inspection report will be placed in the NRC's Public Document Room. If this report contains any information that you (or your contractors) believe to be exempt from disclosure under 10 CFR 9.5(a)(4), it is necessary that you (a) notify this office by telephone within ten (10) days from the date of this letter of your intention to file a request for withholding; and (b) submit within twenty-five (25) days from the date of this letter a written application to this office to withhold such information. If your receipt of this letter has been delayed such that less than seven (7) days are available for your review, please notify this office promptly so that a new due date may be established. Consistent with Section 2.790(b)(1), any such application must be accompanied by an affidavit executed by the owner of the information which identifies the document or part sought to be withheld, and which contains a full statement of the reasons which are the bases for the claim that the information should be withheld from public disclosure. This section further requires the statement to address with specificity the considerations listed in 10 CFR 2.790(b)(4). The information sought to be withheld shall be incorporated as far as possible into a separate part of the affidavit. If we do not hear from you in this regard within the specified periods noted above, a copy of this letter and the enclosed inspection report will be placed in the Public Document Room.

M-12

March 27, 1984

We will gladly discuss any questions you have concerning this inspection.

Sincerely,



C. J. Paperiello, Chief  
Emergency Preparedness and  
Radiological Safety Branch

cc w/encl:

J. A. Rode, Plant Manager

DMB/Document Control Desk (RIDS)

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France  
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U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 70-036

License No. SNM-33

Licensee: Combustion Engineering, Inc.  
Nuclear Power Systems  
Windsor, CT 06905

Facility Name: Hematite

Inspection At: Hematite, MO

Inspection Conducted: March 6-9, 1984

Inspectors: W. B. Grant

*G. M. France, III*  
G. M. France, III

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

*23 March 84*  
Date

*25 March 84*  
Date

*3/26/84*  
Date

Inspection Summary:

Inspection on March 6-9, 1984 (Report No. 70-036/84-01 (DRMSP))

Areas Inspected: Routine unannounced inspection of the Radiation Protection and criticality safety programs including: organization, facility changes and modifications, audits, training, procedure control, operations review, nuclear criticality safety, radiation protection procedures, posting-labeling and control, surveys, notifications and reports, and radioactive waste management. The inspection involved 56 inspector-hours on site by two NRC inspectors.

Results: No violations or deviations were identified.

## DETAILS

### 1. Persons Contacted

G. Boyer, Safety Technician, trainee  
\*L. Deul, Engineer  
\*H. Eskridge, Nuclear Licensing, Safety and Accountability, Supervisor  
\*G. McKay, Nuclear Industrial Safety Coordinator (Radiation Specialist)  
\*R. Miller, Production Control Supervisor  
\*A. Noack, Production Superintendent  
\*J. Rode, Plant Manager  
\*L. Swallow, Quality Control Manager  
N. Wilpur, Safety Technician

Other licensee employees contacted included technicians, operators and maintenance personnel.

\*Denotes those attending the exit interview.

### 2. General

This inspection began at 8:00am on March 6, 1984 and was concluded on March 9, 1984. Normal production of uranium oxide powder, pellets, and scrap recovery was observed during tours of the facility. License SNM-33 renewal was issued December 30, 1983.

### 3. Organization

The inspectors reviewed recent changes in the plant organization. One of the two laboratory technicians being cross trained as a safety technician chose to remain a laboratory technician. In addition, an experienced safety technician resigned in February 1984. In order to augment the radiation protection staff, the licensee recalled an employee on layoff as a safety technician trainee on February 27, 1984. No problems were noted.

No violations or deviations were identified.

### 4. Radiation Protection

#### a. Air Sampling

As discussed in Inspection Report 70-036/83-03, the licensee determined that fixed air sample data is more representative of the pellet plant workers' exposure than is lapel sample data. The licensee therefore is adding fixed air sampling heads in the pellet plant (Bldg. 255) as follows:

1. In front of the new can cleaning hood;
2. At the new utility hood;
3. Pellet pan layout table area;
4. At the Grinder

In addition, the existing sample heads at each pellet press were moved closer to the operators' breathing zone.

The pellet plant has been closed since June 1983, except for approximately two weeks between February 27 and March 8, 1984. The licensee will attempt to collect additional data on lapel vs. fixed air samples at the agglomeration station when the pellet plant is in operation for a longer period of time.

Since June 1983, except for the short time the pellet plant operated air was continuously sampled from about 20 fixed locations. During pellet plant operation an additional 12 locations are sampled. Samples are counted daily. No exposures exceeded 40 mpc-hours, the weekly control level for insoluble uranium dioxide. No problems were noted.

b. Urinalysis

Monthly analyses since the inspection in August 1983 disclosed one individual with a concentration above the action point of 25 ug/l uranium-235. In September 1983, an operator's urine sample was reported to have a concentration of 26.9 ug/l. According to procedure, the operator was immediately resampled and this analysis showed a concentration of less than 5 ug/l. No further action was required. The average concentration for all individuals sampled since August 1983 was less than 5 ug/l. No other problems were noted.

c. In Vivo Counting

Whole body counts (WBC) were conducted in October 1983 and March 1984. About 50% of the operators were counted during each session. During the October 1983 session two individuals exceeded the licensee's 130 ug of uranium-235 action level. (The maximum permitted organ burden for the lung is 200 ug.) One individual has been restricted from uranium work for many years. The other individual was whole body counted again the same day and remained slightly above the 130 ug level. Since the licensee could not determine a cause for the apparent elevated count the individual was restricted from further uranium work. The March 1984 WBC for the second individual was normal and he was released from the uranium work restriction. All other WBCs averaged about 43 ug. The inspectors interviewed the licensee's WBC contractor and determined that minimum detectable activity (MDA) is about 35-40 ug depending upon the thickness of the chest wall.

d. Surveys

Records of smear surveys of materials and equipment released from the plant and plant operating areas were reviewed. No problems with the survey system or results were identified.

Lunch room tables are smear surveyed daily. The licensee has recently raised the level of removable alpha contamination at which the lunch room tables must be decontaminated from 10 dpm/100 cm<sup>2</sup> to 20 dpm/100 cm<sup>2</sup>. The inspectors noted that 20 dpm/100 cm<sup>2</sup> is one tenth of the level allowed without decontamination in Regulatory Guide 8.24 and that the change was needed due to counting statistics. No problems were identified.

No violations or deviations were identified.

## 5. Radioactive Waste Management

### a. Solid Wastes

Records of recent low specific activity (LSA) waste shipments to burial sites were reviewed. Two shipments have been made since the August 1983 inspection. On November 21, 1983, 76 drums of waste containing 99 mCi were shipped. On January 26, 1984, three LSA boxes of contaminated soil containing 40.6 mCi were shipped. Shipping papers, survey records, and certifications indicated there were no problems.

### b. Liquid Wastes

Laundry waste water remains the only radioactive liquid released from the facility. Measured volumes are sampled and discharged through the storm sewer to the site pond which flows to Joachin Creek. Quantities released have been less than 20 grams of uranium per month and concentrations are well within the MPC for release to an unrestricted area.

### c. Airborne Releases

Ten stacks are continuously sampled when associated equipment is in operation. Stack samples are changed and analyzed weekly. Count data are combined with exhaust volumes, which are determined annually, to calculate radioactive concentrations and stack loss quantities. A review of this data showed that concentrations from each stack were less than MPC for release to unrestricted areas. Concentrations generally are less than 1E-12 uCi/ml.

No violations or deviations were identified.

## 6. Audits

The inspectors reviewed the semiannual nuclear safety audit conducted by the Hematite criticality specialist, the weekly inspections conducted by the Nuclear Licensing, Safety and Accountability Supervisor, and the annual audit of the Nuclear Safety Program conducted by Windsor representatives in January 1984. Except as noted in Section 9A, no significant problems were noted concerning the audits and inspections.

No violations or deviations were identified.

## 7. Notifications and Reports

The inspectors selectively reviewed licensee reports submitted in accordance with 10 CFR 20.407 and 10 CFR 20.408 (occupational exposure), and 10 CFR 20.409 and 10 CFR 19.13 (reports to individuals). No problems were noted.

No violations or deviations were identified.

## 8. Facility Modifications Changes

The inspectors reviewed documentation of facility changes requiring criticality considerations performed since August 1983 (Report No. 70-036/83-03). The changes included:

- a. A filter press (cylinder wash filter press) was incorporated into the wet recovery, acid insoluble filtration system. This system was added to provide increased capacity for acid insolubles during dissolution of low grade scrap. Uranyl nitrate ( $\text{UO}_2(\text{NO}_3)_2$ ) is the fissile material formed during the dissolution process. The configuration is based on the  $\text{UO}_4$  filter press (located SE corner of building 240-2) which was discussed in the original wet recovery application.
- b. The roller conveyor assembly in building 255 was lowered approximately 6.5". An area beneath the conveyor was designated for storage of scrap  $\text{UO}_2$  pellets in a 5 gallon container. This configuration, involving the movement and subsequent interaction of fissile material, with  $\text{UO}_2$  pellets stored beneath the conveyor in a 5 gallon pail, necessitated a new nuclear safety analysis. The inspectors reviewed the criticality analysis and discovered an arithmetic error in the calculation. The licensee corrected the arithmetic error and calculated a new value, hence, demonstrating that the system was actually more conservative than previously shown. The inspectors cautioned the licensee to conduct nuclear safety analyses with a sense of urgency and accuracy. This item was discussed during the exit interview.
- c. A material consolidation hood was relocated to use as a new can cleaning hood. This replaces the old can cleaning hood and improves ventilation of the can cleaning operation. Uranium oxide, ( $\text{UO}_2$ ) powder and pellets, is the fissile material used in the operation. There was no change in the operation, hence the consideration for interaction of fissile material remained the same.

Notwithstanding the arithmetic error, in depth discussions with the licensee's Nuclear Licensing, Safety and Accountability Supervisor, and a review of recent nuclear criticality analyses, demonstrated to the inspectors that the licensee uses conditions and assumptions in

performing NCS analyses that are valid, and that facility modifications and changes undergo independent reviews that meet nuclear safety, industrial and health safety practices.

No violations or deviations were identified.

## 9. Nuclear Safety

During an independent tour of the facility the inspectors confirmed that signs listing approved nuclear criticality safety limits were posted in a manner discernible to employees and commensurate with the referenced license renewal application. The inspectors confirmed through records review and inspections of SNM storage arrays, that the licensee was using uranium enriched to a maximum 4.1 weight percent in the U-235 isotope in quantities conformable to license condition 8A.

### a. Licensee Nuclear Safety Audits

The inspectors reviewed audit reports conducted by the Nuclear Safety, Licensing and Accountability Supervisor, the Quality Control Manager, and representatives from corporate management conducted since August 1983, the date of the previous NRC inspection. Several significant problems that were identified have been corrected and closed.

1. Excessive use of mop buckets throughout the plant. The licensee has limited the number of mop buckets to one in each area.
2. Improved use of "empty" labels. The licensee has designated areas, posted with signs marked empty, where empty powder and pellet cans may be stored without labeling each container.
3. An internal audit identified 2 trash bags that were not properly stored in the gamma counting area. The inspectors verified through discussion and visual observation that this problem was corrected.
4. The corporate audit revealed that five storage positions located on the second and third levels of the oxide building exceeded the posted mass limit. In addition, the blender in the red room has no criticality limit sign, and no criticality limit signs were posted in building 252 where a large number of filters containing various amounts of  $\text{UO}_2$  were stored. The inspectors observed that the licensee corrected these problems.

### b. Criticality Monitoring Systems

The licensee maintains one or more spare criticality alarm units, for rapid deployment in case of unit failure. Under conditions of alarm system unit failure, all SNM movement is halted by administrative controls. These administrative controls remain in effect until a spare criticality alarm unit is installed.



In December 1983, the licensee completed the annual calibration of the criticality alarm system. This item was left open during the August 1983 NRC inspection (70-036/83-03). To date, weekly checks have shown that the nuclear alarm and emergency equipment systems are functioning properly.

c. Examination of Unsafe Geometry Containers

The inspectors reviewed the licensee's data for the annual inspection and testing of Raschig Rings. It appears that the licensee has met the general specifications and criteria, stated in the American National Standard (referenced in Regulatory Guide 3.1) which described the use of borosilicate-glass Raschig rings as a neutron absorber in solutions of fissile material. The licensee's 1983 data has not been published. The inspectors will review the document during the next inspection.

Based on an examination of licensee records and in depth interviews with plant personnel, it appears that facility operations are being conducted safely.

No violations or deviations were identified.

10. Training

The licensee conducted annual employee respiratory training sessions to review instructions on the proper use of respiratory equipment and the locations of respiratory controlled areas.

The inspectors verified through record review and in depth interviews with the Nuclear Licensing, Safety and Accountability Supervisor, and the Nuclear Industrial Safety Coordinator, that the licensee conducted annual retraining in criticality control and radiation safety, as stated in the license renewal application. Training sessions were scheduled to accommodate operators from all three of the workshifts.

No violations or deviations were identified.

11. Posting, Labeling, and Control

During plant tours, the inspectors observed posting and labeling of radioactive material and contaminated areas. No posting or labeling problems were noted.

Work which has criticality or radiation safety significance must be performed under a Special Evaluation Traveler or a Shop Traveler. Selected travelers currently in use were reviewed. No problems were noted.

No violations or deviations were identified.

12. Safety Committees

Each operating shift held monthly safety meetings during 1983. During each meeting, a specific topic related to radiation or industrial safety was discussed. In addition, criticality safety training and respiratory protection training were conducted annually.

13. Exit Meeting

The inspectors met with licensee representatives (denoted in Section 1) at the conclusion of the inspection on March 9, 1984. The inspectors summarized the scope and findings of the inspection. The inspectors stated that there were no violations, deviations, or other problems identified within the scope of this inspection. The licensee acknowledged the inspectors' comments concerning the criticality calculational error.