70-36

AUG 31 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 August 6-10, 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, 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

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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.

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

Sincerely,

C. J. Paperiello

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

Enclosure: Inspection Report
No. 70-36/84-03(DRSS)

cc w/encl:
J. A. Rode, Plant Manager
DMB/Document Control Desk (RIDS)

RIII	RIII	RIII	RIII
France/sf	Grant	Greger	Paperiello
08/31/84			8/31/84

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 70-36/84-03(DRSS)

Docket No. 70-36 License No. SNM-33

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

Facility Name: Hematite

Inspection At: Hematite, MO

Inspection Conducted: August 7-10, 1984

Inspectors: G. M. France, III — 8/31/84 Date

W. B. Grant — 8/31/84 Date

Approved By: L. R. Greger, Chief
Facilities Radiation
Protection Section — 8/31/84 Date

Inspection Summary:

Inspection on August 7-10, 1984 (Report No. 70-36/84-03(DRSS))
Areas Inspected: Routine, unannounced inspection of the radiation protection and criticality safety programs including: organization, facility changes and modifications, internal reviews and audits, maintenance, operations review, nuclear criticality safety; radiation protection program, instruments, and equipment exposure control, posting-labeling controls, surveys, radioactive waste management, and emergency planning. The inspection involved 52 inspector-hours on site by two NRC inspectors.
Results: No violations or deviations were identified.

DETAILS

1. Persons Contacted

G. Boyer, Safety Technician
*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

*Denotes those present at the exit meeting.

2. General

This inspection, which began at 8:30 a.m. on August 7, 1984, was conducted to examine licensee actions in complying with regulatory requirements related to fuel facilities. In addition, the inspectors reviewed licensee activities in accordance with statements, representations, and conditions contained in material license SNM-33. The inspectors toured the licensee's Nuclear Fuel Manufacturing facility located near Hematite, Missouri.

3. Organization

The inspectors reviewed the licensee's organizational structure and noted that only one worker was added to the plant work force since the previous inspection.

The new employee was hired as an operator and received training in industrial and nuclear safety, radiation protection and an engineering review of systems in wet recovery processes. The new operator was placed with an experienced operator for continued on the job training.

No problems were identified.

4. Radiation Protection

The inspectors reviewed the licensee's internal and external exposure control programs since the March 1984 inspection, including: film badging, bioassay, air sampling and associated records, reports and notifications, and the licensee's program for maintaining occupational exposures ALARA.

a. Internal Exposure Control

The inspectors reviewed results of routine urinalyses performed on Hematite personnel since March 1984. All reported bioassay results were less than the licensee's action level of 25 micrograms of uranium per liter (25 ug U/l). Results of whole body counts were discussed previously in Inpsection Report 84-01 (March 1984).

b. External Exposure Control

The licensee's dosimeter program exposure records are handled by Landauer. The inspectors reviewed exposure records of plant personnel and visitors and determined that no exposure level in excess of 10 CFR 20.101 limits was noted. Year to date, an employee working in uranium oxide powder production received 420 mRem, representing the highest reported exposure.

c. Air Sampling

The inspectors reviewed the licensee's program for determining exposure to personnel from airborne radioactivity detected by label samplers, fixed air samplers, and continuous air monitors (CAM). The licensee has conducted ongoing surveys to determine which plant processes and ancillary equipment are sources for airborne exposures. Data was collected recently from a fixed air sampler located near a pellet press. The air sampler averaged 3.5E-11 uCi/ml, while the corresponding area monitor (CAM) averaged 1E-11 uCi/ml. The inspectors noted that the survey data averaged less than the licensees action level of 8E-11 u/Ci/ml. A detailed discussion of the licensee's air sampling program was presented in inspection reports 84-01 and 84-03.

The inspector reviewed the licensee's airborne exposure summary and selected 12 of the higher air sample results and follow-up reports for discussion with the Nuclear Industrial Safety Coordinator.

The inspectors noted that the airborne exposure summary lists the weekly cumulative MPC hours, lapel sample data, and bioassay data for each operator. In addition, a description of each exposure incident is recorded and cross referenced with a report number. The report number is given to any airborne incident that equals or exceeds the airborne concentration action level of 8E-11 uCi/ml. The corrective action required is described on the High Sample-Follow-Up form.

The inspectors concluded that the described method of documentation provides the licensee with a summary of plant incidents and applied corrective actions designed to preclude events from recurring.

One report noted that data collected from an operator's lapel sampler showed 6.6E-9 uCi/ml, while the follow-up bioassay was less than 1 ugU/l. The operator had been decontaminating the surface of a pellet grinder that was previously cleaned of removable UO_2, but which apparently still contained fixed contamination. It was concluded that grated particles or sparks containing fixed contamination had become airborne and deposited in the lapel sample filter, thus causing high sample counts.

d. Instruments and Equipment

The licensee improved his capability for detecting low-levels of radioactivity in the air sampling program by procuring a new alpha-beta gas proportional counter. The low-level detector is programmed to count air samples taken from plant site and off-site locations. The inspectors noted that background levels for alpha and beta counts with the new counter is lower due to improved shielding and state of the art electronics.

e. Maintaining Occupational Exposure ALARA

The inspectors reviewed the licensee's program for maintaining occupational exposures ALARA, including ALARA considerations and workers awareness of process equipment as a source of airborne contamination.

The inspectors noted that the licensee's ALARA program was not implemented through a formal program. Implementation of the ALARA program is based on the licensee's commitment in Section 2.1 of the license application, dated January 29, 1982, which states that the licensee is committed to keep radiation exposures to employees and the general public as low as reasonably achievable.

In support of the ALARA policy the licensee's Radiation Specialist recently conducted an air sampling survey program that identified several items of process equipment as potential sources of airborne contamination. Subsequent engineering modifications were made to include reworking of duct work to improve ventilation. Additional modifications required a change in the filter systems that serve the pellet presses and ancillary plant areas. As a result of the engineering modifications the average concentration of airborne radioactivity measured throughout the plant was reduced. Fixed air sampler data, based on the analyses of nearly 500 air samples throughout the plant, averaged 2.4E-12 uCi/ml. Previous surveys of air sample data collected before the ventilation system was improved showed an average concentration of airborne radioactivity of 5.8E-12 uCi/ml.

f. Source Leak Test

The inspectors reviewed the licensee's records of the semi-annual leak test performed on two Cobalt-60 sources during July 1984. The records appeared to be complete and the tests performed in accordance with the provision of SNM-33, License Condition 13.

No violations were identified.

5. Facility Modifications Changes

The inspectors reviewed the licensee's documentation of facility changes requiring criticality considerations, including determination of whether the licensee has positive management controls to ensure that facility operations are conducted within nuclear criticality safety limits.

The inspectors reviewed documentation of the following facility changes requiring criticality considerations performed since March 1984 (Report No. 70-036/84-01).

a. The engineering department initiated a change to convert a material consolidation hood to a oxide powder can cleaning hood. The change involved relocating the hood and improving ventilation for operators performing maintenance on UO_2 powder shipping cans and or pellet pans. The nuclear safety requirements did not require any change. The spacing of the new hood did not significantly change the interaction among vessels containing fissile material. A similar nuclear safety analysis was discussed in the March inspection report.

b. The side by side incinerator system was separated in order to place fissile material in each unit. Each incinerator forms an exclusion area. Because of engineering design, the two incinerators cannot operate simultaneously. The new spacing allows one incinerated batch to cool, while another batch is processed in the second incinerator. All equipment under review is located in accordance with surface density criteria discussed in CE's license application.

c. The UO_2 powder storage conveyor was lowered 6 inches to facilitate the transfer of powder cans to the storage conveyor. This small change caused no significant interaction problem. The previous arrangement of locating the equipment that handled fissile material and identifying the parameters of interaction was validated by computer calculations.

d. An exhaust flexi hose was added to the exhaust duct work that directs flow of UF_6 from the vaporizers to the UF_6 scrubber. This addition provides ventilation in the dock area when maintenance is required. Health physics and environmental safety controls are improved by this addition, but no criticality significance is apparent.

e. Two drying ovens were relocated for drying acid insolubles generated from wet recovery operations. This addition simplified the process of transporting acid insolubles to the pellet plant for drying. Each dryer is large enough to form its own exclusion area. Each dryer is limited to a safe batch by weight with the original nuclear safety analysis being validated by surface density calculation.

f. Wall and floor storage locations were modified to store liquid-solid residues in pails that hold 25 liters. Pellets are excluded. The 25-liter pails were reviewed for safe volume with greater spacing between vessels. The new spacing requires a 9 sq. ft. exclusion area.

The inspectors noted that criticality analyses data and procedures showed required approvals and signoffs by the Nuclear Licensing, Safety and Accountability (NLS&A), Supervisor and the Nuclear Criticality Specialist.

No violations or deviations were identified.

6. Nuclear Safety

The inspectors examined records of audits performed by the licensee in order to determine if any breach of procedures had occurred since the previous inspection. The inspectors accompanied the NLS&A supervisor on a plant tour and examined the posted areas where SNM is used or stored for posting of SNM enrichment and batch limits, proper storage, and use of unauthorized containers.

a. Licensee Nuclear Safety Audits

The inspectors reviewed audit reports conducted by the Nuclear Safety Licensing and Accountability Supervisor and the Quality Control Manager since March 1984, the date of the previous NRC inspection. Problems that were identified and have been corrected and closed, include:

- Some workers are having difficulty understanding the significance of designated exclusion areas in approved storage areas. The NLS&A Supervisor explained to the workers the importance of reducing interaction among vessels containing fissile material by increasing the amount of space between vessels.

- Three containers located in storage array exceeded the posted mass limit by several grams. The NLS&A Supervisor instructed the operator to remove the excess material. Apparently, the moisture absorbed by the oxide contributes to the weight increase.

The inspectors observed several discrepancies in nuclear criticality safety practices during a tour of the facility. They included:

- Light weight prefilter material containing small amounts of uranium-oxide, was bagged in poly-plastic and stored in an outside area. The inspectors observed that the light weight material although prebagged, had been scattered about the facility yard, apparently by the wind. The licensee indicated that the waste material was temporarily stored until processed for incineration. The licensee agreed to promptly review and evaluate the problem. This was discussed in the exit meeting.

- A criticality sign showing storage limits of gamma counted HEPA filters was missing; it may have fallen behind the filter array. The inspectors examined the criticality log book of signs and identified a copy of the sign that would be normally displayed. The NLS&A Supervisor initiated steps to correct this oversight during the inspection. This item was discussed during the exit meeting.

- One container in array storage slightly exceeded the posted mass limit, probably due to moisture absorbtion. The NLS&A Supervisor initiated corrective action procedures. The excess material (UO_2) was removed from the container. The operator was scheduled for instruction on proper adherence to procedures. This item was discussed during the exit meeting.

b. Criticality Monitoring System

The inspectors reviewed the licensee's records and calculations used in the calibration of criticality monitors. Evacuation drills and equipment tests are discussed under Paragraph No. 7, Emergency Preparedness.

c. Examination of Unsafe Geometry Container

The inspectors examined the licensee's data for the annual inspection and testing of Raschig rings. The licensee's annual inspection report was approved and published since the previous inspection, March 1984.

The inspectors interviewed the cognizant engineer who inspected the system and reviewed the published report with the NLS&A Supervisor.

Except for minor weight increases from iron oxide, a slight crack in one ring, and a small amount of corrosion from fluoride ions, there was no significant deterioration in the boron impregnated Raschig rings.

No violations or deviations were identified.

7. Emergency Preparedness

The inspectors verified that fire fighting equipment including fire extinguishers and respiratory protection devices is checked on a periodic basis. The inspectors examined written agreements from several offsite agencies to confirm support for the licensee's emergency preparedness program.

a. Drills

Emergency evacuation drills are conducted at least twice a year. Drills are initiated by activation of the criticality alarms. Personnel assemble in the tile barn, a short distance outside the restricted area fence, where emergency supplies and equipment are kept.

One drill on each shift has been conducted to date in 1984. Records indicate that evacuations, personnel accountability, and re-entries were accomplished expeditiously.

b. Emergency Equipment

Emergency supplies in the tile barn are inventoried weekly. The inventory includes radiation instruments, film badges, dosimeters, protective clothing, respirators, SCBA equipment, and first aid supplies. In addition, SCBA equipment and first aid supplies are available at two locations in the plant.

c. Agreements with Emergency Support Organizations

The licensee has letters of agreement dated January 1984 with the physician who normally provides medical assistance to plant personnel and with Barnes Hospital in St. Louis, which is equipped to handle emergency radiation injuries. Agreements with the Jefferson County Sheriff's Department and the local Fire District were verbally renewed in 1984.

d. Fire Protection

Fire extinguishers are available in all operating and storage areas of the plant. Tags indicated that the extinguishers are visually inspected monthly for seal integrity. The extinguishers are weighed quarterly. The inspectors observed that the quantities of combustible materials in operating areas are small.

Semiannual fire protection inspections by American Nuclear Insurers (ANI) continue.

e. Emergency Training

Respiratory protection, criticality safety, and fire extinguisher and SCBA usage are annual subjects in safety meetings. Safety technicians, foremen, and some operators are trained in first aid.

The Emergency Call-In list was reviewed and updated in March 1984. Names and phone numbers were revised as necessary. Offsite agency contracts were made and names of cognizant personnel and phone numbers changed as necessary.

No violations or deviations were identified.

8. Maintenance and Surveillance Testing

The inspectors reviewed the licensee's work control procedures and system maintenance operations that define criteria under which work in process areas or vital areas of the plant will be permitted.

a. Surveillance Testing

The licensee maintains surveillance tests on mechanical process systems, such as fissile material receiving, storage, handling, and fuel manufacturing. Ventilation systems for these mechanical process systems are checked weekly. Material processing hoods are checked for proper flow rates. An action level of 150 cubic feet per minute or less is the criteria used to replace filters.

b. Work Control Procedures

Special evaluation travelers, which are temporary operating procedures, were reviewed for the period January 1984 to date. The travelers are in fact operating procedures for processes which are not routine. In addition to specific procedures for conducting the

operation, the traveler specifies any special equipment that may be required such as respirators, gloves, rubber aprons, or face shields. All special evaluation travelers go through a review/approval process which must be completed prior to starting the job. The traveler stays with the job until it is complete.

No violations were identified.

9. Audits

The inspector reviewed reports of audits and appraisals, including audits required by ANI.

American Nuclear Insurers (ANI) conducted an audit of the licensee's program on April 25-26, 1984. The audit had no new findings. Two previous recommendations were closed: (1) The UF_6 vaporizer safety systems were judged adequate to preclude enclosure of the system. (2) Monthly employee urinalyses were changed from a contractor to the corporate office (Windsor) with a resulting more timely reporting of results.

No violations or deviations were identified.

10. Radioactive Waste Management

The inspectors reviewed the licensee's records to determine whether the licensee is complying with regulations and license requirements related to the release and disposal of liquid, airborne, and solid radioactive waste.

a. Solid Wastes

Records of recent low specific activity (LSA) and limited quantity waste shipments to burial sites were reviewed. Two shipments have been made since the March 1984 inspection. On April 6, 1984, 60 drums of waste containing 33.4 mCi were shipped. On May 18, 1984, 60 drums of waste containing 36.3 mCi were shipped. Shipping papers, survey records, and certifications were reviewed; no problems were identified.

b. Liquid Waste

Laundry waste water is 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 Joachim Creek. Quantities released have been less than 11 grams of uranium per month and concentrations are well within the MPC for release to an unrestricted area. No problems were identified.

c. Airborne Releases

Ten stacks are continuously sampled when associated equipment is in operation. Stack samples from the recycle and wet recovery areas and from the incinerator and storage area are sampled and analyzed

daily. The remainder of the stacks are sampled 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-13 uCi/ml.

No violations or deviations were identified.

11. Proposed Monitoring Program for Spent Limestone Rock

License Conditions 16 and 18 of SNM-33 (December 30, 1983 renewal) require the licensee to: (1) submit to the NRC, within 60 days, a description of a proposed monitoring program to determine the quantity and environmental effects of radioactivity on spent limestone rock used as onsite fill material; (2) determine the environmental effects of outdoor storage of alpha-contaminated material; and (3) submit a plan, including schedule, for disposal of alpha-contaminated spent limestone rock. The licensee submitted the proposed monitoring program and the proposed plan for disposal of alpha-contaminated limestone rock on February 28, 1984.

The Combustion Engineering Hematite plant uses limestone rock chips in dry scrubbers to remove hydrogen fluoride from the off gas of the UF_6 to UO_2 conversion process. Limestone chips are partially converted to calcium fluoride in the scrubbers, and are referred to as "spent limestone" after removal from the scrubbers. Currently the spent limestone is held for monitoring with an alpha survey meter, and the containers are tagged for release as fill material if no alpha activity above background levels are detected. Spent limestone with detectable activity of less than 1000 dpm/100cm^2 is quarantined in an intermediate storage pile at the southeast corner of Building 255. Should the activity level exceed 1000 dpm/100cm^2, the limestone is sealed in 55-gallon drums for shipment to a licensed burial site.

According to licensee representatives, the proposed monitoring program could be implemented within 60 days of NRC approval. The disposal of quarantined spent limestone is planned for late 1984 depending upon NRC approval and weather conditions.

12. Decommissioning of Evaporation Ponds

License Condition 19 of SNM-33, (December 30, 1983 renewal) requires the licensee to decommission the evaporation ponds as soon as reasonably achievable and to submit, within 90 days, a proposed plan for the decommissioning. On March 8, 1984, the due date was extended to May 30, 1984. The licensee submitted the decommissioning plan as required. The plan proposes nine steps to decontaminate and decommission the primary and secondary evaporation ponds located in the southwest corner of the fenced manufacturing area. The object of this action is to reduce residual contamination concentrations of the ponds to as far below acceptable levels as is practical for eventual release for unrestricted use. Anticipated residual contamination concentrations are below 250 picocuries per gram. Five decontamination steps have already been accomplished and

number six is in progress. Completion of sludge removal and residual activity sampling (Steps 7, 8 and 9) are scheduled for completion in 1984, contingent on relatively dry weather. After submission of a survey report and NRC approval, the licensee plans to cover both ponds with a minimum of four feet of clean overfill. This is scheduled to be completed prior to the expiration date of SNM-33, which is December 31, 1988.

13. Dose to Nearest Resident

The inspectors reviewed the licensee's environmental monitoring program, including a tour of the sampling site locations and specific requirements of Materials License No. SNM-33, License Condition 20.b.

The inspectors reviewed the licensee's method for calculating the maximum individual dose to the nearest resident. For airborne effluents released into the environment, the pathways considered in the individual dose estimates included (a) direct irradiation from either ground or shore line deposition, (b) direct inhalation, and (c) ingestion pathways (vegetation, meat, milk) due to airborne deposition. For liquid effluent releases, the pathways included (a) potable water, (b) aquatic food (fish), and (c) shoreline deposition. The models and various assumptions involved in these environmental pathways are those referenced in Regulatory Guide 1.109.

The semiannual release rates of radiological effluents were used as source term for these assessments. The releases were measured values. The respective semiannual release rates were averaged for a representation six-month rate and the value doubled for the annual release value used in the calculations. The critical pathway was determined to be due to inhalation resulting in a maximum dose to the lung of a normal adult of 0.07 mrems/yr. The critical individual in the inhalation pathway is an infant (0-1 years of age). The lung dose to the infant was calculated to be 0.12 mrems/yr. The licensee therefore concluded that the maximum annual lung dose was well below the 25 mrems specified in 50 CFR 190.

Continuous samples are collected at the site boundary, at the nearest residence, and in the prevalent wind direction to determine the annual dose using the above parameters. The inspectors reviewed these sample results; no problems were noted.

14. Exit Meeting

The inspectors met with licensee representatives (denoted in Section 1) at the conclusion of the inspection on August 10, 1984, the inspectors summarized the scope and findings of the inspection. In response to certain items discussed by the inspectors, the licensee:

a. Stated that prefilter material in bags which were being stored outside would be placed in 5 gallon pails until they were processed.

b. Stated the criticality sign in the HEPA storage area would be replaced.

c. Stated operators would be instructed on proper adherence to procedures.