JUN 10 1985

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 Mr. G. M. France, III of this office on May 6-10 and 27, 1985, 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 at the conclusion of the onsite 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.

During this inspection, certain of your activities appeared to be in non-compliance with NRC requirements, as specified in the enclosed Appendix. The inspection showed that action had been taken to correct the identified noncompliance and to prevent recurrence. Consequently, no reply to this noncompliance is required and we have no further questions regarding this matter at this time.

In accordance with 10 CFR 2.790 of the Commission's regulations, a copy of this letter and the enclosures will be placed in the NRC Public Document Room.

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

Sincerely,

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

Enclosures:
1. Appendix, Notice of Violation
2. Inspection Report No. 70-36/85001(DRSS)

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

RIII
France/jp
06/07/85

RIII
Greger

RIII
Paperiello

Appendix

NOTICE OF VIOLATION

Combustion Engineering, Inc.
Nuclear Fuel Manufacturing Facility
Hematite Facility

Docket No. 70-036

As a result of the inspection conducted on May 6-10 and 27, 1985, and in accordance with the General Policy and Procedures for NRC Enforcement Actions, (10 CFR Part 2, Appendix C), the following violation was identified:

10 CFR 20.311(d)(3) requires any waste generating licensee who transfers waste to a land disposal facility to conduct a quality control program that demonstrates compliance with 10 CFR 61.55 and 61.56.

Contrary to the above, 2 drums (887 and 889) containing liquid waste were not completely solidified when inspected by the South Carolina Department of Health on February 4, 1985. A similar problem was observed during this inspection.

This is a Severity Level IV violation.

The inspection showed that action had been taken to correct the identified item of noncompliance and to prevent recurrence. Consequently, no reply to this item of noncompliance is required and we have no further questions regarding this matter.

Dated June 10, 1985

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

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 70-36/85001(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: May 6-10 and 27, 1985

Inspector: G. M. France, III June 10, 1985
Date

Approved By: L. R. Greger, Chief 6/10/85
Facilities Radiation Protection Section
Date

Inspection Summary

Inspection on May 6-10 and 27, 1985 (Report No. 70-36/85001(DRSS))
Areas Inspected: Routine, unannounced inspection of the radiation protection program including: organization, facility changes and modifications, environmental protection, maintenance, operations review, nuclear criticality safety, radioactive waste, generator requirements, and transportation activities. The inspection involved 28 inspector-hours onsite by one NRC inspector.
Results: One violation was identified in the area of radwaste generator requirements (inadequate solidification of radwaste shipment-Section 6).

DETAILS

1. Persons Contacted

*L. Deul, Engineer
*H. Eskridge, Nuclear Licensing, Safety, and Accountability Supervisor
*R. W. Griscom, Engineering Supervisor
*G. McKay, Nuclear Industrial Safety Coordinator (Radiation Specialist)
*R. Miller, Manager, Production Control and Administration
*A. Noack, Production Superintendent
*J. Rode, Plant Manager
J. D. Harter, Shipping and Receiving Foreman
B. Pigg, QC Laboratory Supervisor

M. Ryan, Chem Nuclear, Inc.
S. Creech, Chem Nuclear, Inc.

The inspector also interviewed other production and laboratory personnel during the inspection.

*Denotes those present at the exit interview.

2. General

This inspection, which began at 2:30 p.m. on May 6, 1985, was conducted to examine licensee actions in complying with regulatory requirements related to fuel facilities. In addition, the inspector reviewed licensee activities in accordance with statements, representations, and conditions contained in Material License SNM-33. During a tour of the licensee's Nuclear Fuel Manufacturing facility located near Hematite, Missouri, the inspector noted that the plant was operating three work shifts, 7 days a week, because of commitments made by their Windsor, CT operations. During the course of the inspection, the plant was processing 3.4 percent enriched uranium material.

3. Management Organization and Controls

The inspector reviewed the licensee's management organization and controls for radiation protection, operations, and radwaste generation, including changes in the organizational structure, procedure revising and updating, and utilization of audit systems.

a. Organization

There have been no personnel changes in the health physics organization since the previous inspection (70-36/84005). The inspector noted that the radiation protection organization appears to have onsite management support to insure implementation of an effective control program.

b. Procedure Revising and Updating

The inspector confirmed that the licensee reviews and updates procedures biennially. Updated procedures are reviewed by the Nuclear

Licensing, Safety, and Accountability Supervisor, designated persons from Production and Engineering Departments and the Quality Control Engineer. In addition, the Quality Control Engineer acts as custodian for document controls.

During a plant tour the inspector observed that plant operators performing steps to remove residual uranium hexafluoride (UF_6) from UF_6 cylinder were following updated procedures and operating sheets.

The inspector concluded that the licensee's system for reviewing and approving procedures complies with license requirements.

c. Internal Reviews and Audits

The inspector verified that the licensee utilizes independent audits conducted by corporate personnel as another means of reporting deficiencies to management. Routinely, the Nuclear Licensing, Safety, and Accountability Supervisor acts as liaison to management for conducting audits and promptly reporting deficiencies to management and/or to NRC.

The inspector examined licensee records and verified that appropriate corrective measures were taken to correct deficiencies found during the 1984 corporate audit of the Hematite plant. (See Section 8(a)).

No violations or deviations were identified.

4. Radiation Protection

The inspector reviewed the licensee's internal and external exposure control programs including the required records, reports and notifications, and the licensee's program for maintaining occupational exposures ALARA.

a. Internal Exposure Control

About 20 operators received whole body counts on March 13-14, 1985; three of these workers were recounted due to contamination found on their clothing. Other than the worker mentioned in previous inspection reports who has been restricted from uranium work for several years, no individuals exceeded the licensee's action level of 130 µg of uranium-235. No problems were identified.

The inspector reviewed the results of routine urinalyses performed on plant personnel from January through March 1985. The highest urinalysis result showed about 40 µg U/liter. This occurred when the operator accidentally struck a blow back valve and caused a release of UO_2 powder. Subsequent urinalyses showed a concentration of 13 µg U/liter which is below the licensee's action level of 25 µg U/liter. The employee was placed on restriction and assigned 24 MPC-hours due to the exposure incident. The MPC-hour assignment was calculated from fixed air sample data and appears to show reasonable agreement with the urinalysis data.

No problems were identified.

b. External Exposure

The licensee's film badge records for 1984 were examined. The maximum whole body dose was about 500 millirem. During the course of this inspection the licensee was engaged in the removal of dissolver heels (residual uranium hexafluoride (UF_6) that remains in the 2.5 ton cylinders after UF_6 processing is completed). Exposure levels reached about 100 mR/hr at the surface of two of the cylinders. The dissolver heels campaign involves about 50 cylinders, most of which show exposure levels significantly less than 100 mR/hr. Area dosimeters were strategically placed in the work area, surveys were conducted and workers were inspected for proper clothing, dosimeters, and film badges. The radiation levels were apparently caused by conditions that occur in the gaseous diffusion process. Deposits of technetium-99 are carried as contaminates along with UF_6 from the enrichment plant to UF_6 cylinders. The licensee's dissolver heels program should last through June of 1985. The program will be reviewed during a future inspection.

c. Instrument Calibration

Records of portable instrument calibrations performed since the last inspection indicated that portable health physics survey instruments were calibrated quarterly as required.

d. Source Leak Tests

The inspector examined licensee records for leak testing byproduct material sealed sources. The licensee's leak test records appeared to be complete and tests were performed in accordance with the provisions of Material License No. SNM-33.

e. Air Sampling

The inspector reviewed the licensee's program for determining exposure to personnel from airborne radioactivity detected by lapel samplers. The licensee has set an action level of about 8E-11 µCi/ml for airborne radioactivity concentrations. Lapel sampling data for the eight oxide operators was similar to data compiled in previous years. The action level due to airborne concentrations was exceeded on an average of about 21 times per year for the 1983-84 work period, which is approximately the same as previous recent years. In correlating data for MPC-hour exposure, the inspector noted that MPC hours decreased about 11 percent. The licensee noted that the decrease in MPC-hour exposure is attributed to (1) identification of high airborne locations, (2) operator training and experience, and (3) improved use of operating procedures and operating sheets or special evaluation travelers.

No violations or deviations were identified.

f. Respiratory Protection

The inspector reviewed the licensee's respiratory program including examining the licensee's test equipment for performing quantitative respirator fit tests. The respiratory protection program is conducted in accordance with Regulatory Guide 8.15.

The inspector noted that during an airborne exposure to a pellet plant operator the operator was wearing a lapel sampler and a half-face mask. Although the airborne concentration derived from the lapel sampler exceeded the action level, the operator was wearing a half-face mask (the protection factor allowed an exposure of about 10-MPC hours) which limited the worker's calculated intake to below regulatory and licensee action limits.

No violations or deviations were identified.

g. Notifications and Reports

The inspector reviewed licensee reports submitted in accordance with requirements of 10 CFR 20.407 (personnel monitoring reports), 10 CFR 20.408 (reports of personnel monitoring on termination of employment or work), and 10 CFR 19.13 (notifications and reports to individuals). The licensee showed documentation of terminated employees' radiation exposure history. The licensee provides each employee with a copy of his/her radiation history, upon termination. The licensee's report on whole body exposures for the 1984 operating year showed that out of 69 employees three had exposure levels greater than 250 millirem, but equal to or less than 500 millirem.

No violations or deviations were identified.

5. Operations Review

The inspector reviewed with the licensee the status of operations at the Hematite facility. In addition, the inspector observed operator practices to determine conformance with operating procedures.

a. Observation of Operations

The inspector was escorted by the Nuclear Licensing, Safety and Accountability Supervisor and Production Engineer during a tour through the Hematite facility. The plant was processing uranium enriched to 3.4 percent. Plant operations had shifted to a 7-day work week in order to effect completion of the campaign in accordance with corporate commitments. An assay change is planned to prepare the plant to process uranium enriched to 4 percent. In response to NRC concerns discussed in information notice 85-31 about build-up of enriched uranium in ventilation ducts, the Production Engineer and Production Supervisor noted that the plant relies on periodic cleaning of the ventilation ducts to prevent a significant accumulation of uranium.

In the most credible area for UO_2 buildup, the UO_2 cooler, the ventilation system is equipped with prefilter material mounted upstream of the main filter. Prefilters are checked frequently for UO_2 powder buildup, removed if necessary, and processed through to incineration. In addition, an assay change in uranium enrichment requires an extensive cleanout of production systems. Scrubber systems are frequently analyzed for uranium concentration in accordance with criticality safety practices. CE Hematite conducts an annual plant shutdown, hence, allowing for additional opportunity to reduce the buildup of enriched uranium in ventilation duct work and in-process systems.

During the plant tour the inspector observed operator practices in removing dissolver heels from UF_6 cylinders. The operator performed the task according to procedure, taking adequate precautions for radiation protection and criticality safety. Dissolver heel rinsings were transferred to containers located in designated arrays to prevent double batching.

No violations or deviations were identified.

b. Housekeeping

During the course of this inspection, the inspector observed that SNM material was stored in designated storage areas, evacuation pathways were clear, and the potential for accumulating fissile materials in unauthorized locations was minimized.

The inspector concluded that the licensee's facility operations appear to be adequate to protect the health and safety of facility workers and members of the general public.

6. Waste Generator Requirements, 10 CFR 20 and 61

The inspector reviewed waste generation activities to determine whether the licensee has established and is maintaining adequate management controlled procedures which reasonably assure compliance with the requirements of 10 CFR 20 and 10 CFR 61 applicable to low level radwaste form, waste characterization and classification, stabilization, and shipment manifests and tracking. The inspector also reviewed licensee actions related to a shipment of solidified radwaste shipped on February 5, 1985, to the burial facility located at Barnwell, South Carolina.

The Manager, Production Control and Administration has the responsibility for establishing and maintaining adequate management-controlled procedures in accordance with 10 CFR 20 and 10 CFR 61. The licensee's Shipping and Receiving Operation procedures (O.S. 1001.1-5) appear to address the regulatory concerns for carrying out various radwaste packaging and shipping activities. By procedure the licensee performs quality control inspections for container integrity and surveys the shipment for radiation levels. There appeared to be a clear delineation of authority and responsibility of those individuals assigned to radwaste processing for low level land burial.

a. Waste Manifests/Classification, Waste Form and Labeling

Licensee records appeared adequate to document a manifest tracking system to include waste form and classification, as required under 10 CFR 20 and 10 CFR 61. The inspector verified that the licensee maintained a current copy of the disposal site license.

b. Quality Assurance Review

QA inspections are conducted by the Shipping, Receiving Foreman along with preshipment surveys conducted by Health Physics Technicians.

The inspector noted that the Manager, Production Control and Administration is the cognizant person required to effect an investigation in any instance where receipt of shipment has not been verified within the specified period.

c. Waste Characteristics Incident

The inspector reviewed the licensee documentation and records of activities to assure that all low-level radwaste conforms to the waste characteristics of 10 CFR 61.56. A letter from the South Carolina Department of Health to CE Hematite dated February 14, 1985, discussed noncompliance with applicable state and federal regulations and an assessed civil penalty of one thousand dollars ($1,000). Chem Nuclear Systems, Inc. operating the burial facility in Barnwell, South Carolina noted that 2 drums purportedly containing solidified liquid waste, from the CE Hematite radwaste shipment of February 4, 1985, actually contained incompletely solidified material.

On May 27, 1985, the inspector met with Mr. M. Ryan of Chem Nuclear, Inc. and discussed operations at the Barnwell radwaste disposal site. Mr. Ryan noted that the QC program requires inspection of shipments by employees of both Chem Nuclear and the South Carolina Department of Health. In a given shipment, 6 to 8 packages may be thoroughly examined. He also noted that every 33rd shipment received a thorough inspection of each package. The Regulatory Affairs specialist of Chem Nuclear, Inc. noted that drums containing solidified waste apparently provide a specific distinctive sound when hit. The drum inspector at the Barnwell burial site investigated the contents of several drums as part of a shipment from CE Hematite. A hole was drilled in each of the drums and a probe was inserted and withdrawn. A gelatinous substance was found on the probe, indicating that the solidification process was incomplete. During the course of this inspection when using a stick to probe the contents of one of the drums, the inspector determined that the surface did not appear to be penetrable. When probing the contents of the other drum, the inspector observed that a gelatinous substance adhered to the stick. The monolith that was formed in each of the 2 drums was still damp and gave the appearance of a concrete form in the curing stage. Failure of a generating licensee to conduct a quality control program that demonstrates that liquid waste will be shipped from burial as a free standing monolith, appears to be in violation of 10 CFR 20.311(d)(3).

Findings that contributed to the problems included: (1) the liquified waste was not properly mixing with the cement to consistently ensure a free standing monolith. (2) inspection of the mixture by the licensee only included the top portion of the drum contents. The licensee notified the South Carolina Department of Health about corrective actions taken in a letter submitted March 5, 1985. The transmittal included revised procedures for solidification of liquid residue. The inspector noted that the licensee now uses a mortar mixer to provide thorough mixing of concrete and liquid radwaste into a homogeneous batch. The mixing occurs outside of the shipping container and the batch of concrete/waste formed is considered a waste ingot. The newly formed ingot is equipped with a rebar rod shaped to enhance lifting and placement into the shipping container. The ingot is also easily inspected to ensure that the concrete and liquid residue form a free standing monolith.

On March 12, 1985, the South Carolina Department of Health acknowledged that CE Hematite had submitted an acceptable procedure for waste solidification, shipments could resume and the payment for civil penalty was received. Upon receipt of a subsequent April 25, 1985 waste shipment, the South Carolina Department of Health indicated that the material met all license requirements and was disposed of in accordance with the burial license.

During a tour of the licensee's waste handling facilities and waste storage locations, the inspector noted that the February 4, 1985 shipment in question had been returned from the Barnwell South Carolina burial location to CE Hematite. The licensee plans to rework the shipment through the solidification process.

One violation was identified.

7. Transportation

The inspector reviewed 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.

The inspector reviewed licensee shipping records and confirmed that health physics surveys were documented. In reviewing records of the licensee's Manager, Production Control and Administration and the records maintained by the Shipping and Receiving Foreman, the inspector noted that a system is in place to maintain a record of each shipment of licensed material in accordance with 10 CFR 71.

No violations or deviations were noted.

8. Nuclear Safety

The inspector examined records of audits performed by the licensee in order to determine if any breach of procedures had occurred since the previous inspection. The inspector 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

In accordance with Material License SNM-33 on February 7, 1985, CE corporate representatives conducted an annual audit of the Nuclear Safety Program at the Hematite facility. The audit also covered the radiation protection program, training, facility changes and evacuation drills.

- In response to audit findings the pellet plant micronizer hood was approved for utility use on a safe batch basis.
- In another response to audit findings technicians were instructed to place trash bags in designated storage boxes after gamma counting.

During a tour of the plant, the inspector verified that the licensee had adequately responded to corporate audit findings.

The inspector also reviewed the quarterly audit conducted by the Nuclear Licensing, Safety and Accountability Supervisor, and the annual audit conducted by American Nuclear Insurers.

No violations or deviations were identified.

b. Examination of Unsafe Geometry Container

The inspector examined the licensee's data for the annual inspection and testing of Raschig rings. The inspector reviewed the published report with the NLS&A Supervisor.

According to the cognizant engineer who inspected the system, there was no significant deterioration in the boron impregnated Raschig rings. No violations or deviations were identified.

c. Facility Modifications and Change Requiring Criticality Review

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

Several changes and/or modifications to operations were noted by the inspector, including:

- An ammonia scrubber hold tank was placed in service. The tank was previously used as a utility tank. This will allow ammonia scrubber solution to be stored separately from potassium hydroxide scrubber solution. Similar to the KOH hold tank criticality is based on uranium concentration. Previous operating data shows a uranium assay of less than 1g U/l. The solution limit for uranium is about 25g U/l.

- A process hood was reclassified as a utility hood to cross blend consolidations of acid insolubles, agglomeration of test batches and other operations to be specified. Operations are conducted on a safe batch basis. As an operating restriction, the micronizer mounted above the hood will not be used to process UO_2 powder.

- An operating procedure was revised to handle the flow of combustible material from its point of origin to incineration. combustibles are generally burned in the incinerator to effect waste volume reduction. The bulk volume of these materials would preclude the accumulation of uranium equal to or in excess of a safe mass. In addition, the material will be processed in small batches and gamma counted for mass control.

- Cylinder rollers capable of rolling the 2 1/2 ton 30-B, UF_6 cylinder were installed to effect dissolution of dissolver heels (residual UF_6 remaining in cylinders after vaporizing major contents through plant processes). Spacing is confirmed by the roller block forming an exclusion area of more than one foot from other SNM. The inspector reviewed the operating sheet, observed the operators in performance of the procedure, and reviewed each step with the cognizant Plant Engineer and Production Supervisor.

- An additional service tank was placed in service to accommodate ammonia diurante filtrate from the UF_6 cylinder dissolution washes of dissolver heels. The filtrate is sampled for grams U/liter, with a limiting quantity of 10 kilograms of uranium. The rinsings are analyzed before additions are made to the ADU service tank.

In depth discussions with the cognizant Engineer, observation of operator performance during dissolver heel dissolution program, and review of recent nuclear criticality analyses with the Nuclear Licensing, Safety and Accountability, Supervisor demonstrated to the inspector 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 and health safety practices.

No violations or deviations were identified.

9. Environmental Monitoring

The inspectors reviewed the licensee's documentation of monitoring results specifying the quantity of low-enriched uranium released to unrestricted areas in liquid and gaseous effluents during the last six months of 1984. The radionuclide concentrations found in liquid and gaseous effluents were significantly lower than limits expressed in 10 CFR 20.

In response to NRC concerns about decommissioning of the licensee's waste ponds, the NLS&A Supervisor escorted the inspector on a tour of the evaporation ponds. The inspector observed that the smaller pond is nearly dry and fitted with a plastic liner designed to act as a collection basin during storm water run-off. Water collected on the liner is analyzed for uranium concentration. Based on the analyses, the water is processed through the discharge system for unrestricted release or evaporated, solidified for waste volume reduction, and shipped to burial.

Soil removal operations have commenced on the larger pond and gravel and sludge was visible on the pond bottom. During the summer of 1985 the licensee plans to remove the remaining sludge and gravel for waste disposal processing.

No violations or deviations to NRC regulations were identified.

10. Maintenance and Surveillance Testing

The inspector reviewed the licensee's maintenance operations to determine specifically whether process monitoring instrumentation is being maintained and calibrated as required.

The licensee's UO_2 powder operations involve no hydrogenous material. The atmosphere in the blender is continuously monitored for humidity, because an increase in moisture detected at the action level will cause an alarm and subsequent cessation of the blending operation. In response to the inspector's concern for nuclear safety, assuring that surveillance tests have been met, the licensee noted that the moisture or relative humidity gauges were traced and monitored on the instrument control panel and that annual maintenance to include calibration was performed by an independent reviewer or vendor.

The inspector noted that the frequency and extent of calibration of moisture gauges appear adequate.

No violations or deviations were identified.

11. Exit Meeting

The inspector met with licensee representatives (denoted in Section 1) at the conclusion of the onsite inspection on May 10, 1985. The inspector summarized the scope and findings of the inspection.

The licensee acknowledged the violation concerning waste form and characterization, described in Section 6, waste generator requirements.

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