

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report Nos. 70-1100/85-03
30-3754/85-01

Docket Nos. 70-1100/30-3754

License Nos. SNM-1067
06-00217-06

Priority 1

Category ULFF

Licensee: Combustion Engineering, Inc.
P. O. Box 500
Windsor, Connecticut 06095

Facility Name: Nuclear Fuel Manufacturing and Nuclear Laboratories

Inspection At: Windsor, Connecticut

Inspection Conducted: May 20-24, 1985

Inspector: *J. Roth*
J. Roth, Project Engineer

9-6-85
date

Approved by: *R. R. Keimig*
R. R. Keimig, Chief
Safeguards Section
Nuclear Materials Safety and Safeguards Branch
DRSS

9-6-85
date

Inspection Summary: Inspection on May 20-24, 1985 (Combined Inspection Report
No. 70-1100/85-03; 30-3754/85-01)

Areas Inspected: Routine, unannounced inspection by a region based inspector (50 hours) of the licensed program including: organization, nuclear criticality safety, operations, radiation protection, transportation activities, 10 CFR Part 61, non-routine events and licensee action on previously identified enforcement items.

Results: Six violations, one deviation and one unresolved item were identified. Violations: failure to maintain a ten inch separation along the length of fuel assemblies in vertical storage (paragraph 3a(2)); storage of containers of SNM in unauthorized locations in the pellet shop (paragraph 3a(3)); two instances of failure to follow SNM logging procedures (paragraph 3a(4)); failure to calibrate level gauges in the liquid waste tanks annually, (paragraph 3a(6)); storage of SNM in an unauthorized location on the Windsor site (paragraph 3b(1)); and failure to leak test an alpha emitting Am-241 source every three months (paragraph 6b). Deviation: failure to require in the QA Manual relative to shipping packages that changes to procedures are properly reviewed and

approved (paragraph 9b). Unresolved item: Authority of the licensee to conduct a self evaluation to authorize storage of fuel rods in a six inch slab (5.5 inch slab authorized by the SNM license). In addition, the licensee committed to complete the surface cleanup of the contaminated wooded area of the site by November 1, 1985.

DETAILS

1. Persons Contacted

Nuclear Manufacturing

- *H. V. Lichtenberger, Vice President, Nuclear Fuel Manufacturing
- *R. E. Sheeran, Manager, Nuclear Licensing, Safety, Accountability and Security
- *R. Klotz, Criticality Safety Specialist
- J. Volaro, Supervisor, Health and Safety
- *J.F. Gibbons, General Manager, Nuclear Fuel Manufacturing

Nuclear Laboratories

- *P. R. Rosenthal, Section Manager, Radiological Protection Services
- E. C. Gordon, Senior Radiological Engineer
- J. Limbert, Radiological Engineer

The inspector also interviewed other licensee employees during the inspection.

*present at the exit interview.

2. License Action on Previously Identified Enforcement Items

(Open) Inspector Followup Item (1100/84-05-01): Licensee reevaluation of the powder hopper mezzanine to address the nuclear safety implications of two full hoppers located within twelve inches of each other during transit. The inspector examined the Nuclear Licensing, Safety and Accountability (NLS&A) approval of a process/equipment/facility change (Approval No. 184) which was issued to reevaluate the powder hopper mezzanine. The K-effective determined by the licensee for two powder hoppers brought to within 1.62 inches of each other was calculated to be a maximum of 0.4501 ± 0.0150 for full density water. This analysis has been submitted to the Office of Nuclear Material Safety and Safeguards (NMSS) for verification. This verification had not yet been completed by NMSS.

(Closed) Violation (1100/84-05-03): Storage of two containers of U-235 in three concrete block storage positions in the pellet shop annex. The inspector verified by observation that no concrete block storage positions throughout the pellet shop contained more than one container. The inspector also verified through discussions with operators that they had been retrained to assure that no more than one container was stored in each storage position.

(Closed) Inspector Followup Item (1100/84-05-04): Assure that the proper information was placed on the labels on containers stored in the storage trailer. The inspector verified by observation that the licensee had properly filled out the labels placed on shipping containers stored in the trailer.

(Closed) Inspector Followup Item (1100/84-05-06): Review licensee corrective actions to assure that pellet "rakes" are not removed from the pellet press enclosure. The inspector verified through discussions with operators that the licensee had reinstructed the operators not to remove the highly contaminated pellet "rakes" from the pellet press enclosures. The inspector also observed that operators were not removing the "rakes" from the enclosures during this inspection.

(Open) Violation (1100/84-05-09) The licensee possesses U-235 enriched in excess of the license limit of 20 weight % as residuals. The licensee has submitted a license amendment application to NRC-NMSS, dated November 30, 1984, to possess up to 1000 grams of U-235 enriched in excess of 20 weight % as residuals. This license amendment application is currently under review.

3. Review of Operations

The inspector examined all areas of the plant and the nuclear laboratories to observe operations and activities in progress; to inspect the nuclear safety aspects of the facilities; and to examine the general state of cleanliness, housekeeping, and adherence to fire protection rules.

a. Nuclear Fuel Manufacturing Facilities

(1) Access Aisle Blockage

During examination of the cold shop, the inspector observed that the access aisle at the northeast entrance to the cold shop (near the double doors between the cold shop and the pellet shop) was blocked by at least five rod and/or turret carts. In addition, the access aisle at the bottom of the steps to the mezzanine in the pellet shop annex was blocked by used filter boxes, waste drums and a package of compacted waste. The inspector stated that the licensee should maintain the aisles clear in all areas of the plant to assure rapid unrestricted egress from the facility in case of an emergency. Licensee representatives stated that all aisles will be cleared and maintained clear. This will be reexamined during future inspections. (IFI 1100/85-03-01).

(2) Fuel Assembly Storage

During examination of the vertical fuel assembly storage room, the inspector randomly measured the spacing between fuel assemblies at the bottom and at the top. The inspector noted that the licensee had installed two inch diameter dowels at the bottom of the racks to assure the required 10 inch center to center spacing. However, the spacing at the top of the assemblies in three locations (Row D Location 10-11, Row K Location 13-14, and Row N Location 18-19) was less than the required 10 inches (approximately 9.75 inches) based on a

previous evaluation. This was identified as a violation of Section 4.3.15 of the approved license application (1100/85-03-02). Licensee representatives indicated that the spacers installed in the top of the storage racks will have to be modified to assure the proper spacing.

(3) Nuclear Safety Posting

(a) Pellet Tray Storage

During examination of the pellet shop, the inspector observed that two trays of Quality Control pellet samples were located on a cabinet situated adjacent to the properly posted table/scale inspection work station at the east end of the pellet shop. This cabinet was not an authorized storage location and was not posted. Storage of the two trays of pellet samples in the unauthorized location was identified as a violation of Section 4.1.4 of the approved license application (1100/85-03-03). Licensee representatives immediately moved these trays to an authorized location.

(b) Pellet Press Postings

The inspector observed that the pellet presses were posted with a limit sign authorizing one pellet boat at each press and equal to or less than one gallon of pellets on the work bench. In addition to a standard approximately 6 inch by 10 inch pellet boat, the inspector observed that a 2 inch by 3 inch tray of pellets was located inside the enclosure for pellet press number 3. This smaller tray of pellets was not authorized by the posted limit sign. This was identified as another example of a violation of Section 4.1.4 of the approved license application (1100/85-03-03). The license representatives stated that the pellet presses will be reevaluated to include placement of this small tray inside the pellet press enclosures and the limit signs will be revised accordingly.

(4) Nuclear Safety Log Sheets

The inspector examined the screening hood and micronizer running balance log sheets for May 20-21, 1985. It was noted that the screening hood log sheet was not being properly maintained as required by operating procedures and the posted nuclear safety limit of 33 kg UO_2 could have been exceeded. Step 4.10 of

Operations Sheet No. 599 states that when sufficient oversized material is available, reweigh the (oversize) UO_2 ; log the weight on the log sheet as weight out; and adjust the net weight (of UO_2 in the screening hood) by subtracting the weight out to give a new net weight. The inspector determined that the quantity of oversized

material that resulted from each processing lot was ~~not~~ accounted for on the log sheet. This material may have been removed from the screening hood, but was not logged out on the log sheet. Assuming that the oversize material was not removed from the hood prior to introduction of the next processing batch, the quantity of UO_2 in the hood may have been as much as about 44 kg UO_2 , in excess of the hood limit of 33 kg UO_2 . Failure to follow the operating procedure was identified as a violation (1100/85-03-04). Through discussions with operators, the inspector determined that the oversized material had been removed from the hood but was not logged out as required.

During examination of the micronizer hood, the inspector observed that a container of 24,660 gms UO_2 had been placed into the hood, but had not been entered onto the micronizer hood log sheet. The running balance on the log sheet indicated a total of 4886 gm UO_2 instead of the actual 29,546 gms UO_2 contained in the hood. Operations Sheet No. 1518, step 4.1, required the operator to record the weight of the UO_2 that is to be micronized in the Micronizing Material Balance Log Book and to add the weight of the UO_2 material being placed into the Micronizing Hood plus the weight of the UO_2 material held in the micronizing system, to obtain the cumulative weight of UO_2 material in the micronizing system. Failure to record the weight of UO_2 placed into the micronizer hood on the log sheet constituted another example of failure to follow procedures (1100/85-03-04). According to the shift foreman, the operator who placed the UO_2 into the micronizer hood had been detailed away from that operation to another job prior to updating the log sheet. The inspector noted that, subsequent to identification by the inspector, another operator independently observed the discrepancy in the log sheet and corrected it prior to initiating any work on the container.

(5) Housekeeping

The inspector noted that the fire load (boxes, paper, files) on the cold shop ventilation mezzanine had increased since the last inspection and that housekeeping in the pellet shop annex (main floor) was poor. The inspector made this same observation during the last inspection. Licensee representatives stated that they were aware of this continuing problem and that actions were being taken to assure cleanup of both areas. This will be reviewed during a subsequent inspection (IFI 1100/85-03-05)

(6) Waste Tank Level Gauges

License Condition 18 requires that the instruments measuring the liquid waste level in each dilution tank from where it is discharged to the Farmington River to be calibrated at least annually. The inspector observed that the waste tank level instruments had not been calibrated between April 27, 1984 and May 24, 1985. Failure to calibrate the instruments at least annually was identified as a violation (1100/85-03-06). The inspector determined by observation and through discussions with licensee representatives that the licensee installed new electronic level probes on each tank prior to this inspection. These new level probes were not operational during this inspection.

(7) Nuclear Laboratories

(a) Outside Storage of SNM

During examination of the outside remote storage pad formerly used for SNM waste, the inspector determined that a trailer (No. 409) located on the storage pad contained unmeasured SNM in internally contaminated equipment removed from the Building 5 ceramics laboratory. Storage of SNM on this waste pad is not authorized by the facility license and is a violation of 10 CFR 70.41 (1100/85-03-07).

(b) Trailer Postings

The inspector observed that trailer No. 409, containing stored SNM contaminated equipment, was not conspicuously posted with "Caution-Radioactive Materials" signs and that trailer No. 1141, containing stored byproduct radioactive material in shipping containers, was not posted on all sides with "Caution-Radioactive Materials" signs, as required by 10 CFR 20.203(e). The licensee immediately posted the signs as required. This was verified by the inspector.

(c) Housekeeping

The inspector observed that housekeeping in Building 2A was poor. According to licensee representatives, several truckloads of equipment contaminated with byproduct material had recently arrived from various reactor sites and the licensee was sorting and/or cleaning the equipment for storage prior to release to another reactor site.

4. Nuclear Criticality Safety

a. Nuclear Fuel Manufacturing

(1) Internal Review and Audit

(a) Daily Audits

Records of daily audits conducted by health physics technicians for the time period January 2, 1985, through May 20, 1985, were examined by the inspector. The licensee has developed a detailed checklist covering all aspects of the operations as an aid to the health physics technicians when they conduct this facility review. Areas examined include signs, logs, radiation alarms, criticality safety compliance, contamination levels, and airborne contamination levels. Items requiring correction were corrected immediately.

(b) Weekly Audits

Records of weekly audits conducted by the Supervisor, Health Physics for the period January 3, 1985, through May 8, 1985, were examined by the inspector. Areas examined included the same topics as described above. In addition, this individual measured and recorded air flow from areas of lower to areas of higher potential contamination. The inspector determined that air flow direction was being recorded weekly as a part of the weekly audit report.

(c) Monthly Audits

The inspector examined documentation of monthly audits conducted by the Manager, Nuclear Licensing and Safety and/or a Criticality Safety Specialist during the time period January 31, 1984, through April 29, 1985. A total of 32 audit reports were reviewed. The inspector verified that appropriate corrective actions were taken or had been initiated by the licensee for the items identified in the 32 reports.

(d) Quarterly Nuclear Safety Committees Audits

The inspector examined documentation of quarterly audits conducted by the Criticality Safety Specialist for the Nuclear Safety Committee between March 30, 1984, and April 1, 1985. This inspector verified that appropriate corrective actions were taken or had been initiated by the licensee for the items identified in the audit reports.

(2) Nuclear Safety Evaluations

(a) Facility Changes and Modifications

The inspector observed that no significant modifications or changes to the facility had been made since the last inspection.

(b) Review of Nuclear Safety Evaluations

The inspector reviewed the records of the review and approval of process equipment or facility changes performed by the Criticality Safety Specialist for criticality safety or by the Manager, Nuclear Licensing and Safety for radiological safety. From February 22, 1984, through May 6, 1985, (Request No. 195), 28 requests for review and approval were made by Engineering. All but four of the requests were reviewed and approved. Twenty-seven of the requests involved both nuclear criticality and radiological safety considerations and one involved only radiological safety considerations. Conditions of approval were imposed, as needed, for criticality and radiological safety considerations. The requests that involved criticality safety considerations were independently reviewed by a qualified person designated by the Nuclear Safety Committee and by the Criticality Safety Specialist, if the original review was conducted by the Manager, Nuclear Licensing and Safety. The request involving radiological safety considerations was reviewed by the Manager, Nuclear Licensing and Safety. The evaluations were then countersigned by the qualified persons as required.

During examination of the evaluation documents, the inspector noted that Request No. 180, to increase the slab thickness of fuel rods in fuel rod holding boxes from 5.5 to 6 inches, was evaluated on the basis of Section 2.7.1 of the approved license application, which states that the Nuclear Criticality Specialist shall review and approve facility and process changes, equipment rearrangements and additions affecting criticality safety which fall within the criteria of Section 4.2, provided that an independent review is performed by the Nuclear Safety Committee or persons designated by that committee. However, the 5.5 inch slab thickness for fuel in fuel rod boxes is a specific criterion contained in paragraphs 4.3.11, 4.3.13 and 4.3.14 of the approved license application and the specific criticality safety criteria of Section 4.3 of the approved license application states that, ...in addition to the general criteria described in Section 4.2, this is necessary to assure nuclear safety for several process operations as described. Therefore, the inspector questioned the authority of the licensee to modify, by

evaluation, a criterion which was specifically indicated in the approved license application. Since the inspector did not observe any fuel rod boxes filled to the six inch slab thickness, this was identified as an unresolved item. The licensee agreed to discuss the matter with NRC-NMSS (1100/85-03-08). An unresolved item is one about which more information is required in order to ascertain where it is acceptable, an item of noncompliance, or a deviation.

b. Nuclear Laboratories

(1) Audits of the Nuclear Laboratories

The inspector examined the records of four quarterly audits of the Nuclear Laboratories conducted by the Manager, Nuclear Licensing, Safety, Accountability and Security (NLSA&S) between June 12, 1984 and March 6, 1985. The June 12, 1984 quarterly audit served as the initial annual audit as specified by Amendment No. 2 to the facility license dated May 23, 1984.

(2) Facility Changes and Modifications

No significant facility changes or modifications were made by the licensee since the last inspection.

c. Calibration of Criticality Monitors

The inspector examined licensee records and determined that the facility criticality monitors were calibrated quarterly between October 28, 1983, and April 10, 1985. The inspector also determined that the dual detector criticality monitoring system installed in Building 17 has been in operation since April 6, 1983. This system meets the requirements of 10 CFR 70.24(a)(1). The licensee's previous criticality monitoring system located in Building 17 remains operational. The two systems will remain in operation until the licensee establishes confidence in the new system.

5. Safety Committee

The Nuclear Safety Committee conducted the annual meeting and tour of the Nuclear Fuel Manufacturing facilities on December 19, 1984. Areas of the facilities examined during the tour, and discussions held during the meeting included: housekeeping; incidences of license violation; implementation of action concerning previous observations; review of facility changes; and review of the radiological protection and ALARA programs. Minutes of the meeting were issued to the Vice President, Nuclear Fuel Manufacturing with a copy to the Vice President, Nuclear Power Division, on March 27, 1985.

6. Radiation Protection

a. Radiation Work Permits - Nuclear Laboratories

The inspector examined Radiation Work Permit (RWP) B-5-2A-116, dated May 20-25, 1985, for work being done in Building 2A on equipment contaminated with byproduct material. The equipment had been returned to the site from various reactor plants. The RWP was properly completed and approved by qualified personnel. Health Physics requirements, radiation and contamination levels and the use of breathing zone air examples were specified. The inspector verified by direct observation that operators were wearing the specified protective clothing and breathing zone air samplers.

b. Sealed Source Leak Tests - Nuclear Laboratories

The inspector examined licensee records of sealed source leak tests conducted between September 23, 1982 and February 25, 1985. Sources containing beta-gamma emitting radionuclides were leak tested as required at least once every six months. Sources containing alpha emitting radionuclides were leak tested as required at least once every three months, with the exception of an 10 microcurie americium-241 source (No. CE-5) which was not leak tested between December 27, 1984, and May 20, 1985. License Condition 13.C of Materials License No. 06-00217-06, Amendment 33, dated February 12, 1985, requires, in part, that each sealed source containing licensed material with a halflife greater than thirty days in any form other than gas and designed for the purpose of emitting alpha particles be tested for leakage at intervals not to exceed three months. Failure to leak test Source No. CE-5 at three month intervals was identified as a violation (3754/85-01-01; 1100/85-03-09).

c. Hood Velocity and Pressure Drop Checks - Nuclear Laboratories

The inspector examined licensee records and verified that the licensee had conducted face velocity checks monthly on all applicable hoods between December 15, 1983, and March 27, 1985, and hood filter pressure drop measurements were recorded weekly between September 22, 1984, and April 13, 1985.

d. Contamination Surveys - Nuclear Fuel Manufacturing

During examination of the roofed concrete block enclosure at the northwest corner of Building 17, the inspector questioned licensee representatives concerning the conduct of contamination surveys in that enclosure. The enclosure is used to protect the outside portions of the shipping drum unloading station and contains a conveyor system

to handle up to 13 full drums at one time. There is an opening in the wall between the conveyor system and the shipping container unloading station inside the main building. Because of the opening, there is a potential for contamination of the concrete block enclosure. Licensee representatives stated that routine contamination surveys were not conducted in the enclosure. The inspector stated that these surveys should be conducted to identify any contamination in the enclosure. Licensee representatives stated that routine contamination surveys would be conducted in this enclosure. This was identified as an inspector follow item (1100/85-03-10).

7. Nonroutine Events

The inspector determined through discussions with licensee representatives and review of licensee records that no reportable or other events had occurred at the facility since the last inspection.

8. Organization

Through discussions with licensee representatives, the inspector determined that the licensee's organizational structure for the Nuclear Power System Division was being modified. Mr. J. M. West, Vice President, Nuclear Power Systems Division, retired and has been replaced by Mr. S. Brewer, formerly of the US Department of Energy. Mr. F. Stern, Vice President, Nuclear Services, and Mr. H. V. Lichtenberger, Vice President, Nuclear Fuel, report to Mr. Brewer and are responsible for the NRC licensed activities. Mr. Stern is responsible for activities authorized by the NRC byproduct materials licenses and Mr. Lichtenberger is responsible for activities authorized by the NRC SNM license. The organizations reporting to Mr. Stern and Mr. Lichtenberger were not fully in place at the time of this inspection and will be examined during subsequent inspections (3754/85-01-02; 1100/85-03-11).

9. Transportation Activities

a. Waste Shipments

The inspector examined licensee records of a typical waste shipment from the Windsor, Connecticut site to the burial site in Barnwell, South Carolina. The shipping papers indicated that the shipment left the site on January 29, 1985, and arrived at the burial site on January 31, 1985. The containers and vehicle were surveyed, marked, placarded, and labeled as required. Each container was also identified as Class A, Unstable Waste as required by 10 CFR Part 61.

b. Quality Assurance Program Audit - Packaging

The inspector examined licensee records of the Quality Assurance Program for Shipping Packages for a Radioactive Materials Audit which was conducted on February 12-22, 1985. During the audit several

observations and/or recommendations were made. Actions were taken by the licensee to correct or respond to each item identified during the audit.

The inspector also reviewed the licensee's Quality Assurance (QA) Program Manual which incorporates the Quality Assurance Program for Shipping Packages. The inspector noted that Section 6.5 of the manual, "Procedural Exceptions", did not require that changes to procedures receive the same review and approval as the original procedure. The manual also did not specify the time limit within which handwritten changes to procedures would be formally incorporated or deleted. Paragraph 7, "Document Control", of ANSI Standard N45.2-1977, states that changes to documents shall be reviewed and approved by the same organizations that performed the original review and approval unless other organizations are specifically designated. Failure to require this practice in the QA Manual was identified as a deviation from a standard industry practice identified in ANSI Standard N 45.2-1977 (1100/85-03-12).

10. Waste Generator Requirements

The inspector examined records to determine the type of waste generated by the licensee and discussed the 10 CFR Part 61 requirements with licensee representatives. It was determined that waste routinely generated under NRC License SNM-1067 contains only U-235 and its daughter radioisotopes. Some waste containing thorium and its daughter products is contained as residues in soil and is being cleaned out from one area of the site (see paragraph 11). These residues were generated during previous licensed and AEC contractor activities at the site. Waste generated under NRC License 06-00217-06 contains mixed fission products as contamination on equipment which has been returned to the site from various operating reactor plants.

The licensee has analytically determined the isotopes of uranium contained in the waste generated under License SNM-1067 and most of the waste generated is classified as Class A-Unstable. For waste generated under License 06-00217-06, the licensee conducts multi-channel analyses to determine the quantity of gamma radiating isotopes and then uses scaling factors, based on information obtained from the reactor plants, to determine the quantity of beta radiating isotopes. This waste is classified as Class A-Stable or Unstable depending on the form in which the waste is transported to the burial site.

During a review of waste shipment documents, the inspector determined that the licensee was not consistently identifying the stability of the waste (e.g., the burial site manifests indicated unstable waste and the Bill of Lading indicated that the waste was stable). In all cases examined by the inspector, the waste should have been identified as unstable. Licensee representatives stated during discussions with the inspector that

shipping papers will be examined prior to shipment to assure that the description of the waste was consistent. Consistency of the paperwork will be examined during subsequent inspections (IFI 1100/85-03-13).

11. Contaminated Wooded Area

The inspector provided the licensee with a copy of the Oak Ridge Associated Universities (ORAU) report, "Confirmatory Radiological Survey of the Combustion Engineering Property Windsor, Connecticut," dated March 1985, for review during a meeting at NRC Region I on April 18, 1985. This survey was conducted by ORAU during Region I Inspection 70-1100/84-05. During the current inspection, the inspector discussed the licensee's anticipated actions and schedule for final cleanup of the wooded area to unrestricted use criteria levels. The licensee stated that additional soil will be removed from the surface of the area and committed to have this work completed by November 1, 1985. After this action, the NRC contractor, ORAU, will determine whether the area can be released for unrestricted use. (IFI 1100/85-03-14). In addition, during a review of the facility license, the inspector determined that this cleanup activity was previously authorized by former Amendment No. 30 to the facility license, prior to its renewal on March 14, 1983. However, the cleanup activity was inadvertently omitted from the current license upon renewal. As a result, the inspector requested the licensee to resubmit the information provided to NRC in support of former Amendment No. 30 so that the cleanup operation is properly authorized. Licensee representatives stated that an amendment application will be submitted to the NRC-NMSS to authorize this activity (IFI 1100/85-03-15).

12. Exit Interview

The inspector met with the licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on May 24, 1985. The inspector summarized the scope and findings of the inspection. During the exit interview, the licensee committed to a date of November 1, 1985, for completion of the cleanup of a radioactively contaminated wooded area on the facility site. In addition, the licensee stated that discussions will be held with NRC-NMSS concerning the unresolved item presented in paragraph 4a(2)(b). No written material was provided to the licensee during this inspection.