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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAR 2 6 1993

Docket 70-36
License SNM-33
Amendment 23

Mr. J. A. Rode, Plant Manager
Hematite Nuclear Fuel Manufacturing
Combustion Engineering, Inc.
P.O. Box 107
Hematite, MO 63047

Dear Mr. Rode:

SUBJECT: STORAGE OF ENRICHED URANIUM PELLETS (TAC L30503)

In accordance with your application dated January 11, 1993, and the nuclear safety issues associated with pellet handling and Kardex storage in the supplement dated February 19, 1993, and pursuant to Part 70 of Title 10 of the Code of Federal Regulations, Materials License No. SNM-33 is hereby amended to authorize introduction of special nuclear material in Buildings 256 and 230 for the purpose of loading the Kardex storage unit with fuel pellets. This authorization shall expire 1 year from the date of this amendment. Accordingly, Condition 9 is amended to include the dates of January 11, and portions of the February 19, 1993, submittal.

All other conditions of the license shall remain the same.

This amendment is issued following preparation of an Environmental Assessment (EA) related to your proposed consolidation program. Based on this assessment, a Finding of No Significant Impact (FONSI) has been prepared pursuant to Part 51 of the Code of Federal Regulations. The FONSI and corrected pages for the FONSI were published in the Federal Register on December 30, 1992, and February 2, 1993, respectively. Copies of the EA and FONSI were forwarded to you by separate correspondence.

Your amendment application dated August 5, 1992, requesting authorization for the full fuel production with enriched uranium has not been approved and is under consideration by the U.S. Nuclear Regulatory Commission staff.

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Enclosed are copies of the revised Materials License No. SNM-33 and the Safety Evaluation Report.

Sincerely,

Original Signed By:

Elinor G. Adensam, Acting Chief
Licensing Branch
Division of Fuel Cycle Safety
and Safeguards, NMSS

Enclosures:
1. Revised License No. SNM-33
2. Safety Evaluation Report

cc w/encls:
Mr. A. E. Scherer, Vice President
Regulatory Affairs

Mr. C. B. Brinkman, Manager
Washington Nuclear Operations

Dr. R. S. Siudek, President
ABB CE Nuclear Fuel

Mr. J. F. Conant, Manager
Nuclear Materials Licensing

Mr. H. E. Eskridge, Manager
Nuclear Licensing, Safety and
Accountability

Mr. S. B. Junkrans, Vice President
Manufacturing Operations

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MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 39, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee		
1. Combustion Engineering, Inc.	3. License number	SNM-33 Amendment No. 23
2. P. O. Box 107 Hematite, Missouri 63047	4. Expiration date	December 31, 1989
	5. Docket or Reference No.	70-36

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Uranium enriched to maximum 5.0 weight percent in the U-235 isotope	A. Any, excluding metal powder	A. 8,000 kilograms contained U-235
B. Uranium, any U-235 enrichment	B. Any	B. 350 grams
C. Source material (Uranium and Thorium)	C. Any, excluding metal powder	C. 50,000 kilograms
D. Cobalt-60	D. Sealed sources	D. 40 millicuries, total
E. Americium-241	E. Solid sources	E. 200 microcuries
F. Cesium-137	F. Sealed sources	F. 500 millicuries
G. Californium-252	G. Sealed sources	G. 4 milligrams

9. Authorized use: For use in accordance with the statements, representations, and conditions contained in Part I of the licensee's renewal application dated February 26, 1982, and supplements dated July 21, 1982; February 21, 1983; May 31, 1984; April 29, June 6, and October 11, 1988; February 10, March 22, May 1, August 18, October 23, October 26, and November 8, 1989 (2); January 3, January 12, March 16, and September 4, 1990; August 12, 1991; October 9, October 30, November 6, and November 24, 1992; and January 11, 1993, and those portions of the February 19, 1993, submittal pertaining to pellet handling and the Kardex storage; and letters dated February 29, 1984, January 20, 1986, and March 30, 1987.

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MATERIALS LICENSE
SUPPLEMENTARY SHEET

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10. Authorized place of use: This licensee's existing facilities in Hematite, Missouri, as described in the referenced license renewal application.

11. Deleted.

12. A written report shall be made by the NLS&A Supervisor to the Plant Manager every 6 months reviewing employee radiation exposure (internal and external) and effluent release data to determine:

    a. if there are any upward trends developing in personnel exposure for identifiable categories of workers, types of operations, or in effluent releases;

    b. if exposures and releases can be lowered in accordance with the ALARA commitment; and

    c. if equipment for effluent and exposure control is being properly used, maintained, and inspected.

13. The licensee shall leak test sealed sources in accordance with the enclosed "License Condition For Leak Testing Sealed Byproduct Material Sources."

14. Release of equipment and material from the plant site or to clean areas onsite shall be in accordance with the enclosed "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," dated August 1987.

15. Pursuant to 10 CFR 20.302, the licensee is authorized to treat waste and scrap materials containing uranium enriched in U-235 and/or source material by incineration.

16. Within 60 days of the date of this license renewal, the licensee shall submit to the NRC 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 and to determine the environmental effects of outdoor storage of the alpha-contaminated material.

17. The licensee shall survey spent limestone rock discharge from each HF scrubber for beta contamination. Rock with beta contamination which exceeds five times the background of fresh rock shall not be used for landfill.

18. Within 60 days of the date of this license renewal, the licensee shall submit to NMSS a plan, including schedule, for the disposal of alpha-contaminated spent limestone rock.

19. The licensee shall decontaminate the two evaporation ponds such that the average residual contamination in each pond does not exceed the appropriate limit of either 250 picocuries of insoluble uranium or 100 picocuries of soluble uranium per dry gram of soil. The Tc-99 concentrations in a composite sample for each pond shall be determined.

20. a. If the radioactivity in plant gaseous effluents exceeds 150 μCi per calendar quarter, the licensee shall, within 30 days, prepare and submit to the Commission a report which identifies the cause for exceeding the limit and the corrective actions to be taken by the licensee to reduce the release rates. If the parameters important to a dose assessment change, a report shall be submitted within 30 days which describes the changes in parameters and includes an estimate of the resultant change in dose commitment.[1]

    b. In the event that the calculated dose to any member of the public in any consecutive 12-month period is about to exceed the limits specified in 40 CFR 190.10, the licensee shall take immediate steps to reduce emissions so as to comply with 40 CFR 190.10. As provided in 40 CFR 190.11, the licensee may petition the Nuclear Regulatory Commission for a variance from the requirements of 40 CFR 190.10. If a petition for a variance is anticipated the licensee shall submit the request at least 90 days prior to exceeding the limits specified in 40 CFR 190.10.

21. The licensee shall maintain and execute the response measures of his Radiological Contingency Plan submitted to the Commission by letters dated December 28, 1987, and August 23, 1990. The licensee shall also maintain implementing procedures for his Radiological Contingency Plan as necessary to implement the Plan. The licensee shall make no change in his Radiological Contingency Plan that would decrease the response effectiveness of the Plan without prior Commission approval as evidenced by a license amendment. The licensee may make changes to his Radiological Contingency Plan without prior Commission approval if the changes do not decrease the response effectiveness of the Plan. The licensee shall furnish the Chief, Fuel Cycle Safety Branch, Division of Industrial and Medical Nuclear Safety, NMSS, U. S. Nuclear Regulatory Commission, Washington, DC 20555, a report containing a description of each change within 6 months after the change is made.

22. At the end of the plant life, the licensee shall decontaminate the facilities and site in accordance with the general decommissioning plan submitted in the enclosure to the letter dated January 12, 1979, so that these facilities and grounds can be released to unrestricted use. The financial commitment to assure that funds will be available for decommissioning in the letter dated March 8, 1979, is hereby incorporated as a condition of the license.

[1]The report or petition should be submitted to the Director, Office of Nuclear Material Safety and Safeguards, with a copy to the Regional Administrator, Region III.

23. The licensee shall continue the soil sampling program for the spent limestone fill areas, as described in the letter dated February 29, 1984, until discontinuance is authorized by the Commission.

24. The monitoring program for the spent limestone shall include:

    a. Continuous air sampling at the center of, and approximately 1 meter above, the uncovered spent limestone piles for a minimum 2-year period. The weekly samples may be composited and analyzed for uranium activity on a quarterly basis. The lower limit of detection shall be 10^{-16} μCi/ml, or

    b. Measurement of the uranium activity on the surface of the spent limestone. Prior to conducting such a program, the licensee shall submit the sampling and analytical program to the NRC for approval.

25. Processing of UF_6 in 10-ton cylinders is not authorized.

26. The 10-ton UF_6 cylinders shall be equipped with valve protectors.

27. The concrete pad for storage of UF_6 cylinders and the surrounding area shall be sloped or graded so that any spilled combustible fluids would not be confined to the storage area.

28. No combustibles shall be stored on the concrete pad.

29. A CO_2 fire extinguisher shall be readily available near the storage pad.

30. In addition to the controls in Section I of the enclosure to the letter dated March 30, 1987, UF_6 cylinders which are in transport and containing UF_6 heels shall be either sealed, in sealed overpacks, or in sealed vehicles.

31. Notwithstanding the statement in Section 4.2.3 of the application, the k-effective of a unit or an array of units shall not exceed 0.95 unless specifically authorized by the license.

32. Nuclear criticality safety evaluations performed by the licensee in accordance with Section 2.7, Part I of the application, shall be based on assumptions of optimum moderation and reflection of individual safe units and of arrays.

33. Nuclear criticality safety evaluations involving k-effective calculations performed by a Nuclear Criticality Specialist shall be independently reviewed and approved by an individual having, as a minimum, the qualifications of a Nuclear Criticality Specialist.

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34. For uranium enriched to more than 4.1 w/o U-235, the licensee shall limit the agglomeration/granulation process, each agglomerated powder storage location, and the pellet pressing operation to safe mass units as specified in Table 4.2.4, Part I of the application.

35. Deleted.

36. Deleted.

37. Deleted.

38. Deleted.

39. At all times, the licensee shall limit moderating material (solutions and powders), except poreformer and lubricant, to not more than two 5-gallon pails on each of the second and third floors of Building 254.

40. The incumbent Superintendent, Production, identified in the amendment application dated August 12, 1991, is deemed to satisfy the education requirements for the position because of the incumbent's experience in the position since 1981 and his plant experience since 1974.

FOR THE NUCLEAR REGULATORY COMMISSION

Original Signed By:

Date: MAR 2 6 1993

By: Elinor Adensam
Division of Fuel Cycle Safety
and Safeguards, NMSS
Washington, DC 20555

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAR 2 6 1993

DOCKET NO: 70-36

LICENSEE: Combustion Engineering, Inc (CE)
Hematite, Missouri

SUBJECT: SAFETY EVALUATION REPORT, AMENDMENT APPLICATION DATED JANUARY 11, 1993, AND SUPPLEMENT DATED FEBRUARY 19, 1993, RE STORAGE OF ENRICHED URANIUM PELLETS

BACKGROUND

By application dated January 11, 1993, CE requested authorization to use special nuclear materials in Buildings 256 and 230 for the purpose of loading enriched uranium pellets into a uranium oxide storage and retrieval system (Kardex Unit). By letter dated January 29, 1993, NRC staff requested additional information concerning the application. On February 19, 1993, CE supplemented the application. Although the supplement also provided additional information for another licensing action, only the nuclear safety issues associated with pellet handling and Kardex storage will be addressed in this review. The remaining information in the supplement will be addressed by a separate licensing action. This is one of several startup activities to be completed prior to commencing fuel production with enriched uranium in May 1993. CE requests that authorization be granted for 1 year.

This safety evaluation report is based on the review of the January 11, 1993, application and the February 19, 1993, supplement; discussions with the Region III Project Inspector; a site visit to discuss nuclear safety aspects of the operations; and Inspection Report No. 70-0036/92004 issued on October 5, 1992. The purpose of the inspection was to observe the installation of the Kardex unit and review drawings of the Kardex.

DISCUSSION

Nuclear Criticality Safety

Proposed operations include pellet inspection and drying in Building 256, pellet transportation to Building 230, and pellet storage in Building 230.

Pellet Inspection, Drying, and Transportation

Nuclear criticality safety for pellet inspection, drying, and transportation relies on geometry control. Geometry is controlled by handling the pellets within the criteria specified for height and spacing. Slab height limits are specified in Table I.4.2.4, and spacing criteria are specified in Table I.4.2.5. These tables are provided in the amendment application.

Equipment used for handling pellets during inspection, drying, and transportation includes the inspection hood, corrugated pellet trays, Kardex pans, Kardex pan transfer cart, and transport vehicle. Pellets are inspected while present in a mono-layer under the hood. Following inspection, pellets

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are loaded into corrugated pellet trays which are stacked in a Kardex storage pan. After drying, the Kardex pan is loaded onto a Kardex pan transfer cart. Kardex pans are prepared for transport to Building 230 at the transporter loading station located in Building 256. Kardex pans are loaded into transporter boxes which are, in turn, loaded onto the transport vehicle. The vehicle transports two boxes, each box contains two pans, and each pan is loaded with two stacks of trays.

To ensure nuclear criticality safety, all equipment and operations shall adhere to the slab and spacing criteria. Since these criteria assume full moderation, both the loss of geometry control and the presence of hydrogenous material are required for criticality. To limit the source of moderation, Section 4.2.3(d) prohibits the installation of sprinklers and the use of fire hoses in Building 256. Additional factors of safety not committed to in Part I of the amendment application, but discussed in the safety analysis, include the open design of equipment to prevent the retention of water, and the transport boxes and cargo shield over the transport boxes which aid in preventing the ingress of water.

Pellet Storage

Nuclear criticality safety for pellet storage relies on moderation control. Combustion Engineering analyzed storage under postulated adverse conditions concerning the ingress of water. The analysis examined the sensitivity of the multiplication factor for the Kardex unit to postulated distributions of hydrogenous material within the Kardex unit. Under normal conditions, when there is no hydrogenous material present in the pellet trays, the storage array is highly subcritical (i.e., the effective multiplication factor is less than 0.5). Calculations for flooded Kardex pans, under optimum moderation, result in effective multiplication factors greater than 0.95. These results represent an inadequate safety margin and an unacceptable degree of subcriticality. Thus, multiple physical barriers to moderation are established as controls and are committed to in Section 4.2.3(t) of Part I of the amendment application.

The proposed barriers are described in Part II and include the building roof, Kardex unit shield wall and roof, and the metal skin on the Kardex structural frame. Although moderation control is the only Part I requirement supporting the double contingency principle, additional safety factors exist that are not included as license conditions. Additional factors of safety, described in Part II, include the absence of water pipes in proximity to the Kardex unit and the drain ports at the base of the Kardex shield wall enclosure.

Combustion Engineering conducted a safety analysis which considered the following process upsets: Kardex storage shelf failure, SNM accumulation in the bottom of the Kardex, leak in the Building 230 exterior roof, and failure of the computer control. Failure of the structural integrity of the Kardex storage unit will not alone cause a criticality; the presence of water is required to attain criticality. All process upsets remain subcritical without the presence of hydrogenous material.

Moderation control through design of the multiple barriers is intended to prevent the ingress of water to the Kardex unit. Exclusion of moderators relies upon the integrity of the water barrier and limiting the sources of water in the process area. Section 4.2.3(t) requires the presence of physical multiple barriers, and Section 4.2.3(d) prohibits the use of sprinklers and fire hoses in Building 230. These conditions ensure that water cannot inadvertently enter the Kardex storage unit, that the Kardex storage unit is maintained in an atmosphere which contains no source of moderation, and that no source of moderation is piped to the Kardex storage unit.

Storage of fissile material shall obviate concern with accidental nuclear criticality in the event of fire, flood, or earthquake. The fissile material will be stored at an elevation above the flood plain, and the Kardex has been designed to meet the earthquake rating. The adequacy of the structural integrity of the Kardex unit is not evaluated as part of the licensee's safety analysis provided in Part II; however, through inspection, the NRC determined that the construction and installation were accomplished with sound-engineering practice. In addition, Section 4.2.10 contains license requirements for continued inspection and maintenance of structural integrity.

Radiation Safety

The existing radiation protection program, as described in the license, is adequate to cover this requested action. The program includes the routine monitoring of radioactive airborne concentration in the work areas, radiological surveys for surface contamination, monitoring workers' exposures, waste management, and monitoring radiological effluents.

To reduce radiation exposure levels, the Kardex is surrounded by a concrete-shield wall. The exposure rate to the adjacent office space is expected to be less than 0.1 mrem/hr.

The staff has determined that there is reasonable assurance that the requested activities can be conducted safely from a radiation protection standpoint.

CONCLUSION/RECOMMENDATION

Combustion Engineering conducted a safety analysis for all normal and foreseeable abnormal conditions to determine that the entire operation or system will be subcritical based on the new criteria proposed in Section 4.2, Technical Requirements. The proposed criteria are adequate to handle, store, and transport fuel units in a manner which provides a sufficient factor of safety to require at least two unlikely, independent, and concurrent changes in conditions before a criticality is possible. The application identifies and discusses the criteria to be applied to NCS controls and describes the methods used to ensure subcriticality in operations with fissile materials under all predictable facility operating conditions.

The staff concludes that the proposed operation will have no adverse effect on the public health and safety or the environment. Approval of the amendment application is recommended.

The Region III staff has no objection to this licensing action.

Original Signed By:

Chuck Robinson
Inspection Section
Operations Branch
Division of Fuel Cycle Safety
and Safeguards, NMSS

Original Signed By:

Sean Soong
Licensing Section 2
Licensing Branch
Division of Fuel Cycle Safety
and Safeguards, NMSS

Approved by: _____
Michael Tokar, Section Leader
Licensing Section 2

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NAME	SSoong		CRobinson		WTharpe		MTokar	
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