

MAY 10 1989

DOCKET NO: 70-36
LICENSEE: Combustion Engineering, Inc. (CE)
Hematite, Missouri
SUBJECT: SAFETY EVALUATION REPORT, APPLICATION DATED FEBRUARY 10, 1989,
RE MODIFICATION OF R-2 CONVERSION REACTOR

Background

CE is authorized to convert UF_6 to UO_2 using a dry fluidized bed conversion process. In the subject application, CE proposes modification to one of the three conversion reactors (R-2).

Discussion

The R-2 reactor is used to reduce UO_2F_2 to UO_2 , utilizing either "cracked" ammonia or hydrogen. The current design of the R-2 reactor consists of a 10-inch diameter lower cylinder connected to an upper 12-inch diameter disengaging column. The proposed modification involves the addition of a 16-inch diameter disengaging section to the upper end of the reactor. This modification will reduce material carryover, minimize recycle, and reduce material handling.

A previous analysis performed by the licensee of a worse-case situation yielded a k-effective of 0.95 for a single reactor and 0.97 for the conversion process array. NRC staff accepted these values based on a number of process controls and fail-safe alarm features associated with the conversion system.

With respect to the subject application, the licensee failed to provide an analysis demonstrating the nuclear criticality safety of the modified system. Staff analyzed the R-2 reactor assuming the reactor is entirely filled with 5 percent enriched UO_2 powder at a density of 2.5g UO_2 /cc and homogeneously mixed with water. At optimum moderation, the k-effective values produced exceeded unity. Therefore, if the situation described above occurs, the possibility exists for a criticality accident. However, in Part II of the application, the licensee presented a number of process and administrative controls to provide assurance that the above situation is never realized.

The steam supply line to the R-2 reactor has two spring-loaded shutoff valves to terminate steam flow under abnormal situations. High and low temperature indicators on the R-2 reactor are interlocked to both valves. A second, redundant, low temperature indicator on the R-2 reactor is interlocked to both valves, therefore, providing continual control even in the event of primary indicator failure. Differential pressure instrumentation is also provided on the R-2 reactor and interlocked to the shutoff valves. Therefore, loss of power to the plant, high or low reactor temperatures, and high system pressure would cause the steam control valves to close. In addition to these

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interlocks, high pressure and low temperature alarms are provided, thus alerting the operator to take necessary action. If all of these controls failed, more than 8 hours of steam flow would be required to fill the 10-inch reactor with condensed steam. The reactor is unloaded at 2-hour intervals so that the water would be discharged through the powder valve system. The licensee has committed to calibrate the high pressure switches and test the operability of the control system every 6 months.

The staff believes that these controls are sufficient to prevent the accumulation of special nuclear material and water in the 16-inch diameter upper disengaging section.

Conclusion/Recommendation

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

The Region III Principal Inspector has no objection to this proposed action.

Original Signed By:

David A. McCaughey
Uranium Fuel Section
Fuel Cycle Safety Branch
Division of Industrial and
Medical Nuclear Safety, NMSS

Approved by: Original Signed By:
George H. Bidinger, Section Leader

OFC: IMUF:	IMUF:	IMUF: <i>DAH</i>
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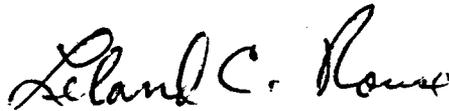
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DOCKET NO: 70-36
LICENSEE: Combustion Engineering, Inc. (CE)
Hematite, Missouri
SUBJECT: CATEGORICAL EXCLUSION FOR AMENDMENT REQUEST DATED
FEBRUARY 10, 1989

By letter dated February 10, 1989, CE requested an amendment to License No. SNM-33 to make modifications to the uranium hexafluoride to uranium oxide process line. These process line changes will not adversely effect the public health and safety or the environment. Accordingly, pursuant to 10 CFR 51.22(c)(11), neither an Environmental Impact Statement nor an Environmental Assessment is warranted for the proposed action.

FOR THE NUCLEAR REGULATORY COMMISSION



Leland C. Rouse, Chief
Fuel Cycle Safety Branch
Division of Industrial and
Medical Nuclear Safety, NMSS

OFC:IMUF:	IMUF:	IMUF:	IMUF: 87HES	IMSB:
MM	VL	DAM		
NAME:MHorn:mlh:	VLTharpe:	DAMcCaughey:	GHBidinger:	LCRouse:
DATE:4/3/89	4/3/89	5/10/89	5/10/89	5/10/89

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