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APR 15 1980

DOCKET NO.: 70-824

APPLICANT: Babcock & Wilcox

FACILITY: Lynchburg Research Center

SUBJECT: REVIEW OF LICENSE AMENDMENT APPLICATION DATED JANUARY 25, 1980, ITS REVISION DATED FEBRUARY 28, 1980 AND SUPPLEMENT DATED MARCH 25, 1980

I. Background

Babcock & Wilcox, Lynchburg Research Center (LRC), by application dated January 25, 1980, its revision dated February 28, 1980, and supplement dated March 25, 1980, has requested authorization for the insertion of irradiated fuel rods and encapsulated sections of fuel rods into any available hole in a fuel element assembly for return to the reactor site.

At the present, each time an assembly is examined, selected fuel rods are removed and the assembly is returned to the reactor site. This sequence of events has resulted in an accumulation of irradiated fuel rods and fuel rod sections at the LRC.

II. Discussion

A. Nuclear Criticality Safety

A normal fuel assembly consists of a square lattice array of fuel rods, locations for control rod guide tubes and an instrument tube (usually in the center of the assembly). The nuclear criticality safety calculations for the examination of the assembly and the removal of fuel rods for examination were based on water flooded assemblies with increasing numbers of fuel rods removed. the K_{eff} was less then 0.95 independent of the number of rods removed.

The LRC performed a nuclear safety analysis of water flooded assemblies with the control rod guide tubes and instrument tubes filled with fuel rods. The K_{eff} of each type fuel assembly at the LRC, fully loaded with fuel rods, was found to be less than that for the normal assembly with the locations for the guide and instrument tubes filled with water.

Independent nuclear criticality safety calculations performed by the staff for water-flooded Mark C fuel assembly with all holes filled with fuel rods (17 x 17 array) indicated a K_{eff} of 0.9046± .0055 compared to 0.876± .008

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calculated by LPC personnel. The results of the two calculations are essentially in agreement at the 95% confidence level. Therefore, it is safe to insert irradiated rods or encapsulated sections in any available hole in the assembly.

As a protective measure, fuel rods inserted into instrument and control rod guide tubes are held in place with a flat metal plate bolted to the top of the fuel assembly. This would prevent the separation from the assembly of the inserted fuel rods and encapsulated segments in case of an accidental tipping of the assembly.

B. Radiation Safety

All radiological safety controls and procedures currently authorized for the storage, examination and packaging for shipment of irradiated fuel assemblies will be used during the insertion of fuel rods in any available hole in the assembly and its packaging for shipment. As an added precaution against leakage, fuel rod segments have their ends sealed and are encapsulated in steel tubing with ends sealed prior to insertion in the LWP fuel assembly.

C. Environmental Effects

No significant environmental effect should result from approval of the amendment request to the license.

D. General

The amendment application of January 25, 1980, its revision dated February 28, 1980, and supplement dated March 25, 1980, were discussed with J. B. Kahle, IE-Region II inspector of the B&W facility, on March 31, 1980. We foresaw no safety or environmental problems with the authorization for the insertion of irradiated fuel rods or encapsulated sections of fuel rods into any available hole in the fuel element assembly for return to the reactor site.

III. Conclusion

The insertion of irradiated fuel rods in any available hole in the assembly provides an adequate margin of nuclear criticality safety. The presently authorized nuclear criticality and radiological safety controls and procedures are adequate to protect the health and safety of the operating personnel, the public and the environment.

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Issuance of the license amendment is recommended.

Original Signed by:

Norman Ketzlach
Uranium Fuel Licensing Branch
Division of Fuel Cycle and
Material Safety

Original signed by:
W. T. Crow

Approved by: _____
W. T. Crow, Section Leader

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