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Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: **10CFR PART 21, REPORTABLE CONDITION**
Rotated C- or S-Lattice Fuel Assembly

This letter is to inform the NRC of a reportable defect per 10CFR Part 21, as reported to Thomas H. Andrews, the duty officer in the NRC operations center, by G. B. Stramback, Safety Evaluation Programs Manager on June 19, 1992.

Recent studies have shown that the conclusion of a generic analysis performed in 1982, regarding rotated fuel assemblies, is sometimes inappropriate for modern type fuel designs. Even though a substantial safety hazard does not exist, this issue is reportable to the NRC because of the potential for exceeding the Technical Specification Safety Limit MCPR.

The affected BWR plants are being notified of this condition. The attached reportable condition report identifies all pertinent information required by 10CFR Part 21.

Very truly yours,

S. J. Stark, Acting Manager
Regulatory and Analysis Services

Attachment

cc: R. C. Jones, NRC-Rockville
C. E. Rossi, NRC-Rockville
L. S. Gifford, GE-Rockville

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Attachment

REPORTABLE CONDITION

- (i) Name and address of the individual or individuals informing the Commission.

S. J. Stark, Acting Manager of Regulatory and Analysis Services, GE Nuclear Energy, 175 Curtner Avenue, San Jose, CA 95125

- (ii) Identification of the facility, the activity, or the basic component supplied for such facility or such activity within the United States which fails to comply or contains defect.

Background

The concern is the change in Critical Power Ratio (CPR) resulting from the inadvertent rotation of a fuel assembly in a C- or S-lattice plant. The original approved version of GESTAR-II (NEDE-24011-P-A, Rev. 0) concluded that there is no need to perform cycle specific evaluations of a rotated fuel assembly for a C-lattice plant since the change in CPR was analyzed to be insignificant due to the fuel design configuration. The original generic studies performed in 1982 had shown that this change in CPR was approximately 0.07 and, therefore, could never impact the plant Technical Specification (Tech Spec) Safety Limit Minimum Critical Power Ratio (MCPR).

The rotation of the C- or S-lattice fuel assembly is important because the physical configuration of the fuel assembly and its mating surfaces has a symmetric configuration with the fuel lower casting, however, the fuel assembly mating at the upper core plate is not symmetric. When rotated, there is a slight vertical tilt of the fuel assembly from the bottom to the top of the fuel assembly. This vertical tilt results in a non-uniform water gap over the active fuel length. This non-uniform water gap changes the local power peaking of the fuel rods, thereby changing the CPR of the fuel assembly.

The 1982 generic analysis included the variable water gap of a rotated bundle. Recent studies have now shown that the conclusion of the generic analysis is sometimes inappropriate for modern type fuel designs. This conclusion is different because of the evolution of the fuel designs and their nuclear characteristics, not the calculation procedures employed.

- (iii) Identification of the firm constructing the facility or supplying the basic component which fails to comply or contains a defect.

GE Nuclear Energy, San Jose, California.

- (iv) Nature of the defect or failure to comply and the safety hazard which is created or could be created by such defect or failure to comply.

Safety Basis

GE performed a complete re-evaluation of the CPR impact of a rotated fuel assembly in C- and S-lattice plants, including calculating the magnitude of the fuel assembly tilt, the impact on local power peaking, the impact on R-factor and the resulting delta CPR. This evaluation included the NRC mandated 1.01 multiplier to rotated bundle R-factors and the 0.02 delta CPR adder to the final calculated value of the delta CPR.

Attachment (cont'd)

The re-evaluation concluded that:

- 1) An inadvertently rotated fuel assembly for a BWR 4/5 C-lattice plant could not have resulted in exceeding the Tech Spec Safety Limit MCPR.
- 2) For BWR/6 S-lattice plants the delta CPR for the rotated bundle is larger than the delta CPR calculated for the identified limiting transient.
 - A) Review of the exposure accounting for a BWR/6 plant during a past operating cycle revealed that the Tech Spec Safety Limit MCPR for this BWR/6 S-lattice plant could not have been exceeded with an inadvertently rotated fuel assembly.
 - B) Assuming that a BWR/6 S-lattice plant is operating at the Operating Limit MCPR, this postulated rotated bundle condition could result in exceeding the Tech Spec Safety Limit MCPR. Even though a substantial safety hazard does not exist, this issue is reportable to the NRC because of the potential for exceeding the Tech Spec Safety Limit MCPR.

In the late 1970's the NRC mandated that either the calculated delta CPR for a rotated bundle has to be added to the Safety Limit MCPR, or appropriate Tech Spec limits must be adopted to assure detection of the postulated fuel failures resulting from a rotated bundle and appropriate action taken. It continues to be the GE position that the rotated bundle should be considered as an accident and demonstrated compliance to an MCPR Safety Limit is not required. Furthermore, it is important to note that there has been no identified instance of a plant being operated with a rotated bundle since the 1980 issuance of GE Service Information Letter (SIL) 347 "Misoriented Fuel Bundles".

- (v) The date on which the information of such defect or failure to comply was obtained.

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- (vi) In the case of a basic component which contains a defect or fails to comply, the number and location of all such components in use at, supplied for, or being supplied for one or more facilities or activities subject to the regulations in this part.

Clinton, Grand Gulf, Perry, River Bend, and plants outside the United States.
- (vii) The corrective action which has been, is being, or will be taken; the name of the individual or organization responsible for the action; and the length of time that has been or will be taken to complete the action.

All BWR/6 utilities were informed of the on-going evaluation. Cycle specific delta CPR values accounting for the rotated bundle event have been calculated and provided to the near term operating BWR/6s with GE fuel. The NRC was informally contacted. GE has scheduled a meeting with the NRC staff to re-visit the rotated bundle analysis design basis with the intent to request removal of the requirement to apply transient event acceptance criteria. GE will perform cycle specific rotated bundle analyses for future C- and S-lattice fuel designs until the NRC agrees with redefinition of the acceptance criteria. GESTAR-II will be appropriately revised. GE will inform all BWR utilities of this issue because it emphasizes the significance of maintaining sound core verification techniques.

Attachment (cont'd)

- (viii) Any advice related to the defect or failure to comply about the facility, activity, or basic component that has been, is being, or will be given to purchasers or licensees.

See vii above.