

General Information or Other (PAR)

Event # 39247

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| <b>Rep Org:</b> GENERAL ELECTRIC COMPANY        | <b>Notification Date / Time:</b> 10/04/2002 12:35 (EDT) |
| <b>Supplier:</b> GENERAL ELECTRIC COMPANY       | <b>Event Date / Time:</b> 10/04/2002 (PDT)              |
|   | <b>Last Modification:</b> 10/04/2002                    |
| <b>Region:</b> 4                                | <b>Docket #:</b>  |
| <b>City:</b> SAN JOSE                           | <b>Agreement State:</b> Yes                             |
| <b>County:</b>                                  | <b>License #:</b>                                       |
| <b>State:</b> CA                                |   |
| <b>NRC Notified by:</b> JASON S. POST (via fax) | <b>Notifications:</b> KRISS KENNEDY R4                  |
| <b>HQ Ops Officer:</b> STEVE SANDIN             | SONIA BURGESS R3  |
| <b>Emergency Class:</b> NON EMERGENCY           | VERN HODGE (via fax) NRR                                |
| <b>10 CFR Section:</b><br>21.21                 | UNSPECIFIED PARAGRAPH                                   |

FUEL SUPPORT SIDE ENTRY ORIFICE LOSS COEFFICIENT IN CORE MONITORING SYSTEM DATABANK

"This letter provides notification of a Reportable Condition under 10CFR 21.21(d) for Clinton and Perry 1. The basis for this conclusion is the data used for the fuel support side entry orifice (SEO) loss coefficient in the core monitoring system supplied by GE Nuclear Energy (GE)/Global Nuclear Fuel (GNF). Other plants that have a similar geometry, but for which GE/GNF did not provide the core monitoring system (Grand Gulf and River Bend) have also been informed of this issue.

"The core support structure in a BWR/6 affects the fuel support casting SEO loss coefficient. Bundles may be adjacent to zero, one, or two core support beams depending upon their location as illustrated in Figure 1. The SEO loss coefficient depends upon the number of adjacent core support beams.

"The core monitoring system in the affected plants uses an average SEO loss coefficient for all of the central bundles, and a separate average value for all of the peripheral bundles. This was previously evaluated for GE/GNF 8x8 fuel designs and found to be acceptable. Recent calculations have shown that the Critical Power Ratio (CPR) response for newer GE/GNF fuel designs are more sensitive to the reduced flow in bundles that are adjacent to two core support beams (which have the highest loss coefficient). Thus, the core monitoring system over predicts CPR for these bundles, and thereby, may under predict the margin to the Operating Limit Minimum CPR (OLMCPR). The CPR over prediction is approximately 0.01 in CPR, which reaches the threshold for a reportable condition on a Technical Specification Safety Limit. In actual practice, plants maintain significantly more than 0.01 CPR margin to the OLMCPR, so MCPR Safety Limit protection is not threatened."

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**GE Nuclear Energy**

*General Electric Company  
175 Curtner Ave., San Jose, CA 95125*

October 4, 2002  
02-08NRC.DOC  
MFN 02-067

Document Control Desk  
United States Nuclear Regulatory Commission  
One White Flint North  
11555 Rockville Pike  
Rockville, Maryland 20852-2738

**Subject: Fuel Support Side Entry Orifice Loss Coefficient in Core Monitoring System Databank**

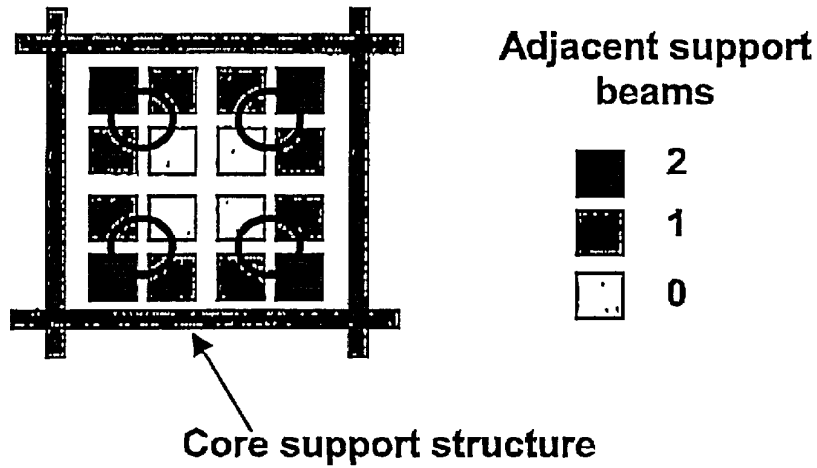
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The core support structure in a BWR/6 affects the fuel support casting SEO loss coefficient. Bundles may be adjacent to zero, one, or two core support beams depending upon their location as illustrated in Figure 1. The SEO loss coefficient depends upon the number of adjacent core support beams.

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October 4, 2002  
02-08NRC.DOC  
MFN 02-067

Figure 1. Sketch of Core Configuration



If you have any questions, please call me at (408) 925-5362.

Sincerely,

Jason S. Post, Manager  
Engineering Quality and Safety Evaluations

cc: S. D. Alexander (NRC-NRR/DISP/PSIB) Mail Stop 6 F2  
C. V. Hodge (NRC-NRR/DISP/PSIB) Mail Stop 12 H2  
J. F. Klapproth (GE-NE)  
H. J. Neems (GE-NE)  
PRC File

Attachment:

1. Reportable Condition Evaluation per §21.21(d)

October 4, 2002  
02-08NRC.DOC  
MFN 02-067

**Attachment 1 – Reportable Condition per §21.21(d)**

- (i) Name and address of the individual informing the Commission:  
Jason S. Post, Manager, Engineering Quality & Safety Evaluation, 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 a defect:  
The basic component is the databank for the GE/GNF supplied core monitoring system for monitoring of minimum critical power ratio (MCPR) for BWR/6 plants that use 9x9 and 10x10 GE/GNF fuel designs.
- (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, and Global Nuclear Fuel, Wilmington, North Carolina
- (iv) Nature of the defect or failure to comply and safety hazard which is created or could be created by such defect or failure to comply:  
The SEO is the primary flow path for core flow to enter a fuel bundle. Due to the core inlet geometry in a BWR/6, the flow path to the SEO is more tortuous for a bundle that is adjacent to two core support beams. The bundles adjacent to two core support beams will have a loss coefficient that is about 20% higher than a bundle adjacent to one core support beam, and about 40% higher than a bundle that is not adjacent to any core support beams. This configuration does not exist on BWR/2-5 plants.  
Bundle flow has a significant impact on CPR and power of a bundle. As bundle flow drops, the CPR decreases (i.e., the margin to boiling transition is reduced). However, this also leads to an increased void fraction in the bundle, which reduces bundle power and tends to increase CPR. For earlier GE/GNF fuel designs, these were offsetting effects and using an average SEO loss coefficient for every bundle in the core monitoring system was acceptable. For newer GE/GNF fuel designs, the CPR decrease from a flow reduction is greater than the CPR increase from the corresponding power reduction. Thus, using an average SEO loss coefficient for a bundle adjacent to two core support beams over predicts the CPR for that bundle. If that is a limiting bundle for CPR, then the margin to the OLMCPR is over predicted.  
10CFR21.4 specifies that a condition is reportable if it can produce a significant safety hazard or lead to violation of a Technical Specification Safety Limit. A CPR impact of 0.01 has been used as the threshold of reporting a SLMCPR impact

October 4, 2002  
02-08NRC.DOC  
MFN 02-067

under 10CFR21.21(d). This condition does not produce a significant safety hazard, but the calculated impact on CPR is approximately 0.01, which leads to the conclusion that it represents a Reportable Condition.

- (v) The date on which the information of such defect or failure to comply was obtained:  
August 8, 2002
- (vi) In the case of a basic component which contains a defect or failure to comply, the number and locations 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:  
A defect has been confirmed to exist in the databank for the GE/GNF supplied core monitoring systems at Clinton and Perry 1.
- (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 (note, these are actions specifically associated with the identified Reportable Condition):  
The affected plants have been notified.  
GE/GNF is developing a modification to the core monitoring system databank so that it will assign a location specific SEO loss coefficient to each bundle in the core. The databank modification will be completed within a few days of the date of this notice.
- (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:  
GE/GNF recommends that the affected plants immediately implement a 0.01 administrative penalty on the OLMCPR until the core monitoring system databank can be modified to use an accurate value of SEO loss coefficient for each bundle.  
GE/GNF recommends that the updated core monitoring system databank be implemented as soon as it is available, at which time it is no longer necessary to use an administrative penalty on the OLMCPR.