

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
WASHINGTON, D.C. 20555

January 24, 1989

NRC INFORMATION NOTICE NO. 89-06: BENT ANCHOR BOLTS IN BOILING WATER  
REACTOR TORUS SUPPORTS

Addressees:

All holders of operating licenses or construction permits for boiling water reactors (BWRs) with Mark I steel torus shells.

Purpose:

This information notice is being provided to alert addressees to the discovery of bent anchor bolts in BWR torus shell supports. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

During recent NRC inservice inspections (50-321/88-03 and 50-366/88-03) at E. I. Hatch Nuclear Plant, inspectors found a rock bolt anchoring a torus shell support bent about 3/4 inch. The NRC requested that the Georgia Power Company (GPC or licensee) perform a detailed survey of all torus anchor bolts in the E. I. Hatch Plant, Units 1 and 2, and determine the extent of bolt distortions. The licensee found 190 bolts in Unit 1 bent from 1/8 inch to 1 inch, with 45 of the bolts bent in excess of 1/2 inch. In Unit 2, the bolt distortions were not as severe.

The subject rock anchor bolts were added to the torus supports to accommodate the vertical torus hydrodynamic loads that were identified in the 1970s during the Mark I containment systems review. The bolts were installed in slotted holes in the column support bases to allow for some lateral movement of the supports while resisting vertical hydrodynamic loads. However, the licensee believes that at the E. I. Hatch Plant the torus column supports experienced unexpected lateral displacements due to weld induced radial shrinkage of the torus as a result of the Mark I program modifications performed several years ago. These modifications consisted of welding T-stiffeners, saddle overlays, and conical web plates to the torus shell. The shrinkage of the welds resulted in excessive radial movement of the torus and the torus supports. The excessive radial displacement of the torus supports is believed to have caused the edges of the slotted holes in the column support bases to push against the anchor bolts and to eventually bend them.

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The licensee has performed an evaluation on the load capabilities of the bolts using 3/4 inch deflections as the criterion and found that their capacities have decreased from 310 kips to 230 kips. The licensee has not completed the evaluation on the bolt load carrying capacity using 1 inch deflections. On the basis of preliminary evaluations, the licensee concludes that the torus is adequately anchored to accommodate anticipated hydrodynamic loads.

Discussion:

Although rock anchor bolt distortions may not immediately affect plant operations, the NRC staff considers such distortions to be significant since the bolt load capabilities may be greatly reduced, and the bolts may crack and break if vertical hydrodynamic loads are applied. Anchor bolt distortions, if excessive and not corrected, may lead to the fracture of the torus and may jeopardize containment integrity.

There are a number of factors, ranging from temperature changes, methods and sequence of construction, design of the column base supports, and type and magnitude of loads applied, that can influence the movement of the torus supports. Depending on the allowances made for such movement in the design of the slotted holes in the support bases, the anchor bolts may be distorted by various means. In view of this fact, it is possible that varying degrees of anchor bolt distortions may exist at different nuclear power plants. Accordingly, addressees may wish to inspect and evaluate the conditions of the torus supports at their plants to determine if any problems similar to those described above exist and to assure that the structural integrity of the torus shell is being maintained.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact one of the technical contacts listed below or the Regional Administrator of the appropriate regional office.

*Charles E. Rossi*

Charles E. Rossi, Director  
Division of Operational Events Assessment  
Office of Nuclear Reactor Regulation

Technical Contacts: Chen P. Tan, NRR  
(301) 492-0829

Jaime Guillen, NRR  
(301) 492-1170

Attachment: List of Recently Issued NRC Information Notices

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01/12/89 12/22/88 12/22/88

D/DOEA-NRR \*C/OGCB:DOEA:NRR  
GERossi CHBerlinger  
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\*EAD/DEST:NRR\*PPMB:ARM  
JRichardson TechEd  
12/28/88 12/22/88

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There are a number of factors, ranging from temperature changes, methods and sequence of construction, design of the column base supports, and type and magnitude of loads applied, that can influence the movement of the torus supports. Depending on the allowances made for such movement in the design of the slotted holes in the support bases, the anchor bolts may be distorted by various means. In view of this fact, it is possible that in some plants the anchor bolt distortions may be more severe than those identified at the Hatch Nuclear Plant. Accordingly, addressees may wish to inspect and evaluate the conditions of the torus supports at their plants to determine if any problems similar to those described above exist and to assure that the structural integrity of the torus shell is being maintained.

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*with minor changes.*

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There are a number of factors, ranging from temperature changes, methods and sequence of construction, design of the column base supports, and type and magnitude of loads applied, that can influence the movement of the supports. Depending on the allowances made for such movement in the design of the slotted holes in the steel bearing plates, the rock bolts may be distorted by various means. In view of this fact, it is possible that in some plants the rock bolt distortions may be more severe than those in other plants. Accordingly, addressees may wish to inspect and evaluate the condition of the torus supports at their plants to determine if any problems similar to those described exist and to assure themselves that the structural integrity of the torus shell is intact.

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Charles E. Rossi, Director  
Division of Operational Events Assessment  
Office of Nuclear Reactor Regulation

cc: V. Stello  
T. E. Murley  
W. Russell  
M. Ernst  
A. Davis  
R. Martin  
J. Martin  
L. Shao  
J. Richardson  
G. Bagchi  
C. H. Berlinger  
J. Guillen  
B. Callure  
C. P. Tan

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Technical Contact: Chen P. Tan, NRR  
(301) 492-0829

Jaime Guillen, NRR  
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LIST OF RECENTLY ISSUED  
 NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
89-05	Use of Deadly Force by Guards Protecting Nuclear Power Reactors Against Radiological Sabotage	1/19/89	All holders of OLs for nuclear power reactors.
89-04	Potential Problems from the Use of Space Heaters	1/17/89	All holders of OLs or CPs for nuclear power reactors and test and research reactors.
89-03	Potential Electrical Equipment Problems	1/11/89	All fuel cycle and major nuclear materials licensees.
89-02	Criminal Prosecution of Licensee's Former President for Intentional Safety Violations	1/9/89	All holders of a U.S. NRC specific license.
88-23, Supp. 1	Potential for Gas Binding of High-Pressure Safety Injection Pumps During a Loss-of-Coolant Accident	1/5/89	All holders of OLs or CPs for PWRs.
89-01	Valve Body Erosion	1/4/89	All holders of OLs or CPs for nuclear power reactors.
88-46, Supp. 2	Licensee Report of Defective Refurbished Circuit Breakers	12/30/88	All holders of OLs or CPs for nuclear power reactors.
88-101	Shipment of Contaminated Equipment between Nuclear Power Stations	12/28/88	All holders of OLs or CPs for nuclear power reactors.
88-100	Memorandum of Understanding between NRC and OSHA Relating to NRC-licensed Facilities (53 FR 43950, October 31, 1988)	12/23/88	All major nuclear materials licensees and utilities holding CPs and OLs.

OL = Operating License  
 CP = Construction Permit