

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

August 11, 1992

NRC INFORMATION NOTICE 92-57: RADIAL CRACKING OF SHROUD SUPPORT ACCESS HOLE  
COVER WELDS

Addressees

All holders of operating licenses or construction permits for boiling water reactors (BWRs).

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to the potential for radial cracking of the welds of the shroud support access hole covers (AHCs) inside the reactor vessel. The radial cracking could propagate into the reactor vessel attachment welds. It is expected that recipients will review this information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice are not NRC requirements; therefore, no specific action or written response is required.

Background

Jet pump boiling water reactors (BWRs) are designed with access holes in the shroud support plate at the bottom of the annulus between the core shroud and the reactor vessel wall. Each shroud support plate in the reactor vessel has two access holes located 180 degrees apart. These holes are used for access during construction and are subsequently closed by welding a plate over the hole. The AHCs and most shroud support plates are fabricated from Alloy 600. The connecting weld material is Alloy 182 or 82. The high residual stresses resulting from welding, the crevice geometry of the weld, and the aggressive water chemistry, could cause intergranular stress corrosion cracking (IGSCC).

On January 21, 1988, the Philadelphia Electric Company (the licensee) found significant circumferential cracking in the shroud support AHC welds at the Peach Bottom Atomic Station, Unit 3, using a remotely operated ultrasonic testing (UT) fixture specially designed by the General Electric Company (GE) for this examination. This was the first time such cracking was reported in a domestic BWR plant. The NRC reported the results of a preliminary inspection of this event in NRC Information Notice No. 88-03, "Cracks in Shroud Support Access Hole Cover Welds," of February 2, 1988. In August 1988, the licensee performed another ultrasonic inspection using several improved examination techniques. The licensee found that these cracks, located in the area of the vertical fusion line on the shroud support ledge side of the welds, appeared to initiate from the vertical crevices of the AHCs.

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Licensees used the improved techniques to perform examinations at a number of other BWRs. The licensee found similar cracking at the ledge side of the AHC welds at the Quad Cities Station, Unit 2. GE provided reactor operating guidelines for detecting core bypass flow in SIL No. 462, Supplement 2, Revision 1, of December 19, 1990. GE also recommended the affected BWR owners inspect the creviced Alloy 600 access hole cover plates ultrasonically during the next outage and repeat the examination at intervals of no longer than 3 years.

#### Description of Circumstances

In SIL No. 462, Supplement 3, of June 6, 1992, GE reported the discovery of apparent radial cracking in an AHC weld in a domestic BWR/4 plant. The radial cracking was discovered during a review of the visual examination data. Video examination had been performed to supplement the ultrasonic (UT) examination to confirm evidence of through thickness cracks. The UT examination detected significant circumferential cracks but did not detect the radial cracking. Some of the radial cracking appeared to have penetrated into the alloy 182 reactor vessel attachment weld of the shroud support plate. GE is developing a specialized UT examination to confirm the extent and the size of radial cracking.

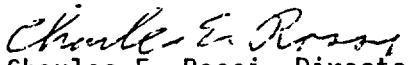
#### Discussion

GE's preliminary evaluation indicated that the radial cracking would not pose an immediate safety concern because the attachment weld areas have a large tolerance for cracks and have large structural margins. However, GE recommended that licensees perform safety evaluations at each plant when cracking is found. The following issues associated with the radial cracking in the access hole cover weld were discussed in GE SIL No. 462, Supplement 3:

- (1) Detection of radial cracking. The current UT procedures recommended by GE for IGSCC inspection of AHCs will not detect the radial cracking. Therefore, special ultrasonic techniques designed for detecting the radial cracking are needed to inspect AHCs.
- (2) Repair of radial cracking. The current repair technique is designed for mitigating circumferential and minor radial cracking of AHCs. Repair methods for extensive radial cracking need to be developed for plants in which such cracking is found.
- (3) Integrity of attachment welds. GE reported that some radial cracking penetrated into the alloy 182 reactor vessel attachment weld of the shroud support plate. Such cracking could challenge the structural margins of the attachment weld depending on the orientation and the extent of the crack growth. Alloy 182 is susceptible to IGSCC which could cause further crack growth. However, the extent of the crack growth in the attachment weld would depend on the magnitude and the distribution of the welding residual stresses.

- (4) Inspection of access hole covers. To ensure early detection of cracking in AHCs, GE SIL No. 462, Supplement 3, made the following recommendations for inspections:
- (a) BWR owners that have not yet inspected the AHCs should perform the UT and visual examinations during the next outage, looking for both the circumferential and radial cracking.
  - (b) BWR owners that performed remote visual examination should review the data and the video tape records for the presence of radial cracking.
  - (c) All BWR owners should examine the AHCs once again for radial cracking sooner than the 3-year interval recommended in SIL No. 462, Supplement 2, Revision 1.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

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

Technical contacts: William H. Koo, NRR  
(301) 504-2706

Robert A. Hermann, NRR  
(301) 504-2768

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Information Notice No.	Subject	Date of Issuance	Issued to
92-56	Counterfeit Valves in the Commercial Grade Supply System	08/06/92	All holders of OLs or CPs for nuclear power reactors.
92-55	Current Fire Endurance Test Results for Thermo-Lag Fire Barrier Material	07/27/92	All holders of OLs or CPs for nuclear power reactors.
92-54	Level Instrumentation Inaccuracies Caused by Rapid Depressurization	07/24/92	All holders of OLs or CPs for nuclear power reactors.
92-53	Potential Failure of Emergency Diesel Generators due to Excessive Rate of Loading	07/29/92	All holders of OLs or CPs for nuclear power reactors.
91-52, Supp. 1	Nonconservative Errors in Overtemperature Delta-Temperature (OTΔT) Set-point Caused by Improper Gain Settings	07/16/92	All holders of OLs or CPs for Westinghouse (W)-designed nuclear power reactors.
92-52	Barriers and Seals Between Mild and Harsh Environments	07/15/92	All holders of OLs or CPs for nuclear power reactors.
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Original Signed by  
Charles E. Rossi

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Office of Nuclear Reactor Regulation

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(301) 504-2706

Robert A. Hermann, NRR  
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Attachment: List of Recently Issued NRC Information Notices

Document Name: 92-57.IN

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RJKiesel	CHBerl	CHBerl	TechEd
07/31/92	08/03/92	08/03/92	06/23/92
*DET:EMCB:NRR	*DET:EMCB:NRR	*A/C/EMCB:DET:NRR	*D/DET:NRR
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08/31/92	06/25/92	06/26/92	06/26/92	06/23/92
				*D/DET:NRR
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*Tech Editor provided comments which were incorporated on 6/24/92 C#13.*

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