

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
WASHINGTON, D.C. 20555-0001

April 4, 1997

**NRC INFORMATION NOTICE 97-17: CRACKING OF VERTICAL WELDS IN THE CORE SHROUD AND DEGRADED REPAIR**

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 discovery of cracks in vertical welds in the core shroud and degradation of core shroud repairs at Nine Mile Point Nuclear Station, Unit 1 (NMP1). 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 are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

**Cracking of Vertical Welds**

During the current refueling outage (March 1997), Niagara Mohawk Power Corporation, the licensee for NMP1, was performing an augmented inservice inspection of welds in its repaired core shroud in accordance with Boiling Water Reactor Vessel and Internals Project (BWRVIP), "Guidelines for Reinspection of BWR Core Shrouds" (BWRVIP-07). On March 14, 1997, the licensee informed the NRC that it found significant cracking in vertical welds V9 and V10. (Welds V9 and V10 extend for 228.6 centimeters [90 inches] near the mid-plane of the shroud). The indications were located in the heat-affected zones both on the outside diameter and to a lesser extent on the inside diameter. Approximately two-thirds of the length of these welds were cracked to a depth of 50 to 80 percent of the wall. As specified by BWRVIP-07 criteria, the licensee expanded the inspection sample to include other vertical shroud welds.

Niagara Mohawk had last examined vertical welds during the 1995 refueling outage as part of its pre-modification inspection plan. At that time, the licensee performed enhanced visual examinations from the inside-diameter surface of four vertical welds (V9, V10, V11, and V12) for a length of 15.2 centimeters [6 inches] near their intersection with the H5 circumferential weld. No crack indications were found in these areas during the 1995 inspection or during the current inspections.

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Also, in the spring of 1996, Georgia Power Company (GPC) reported indications in vertical core shroud welds V5 and V6 at the Edwin I. Hatch Nuclear Plant, Unit 1. GPC conducted the inspection in accordance with the guidance in BWRVIP-07. GPC reported two indications of 5.1 centimeters [2 inches] and 30.5 centimeters [12 inches] in the V5 weld on the outside diameter. They also reported one indication 81.3 centimeters [32 inches] long and four small (3.05 centimeters [1.2 inches]) indications in V6 on the outside diameter. Inspections of the inner diameter of both the V5 and V6 welds showed no cracking. A limited visual inspection of 54.7 centimeters [18 inches] of the vertical welds V5 and V6 near the intersection with the horizontal H4 welds in the fall 1994 outage had not revealed any cracks. At least a part of the region of one of the indications that was found in 1996 in the V6 vertical weld had been visually inspected in the fall 1994 outage and was found to be uncracked.

#### Degraded Repair at NMP1

Niagara Mohawk found the core shroud repair, which had been installed during the 1995 refueling outage, was degraded. The repair consisted of four pretensioned tie rods running vertically from the top to the bottom of the core shroud. Inspections showed that the core shroud lower wedge support was not in contact with the reactor vessel wall and the outside-diameter surface of the shroud as required. The function of this wedge support is to restrain the shroud laterally during a seismic event, and it is held in place by a spring latch device that failed on the tie rod at the 90-degree azimuth location. According to the licensee's preliminary evaluation, the lack of contact could have affected the performance of the lower wedge support during a postulated seismic event.

The failed latch (called a "retainer clip") in the lower part of the 90-degree tie rod assembly resulted in shifting of the associated lateral support block downward to the end of the tie rod. Visual inspection of the other three tie rod assemblies revealed some discoloration of latches in the 270-degree and 350-degree tie rod assemblies, indicating possible degradation. The lateral support block for the 350-degree assembly was found to have shifted about 0.635 centimeter [1/4 inch] downward. The licensee is evaluating the potential consequences of a postulated multiple loss of retainer clips.

The licensee also found the nut at the top of the 270-degree tie rod to be loose, although the retaining device for the nut remained in place. The other three tie rod nuts will be checked for tightness. It was also observed that the lateral support for the 270-degree tie rod assembly, which was contacting the inner radial surface of a recirculation nozzle instead of the vessel wall due to an initial mis-installation, had shifted slightly.

#### Discussion

In view of the extent and location of cracking at vertical core shroud welds observed at NMP1, the BWRVIP intends to revise the shroud inspection guidance in BWRVIP-07. In the interim, the BWRVIP has informed its members that enhanced visual examination of the core shroud outer diameter in the high-fluence area is appropriate based on the vertical weld cracking observed at Hatch 1 and NMP1.

Niagara Mohawk is currently performing evaluations to determine if the degraded core shroud repair would have performed satisfactorily during postulated seismic events and if the shroud would have maintained its structural integrity under all design-basis events.

Related Generic Communications

NRC Information Notice 93-79, "Core Shroud Cracking at Beltline Region Welds in Boiling Water Reactors," dated September 30, 1993.

NRC Information Notice 94-42, "Cracking in the Lower Region of the Core Shroud in Boiling Water Reactors," dated June 7, 1994.

NRC Information Notice 94-42, Supplement 1, "Cracking in the Lower Region of the Core Shroud in Boiling Water Reactors," dated July 19, 1994.

NRC Generic Letter 94-03, "Intergranular Stress Corrosion Cracking of Core Shrouds in Boiling Water Reactors," dated July 25, 1994.

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.



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LIST OF RECENTLY ISSUED  
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Information Notice No.	Subject	Date of Issuance	Issued to
97-16	Preconditioning of Plant Structures, Systems, and Components Before ASME Code Inservice Testing or Technical Specification Surveillance Testing	04/04/97	All holders of OLs or CPs for nuclear power reactors
97-15	Reporting of Errors and Changes in Large-Break Loss-of-Coolant Accident Evaluation Models of Fuel Vendors and Compliance with 10 CFR 50.46(a)(3)	04/04/97	All holders of OLs or CPs for nuclear power reactors and all reactor fuel vendors
97-14	Assessment of Spent Fuel Pool Cooling	03/28/97	All holders of OLs or CPs for nuclear power reactors
97-13	Deficient Conditions Associated with Protective Coatings at Nuclear Power Plants	03/24/97	All holders of OLs or CPs for nuclear power reactors
97-12	Potential Armature Binding in General Electric Type HGA Relays	03/24/97	All holders of OLs or CPs for nuclear power reactors
92-27, Supp. 1	Thermally Induced Accelerated Aging and Failure of ITE/ Gould A.C. Relays Used in Safety-Related Applications	03/21/97	All holders of OLs or CPs for nuclear power reactors

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OL = Operating License  
CP = Construction Permit

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Tech Editor has reviewed and concurred on 03/28/97

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\* see attached concurrences; MBanic per phonecon 3/28/97 concurred on comments

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DATE	03/28/97	03/31/97	04/1/97				

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DATE	3/28/97	3/28/97	3/28/97 <i>w/comm</i>	1/97

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