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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF INSPECTION AND ENFORCEMENT  
WASHINGTON, D.C. 20555

June 11, 1980

IE Information Notice No. 80-27

**DEGRADATION OF REACTOR COOLANT PUMP STUDS**

**Description of Circumstances:**

On May 17, 1980, the NRC staff was informed by Omaha Public Power District (OPPD) that severe corrosion damage was found on a number of closure studs in two of the four Byron Jackson reactor coolant pumps at Fort Calhoun Unit 1 (PWR).

At the time, the reactor coolant system was undergoing a routine low pressure leak test (180 psig) and visual inspection prior to plant restart after a four-month outage for refueling, pipe support modifications and scheduled inservice inspection. During the visual inspection, saturated and dripping insulation was observed at one of the Byron Jackson reactor coolant pump flange regions. Upon removal of the insulation, evidence of coolant leakage was found emanating from the seating surfaces between the pump casing and the pump cover. Further investigation of the three remaining pumps indicated similar coolant leakage past both inner and outer flange gaskets on two of the three pumps. After complete removal of the nonmetallic insulation, further visual observations revealed three studs located side-by-side on one pump and three studs similarly located on the other pump had significant corrosion wastage in the shank area next to the lower thread section in the pump casing flange. Wastage of approximately 50% of the original diameter of the stud giving them an "hour-glass" type appearance was observed. The corroded studs were located in the vicinity of a component cooling water line on both affected pumps but no direct correlation of this fact has been established. Although not confirmed by metallurgical analysis, the cause of the stud wastage is thought to be corrosive attack by hot boric acid from the primary coolant.

The pump cover and casing for these pumps are constructed of ASTM A-351, Grade CF8M stainless steel. Sealing between the cover and casing is achieved by two concentric 304 stainless steel flexitalllic gaskets. A leak-off line installed between the gaskets on each pump was plugged and not instrumented. The leak-off line was not in use and therefore, no indication of RCS leakage from the inner seal was available. Each pump has 16 closure studs, consisting of ASTM A-193 Grade B7 low alloy steel, which are chrome plated in the thread area and phosphate coated in the shank area. The studs are approximately 3-1/2 inches in diameter and about 29 inches long.

No maintenance requiring removal of the pump casing studs had been performed on the reactor coolant pumps since initial construction. The studs were covered

with block type insulation since construction thereby limiting them from view. The studs on two pumps were ultrasonically inspected in place in accordance with the applicable ASME Section XI code rules. These ultrasonic examinations were intended to locate cracks in bolting and were not effective in revealing wastage of the studs.

The three affected pumps will be disassembled for further cleaning and inspection of the studs and mating surfaces. Prior to reassembly, all studs exhibiting significant corrosion will be replaced. All new, or acceptable used studs, will be subjected to ultrasonic, visual and magnetic particle examinations. Installation of instrumentation for actively monitoring the leak-off lines between the flexitalllic gaskets is being performed. Future inservice inspections, presently limited to ultrasonic examination, will be supplemented with visual examination of the studs installed in the reactor coolant pumps. Replacement insulation will be in the form of a removable blanket to facilitate visual examination.

The condition of the studs discovered at Ft. Calhoun raises concerns that such severe corrosion, if undetected, could lead to stud failures which could result in loss of integrity of the reactor coolant pressure boundary. The lack of effectiveness of current ultrasonic examinations in revealing wastage emphasizes the need for supplemental visual inspections and use of instrumented leak detection systems to preclude unacceptable stud degradation going undetected. Licensees should consider that the potential for undetected wastage of carbon steel bolting by a similar mechanism could exist in other components such as valves.

This IE Information Notice is provided as an early notification of a significant matter that is still under review by the NRC staff. It is expected that recipients will review the information for possible applicability to their facilities.

No specific action or written response to this IE Information Notice is required. If NRC evaluations so indicate, further licensee actions may be required.

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Enclosure

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IE INFORMATION NOTICES

| Information Notice No. | Subject  | Date Issued | Issued To  |
|------------------------|--|-------------|--|
| 80-26                  | Evaluation of Contractor QA Programs   | 6/10/80     | All Part 50 Licensees  |
| 80-25                  | Transportation of Pyrophoric Uranium   | 5/30/80     | Material Licensee in Priority/Categories II-A, II-D, III-I and IV-DI; Agreement State Licensees in equivalent categories                             |
| 80-24                  | Low Level Radioactive Waste Burial Criteria  | 5/30/80     | All NRC and Agreement State Licensees  |
| 80-23                  | Loss of Suction to Emergency Feedwater Pumps   | 5/29/80     | All power reactor facilities with an OL or CP  |
| 80-22                  | Breakdown In Contamination Control Programs  | 5/28/80     | All power reactor OLs and near term CPs  |
| 80-21                  | Anchorage and Support of Safety-Related Electrical Equipment   | 5/16/80     | All power reactor facilities with an OL or CP  |
| 80-20                  | Loss of Decay Heat Removal Capability at Davis-Besse Unit 1 While in a Refueling Mode                | 5/8/80      | All light water reactor facilities holding power reactor OLs or CPs  |
| 80-19                  | NIOSH Recall of Recirculating-Mode (Closed-Circuit) Self-Contained Breathing Apparatus (Rebreathers) | 5/6/80      | All holders of a power reactor OL, Research Reactor License, Fuel Cycle Facility License and Priority I Material License                             |
| 80-18                  | Possible Weapons Smuggling Pouch   | 5/5/80      | All power reactor facilities with an OL, fuel fabrication and processing facilities and Materials Priority I licensees (processors and distributors) |