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IN 87-56

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

November 4, 1987

NRC INFORMATION NOTICE NO. 87-56: IMPROPER HYDRAULIC CONTROL UNIT INSTALLATION AT BWR PLANTS

Addressees:

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

Purpose:

This information notice is being provided to alert addressees to a potential problem that could affect the ability of the hydraulic control units (HCUs) to control the positioning of the control rods in the event of an earthquake. In addition, the potential for damage to the control rod drive (CRD) system withdraw lines that exists under certain conditions could result in a small-break loss-of-coolant accident in the HCU area. 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 do not constitute NRC requirements; therefore, no specific action or written response is required.

Background:

The CRD system controls the position of the control rods within the reactor core either to change reactor core power or to rapidly shut down the reactor (scram). The HCU is a major component of the CRD system that incorporates all the hydraulic, electrical, and pneumatic equipment necessary to move one CRD mechanism during normal or scram operations. This equipment, which includes the accumulators, CRD insert lines, CRD withdraw lines, and scram valves, is supported by the HCU frames.

If a sufficiently large number of HCU frame bolts are missing or loose, a Safe Shutdown Earthquake (SSE) could result in damage affecting the ability of the CRD system to control the positioning of the control rods. In addition, damage to a CRD withdraw line could result in a small-break loss-of-coolant accident in the area of the HCUs.

Description of Circumstances:

On May 4, 1986, at the Perry Nuclear Power Plant Unit 1, a hold-down bolt on a CRD system HCU was found to be missing. Four other HCUs were observed with hold-down bolt heads not in contact with the HCU frame. On May 15, further investigation revealed that all of the HCUs had been installed with bolt torque

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values differing from the requirements of the seismic testing in the Environmental Qualification Report. Also, the upper support for each of the 16 branch junction modules (BJMs) was erroneously attached to an HCU frame. (A BJM is an enclosure containing rod position sensor cable terminations and voltage regulating transformers for the Rod Control and Information System. It is mounted to one of a group of HCUs which it serves.) During installation, the BJMs were attached to the HCUs in accordance with a General Electric Co. (GE) drawing, but the HCU seismic test configuration used for equipment qualification did not include a BJM.

After the degraded condition of the HCUs at the Perry plant was discovered, GE issued letters to all BWR owners regarding Potentially Reportable Condition (PRC) 86-08, "Improper Hydraulic Control Unit Installation." The letters informed the owners of the condition of the Perry HCU units. The letters concluded that neither the missing or loose hold-down bolts nor the erroneous BJM attachment observed at the BWR/6 constituted a safety problem during a faulted event at that plant, nor would they at any other BWR because if the remaining hold-down bolts were snug tight, they would enable the HCU to scram the control rods. The GE letters did not address the possibility of damage to a CRD withdraw line that is attached to the HCU. A ruptured CRD line would constitute a small-break loss-of-coolant accident.

During an inspection at Pilgrim Nuclear Power Station on March 13, 1987 (in response to GE Letter No. G-HK-6-326 dated October 22, 1986, regarding improper HCU installation), Boston Edison Company (BECo) identified loose or missing bolts at the top and base of 31 of 145 HCU frames. Also, BECo found flat washers were not installed with the base bolts, which was contrary to the installation drawing. The BECo engineering evaluation of the as-found conditions concluded that design-basis operability of the HCUs could not be established for loading conditions postulated for the SSE. BECo installed the correct bolting to ensure the integrity of the HCU structure.

Discussion:

Although the GE letter, based on the condition of the HCUs at the Perry plant, provides some assurance that a safety problem does not necessarily exist, the experience at the Pilgrim plant demonstrates that some improperly installed HCU configurations might not meet seismic design criteria. The GE letter pointed out that the responsibility for implementing adequate HCU bolt hold-down torque rests with the utility and GE recommended that HCU installations be checked to ensure that:

1. The HCU mounting, whether with bolts or welding, is consistent with the seismic qualification test configuration. The utility may wish to use the actual HCU seismic qualification torque value to ensure adequate tightness.

2. Where BJMs are incorporated, they are not attached directly to the HCU frame above the floor, except in cases where the BJM has been considered in the equipment qualification results.

Attachment
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LIST OF RECENTLY ISSUED
INFORMATION NOTICES 1987

Information Notice No.	Subject	Date of Issuance	Issued to
87-55	Portable Moisture/Density Gauges: Recent Incidents of Portable Gauges Being Stolen or Lost	10/29/87	All NRC licensees authorized to possess portable gauges.
87-54	Emergency Response Exercises	10/23/87	All holders of OLs or CPs for nuclear power reactors.
87-53	Auxiliary Feedwater Pump Trips Resulting from Low Suction Pressure	10/20/87	All holders of OLs or CPs for nuclear power reactors.
87-52	Insulation Breakdown of Silicone Rubber-Insulated Single Conductor Cables During High Potential Testing	10/16/87	All holders of OLs or CPs for nuclear power reactors.
87-51	Failure of Low Pressure Safety Injection Pump Due to Seal Problems	10/13/87	All nuclear power reactor facilities holding an OL or CP.
87-50	Potential LOCA at High- and Low-Pressure Interfaces from Fire Damage	10/9/87	All nuclear power reactor facilities holding an OL or CP.
87-49	Deficiencies in Outside Containment Flooding Protection	10/9/87	All nuclear power reactor facilities holding an OL or CP.
87-48	Information Concerning the Use of Anaerobic Adhesive/ Sealants	10/9/87	All nuclear power reactor facilities holding an OL or CP.
87-47	Transportation of Radiography Devices	10/5/87	All NRC licensees authorized to manufacture, distribute and/or operate radiographic exposure devices and/or source changers.

OL = Operating License
CP = Construction Permit

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact the technical contact 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 Contact: Samuel MacKay, NRR
(301) 492-8394

Attachment: List of Recently Issued NRC Information Notices

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