

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

June 25, 2003

NRC INFORMATION NOTICE 2003-08: POTENTIAL FLOODING THROUGH UNSEALED
CONCRETE FLOOR CRACKS

Addressees

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose

The Nuclear Regulatory Commission (NRC) is issuing this information notice to inform addressees of observed flooding in a room containing safety-related panels and equipment as a result of fire water seepage through unsealed concrete floor cracks. 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 NRC information notice are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

On May 3, 2002, at Energy Northwest's Columbia Generating Station, 15 to 20 gallons of water spilled from a firewater drain line onto the floor of the radwaste building 484' elevation cable spreading room. A small amount of this water leaked down into the remote shutdown room and the Division II switchgear room, which is located below the cable spreading room floor. The licensee determined that the pathway for the leakage was through cracks in the concrete floor.

Discussion

During the performance of a fire protection system surveillance test, 15 to 20 gallons of water spilled on the cable spreading room floor. The water leaked through the concrete floor through a small crack and a spalled area of the concrete floor. The rooms below the cable spreading room floor housed the remote shutdown panel and safety-related switchgear. It was estimated that only a small amount of the 15-20 gallons actually passed through the floor. No damage occurred to the switchgear or the remote shutdown panel. However, thousands of similar small cracks were present on the cable spreading room floor. The room also housed a deluge fire system. Actuation or inadvertent rupture of the deluge system would likely result in additional floor leaks that could impact the Division I and II switchgear, Division I and II batteries, the remote shutdown panel and the alternate remote shutdown panel.

10 CFR 50, Appendix A, Criterion 3 requires licensees to design fire protection systems so that their rupture or inadvertent operation does not significantly impair safety systems. NRC Branch Technical Position 9.5.1, Appendix A, "Guidelines for Fire Protection for Nuclear Power Plants," references guidance contained in National Fire Protection Association (NFPA) 92M for maintaining concrete floors. NFPA 92M states that, "Concrete floors should be

ML031750847

inspected frequently for cracks. Damaged floors may be repaired by use of special compounds. Fine hairline cracks may, in most cases, be sealed with an application of floor paint.” As corrective measures, the licensee performed additional inspections and sealed all appropriate unsealed concrete floors with an approved flexible epoxy coating.

The licensee determined that the cracks in the concrete floor resulted from flexing and shrinkage of the floor. In the case of the spalled concrete around a penetration seal, the material was degraded to the point that cracks provided a pathway for water to bypass the penetration seal and enter the remote shutdown room. The degradation was caused by cracking of the concrete during installation of the concrete anchors adjacent to the seal. The cracking occurred due to insufficient distance between the concrete anchors which allowed the formation of tensile shear cracks.

Neither the water that entered the remote shutdown room nor the water that entered the safety-related switchgear room caused safety-related equipment to become inoperable. In order for the water entry to have become significant, the water would have had to collect in an area where electrical contacts or terminals are located or enter into the cables. A related information notice, IN 2002-12, “Submerged Safety-Related Electrical Cables” addresses cable failure caused by water intrusion into the cable with subsequent drying and degradation of the insulation.

This information notice requires no specific action or written response. If you have any questions about the information notice in this notice, please contact the technical contact listed below or the appropriate project manager from the NRC’s Office of Nuclear Reactor Regulation.

/RA/

William D. Beckner, Program Director
Operating Reactor Improvements Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Technical contact: George Replogle, RIV
509-377-2627
E-mail: gdr@nrc.gov

Attachment: List of Recently Issued NRC Information Notices

inspected frequently for cracks. Damaged floors may be repaired by use of special compounds. Fine hairline cracks may, in most cases, be sealed with an application of floor paint." As corrective measures, the licensee performed additional inspections and sealed all appropriate unsealed concrete floors with an approved flexible epoxy coating.

The licensee determined that the cracks in the concrete floor resulted from flexing and shrinkage of the floor. In the case of the spalled concrete around a penetration seal, the material was degraded to the point that cracks provided a pathway for water to bypass the penetration seal and enter the remote shutdown room. The degradation was caused by cracking of the concrete during installation of the concrete anchors adjacent to the seal. The cracking occurred due to insufficient distance between the concrete anchors which allowed the formation of tensile shear cracks.

Neither the water that entered the remote shutdown room nor the water that entered the safety-related switchgear room caused safety-related equipment to become inoperable. In order for the water entry to have become significant, the water would have had to collect in an area where electrical contacts or terminals are located or enter into the cables. A related information notice, IN 2002-12, "Submerged Safety-Related Electrical Cables" addresses cable failure caused by water intrusion into the cable with subsequent drying and degradation of the insulation.

This information notice requires no specific action or written response. If you have any questions about the information notice in this notice, please contact the technical contact listed below or the appropriate project manager from the NRC's Office of Nuclear Reactor Regulation.

/RA/

William D. Beckner, Program Director
Operating Reactor Improvements Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Technical contact: George Replogle, RIV
817-860-8147
E-mail: gdr@nrc.gov

Attachment: List of Recently Issued NRC Information Notices

DISTRIBUTION:

ADAMS
IN File

DOCUMENT NAME: C:\ORPCheckout\FileNET\ML031750847.wpd
Adams Accession No.:ML031750847

*See previous concurrence

| | | | | |
|--------|---------------|--------------|-----------------|-----------------|
| OFFICE | OES:RORP:DRIP | Tech Editor* | RIV (per email) | RIV (per email) |
| NAME | CDPetrone | | GDRplogle | WBJones |
| DATE | / /2003 | 06/09/2003 | 06/14/2003 | 06/14/2003 |
| OFFICE | RIV | BC:SPLB:DSSA | SC:RORP:DRIP | PD:RORP:DRIP |
| NAME | ATHowell | JHannon | TReis | WDBeckner |
| DATE | 06/23/2003 | 06/17/2003 | 06/24/2003 | 06/25/2003 |

OFFICIAL RECORD COPY

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

| Information Notice No. | Subject | Date of Issuance | Issued to |
|------------------------|--|------------------|--|
| 2003-07 | Water in the Vent Header/vent Line Spherical Junctions | 06/24/2003 | All holders of operating licenses for boiling water reactors (BWRs) with a Mark I containment. |
| 2003-06 | Failure of Safety-related Linestarter Relays at San Onofre Nuclear Generating Station | 06/19/2003 | All holders of operating licenses or construction permits for nuclear power reactors, except those that have permanently ceased operations and have certified that fuel has been permanently removed from the reactor. |
| 2003-05 | Failure to Detect Freespan Cracks in PWR Steam Generator Tubes | 06/05/2003 | All holders of operating licenses or construction permits for pressurized-water reactors (PWRs). |
| 2002-15, Sup 1 | Potential Hydrogen Combustion Events in BWR Piping | 05/06/2003 | All holders of operating licenses for light water reactors, except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor. |
| 2002-21, Sup 1 | Axial Outside-diameter Cracking Affecting Thermally Treated Alloy 600 Steam Generator Tubing | 04/01/2003 | All holders of operating licensees for nuclear power reactors, except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel. |

Note: NRC generic communications may be received in electronic format shortly after they are issued by subscribing to the NRC listserver as follows:

To subscribe send an e-mail to listproc@nrc.gov, no subject, and the following command in the message portion:

subscribe gc-nrr firstname lastname