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IN 86-107

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

December 29, 1986

IE INFORMATION NOTICE NO. 86-107: ENTRY INTO PWR CAVITY WITH RETRACTABLE INCORE DETECTOR THIMBLES WITHDRAWN

Addressees:

All nuclear power reactor facilities holding an operating license or a construction permit.

Purpose and Summary:

This notice is provided to alert licensees of a recurring event where workers were allowed to enter the reactor vessel (RV) sump room at a PWR [cavity beneath the RV] while the retractable incore detector (RID) thimbles are withdrawn. With the RID thimbles retracted, radiation levels of thousands of roentgens per hour (R/hr) can exist in the reactor cavity area. Although established administrative, procedural, and physical controls failed to prevent this latest entry, no excessive personnel exposure occurred because the accompanying health physics (HP) technician acted in a timely, proper manner. Licensee corrective actions to prevent a reoccurrence are discussed below.

Since 1972, 11 unauthorized entries into PWR cavities with the RID thimbles withdrawn have occurred, leading to 6 personnel overexposures. It is suggested that recipients review this notice for applicability to high-radiation area work-controls programs at their facilities and consider actions, if appropriate, to preclude the occurrence of a similar problem at their facilities. Suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required at this time.

Past Related Correspondence:

INPO Significant Operating Experience Report (SOER) 85-3, "Excessive Personnel Radiation Exposures," April 30, 1985.

IE Information Notice No. 84-19, "Two Events Involving Unauthorized Entries Into PWR Reactor Cavities," March 21, 1984.

IE Information Notice No. 82-51, "Overexposure in PWR Cavities," December 21, 1982.

IE Circular No. 76-03, "Radiation Exposure in Reactor Cavities," September 13, 1976.

Description of Circumstances:

On March 30, 1986 the Salem Generating Station Unit 1 was in cold shutdown for refueling with the RID thimbles retracted. While the reactor refueling cavity was being filled, the Unit 1 Shift Supervisor (SS) directed the containment equipment operator (EO) to check the RV sump for water leaks through the inflatable cavity seal. The EO and an accompanying HP technician attempted to enter the locked entrance door to the seal table room. When the high radiation exclusion area key did not open the door (wrong key) the EO jimmied the door and entered the seal table room. The began a descent down the ladder into the RV sump with the HP technician in the lead taking radiation survey readings. When the radiation level indicated 3R/hr, the HP technician aborted the entry, the leak inspection was terminated, and both personnel exited the area. Seal water leakage was noted. Total personnel radiation doses were less than 50 millirem.

The licensee conducted a thorough fact-finding investigation immediately after the event. The following chief causal factors evolved from the review:

1. Lack of Understanding of RV Sump Room's Radiological Hazards

   The SS who directed the sump entry was aware that the RID thimbles were withdrawn, but did not know that these thimbles presented significant radiological hazards. However, the SS did check and ensure that the movable incore detectors were safely stored. Some other plant supervisors also did not understand the thimbles can create intense radiation fields of such magnitude as to jeopardize personnel health and safety. As noted in IE Information Notice 82-51, radiation levels of thousands of R/hr are possible within a few feet of the thimbles. That same notice suggested that each licensee senior reactor operator (SRO) be given a copy of the notice.

2. Lack of Communication Between Work Groups

   The on-shift containment HPs and operation personnel generally understood the RID thimble hazards, but were not informed by shift management that thimbles had been withdrawn.

3. Work-Control Procedures Not Followed

   Procedures for installing safety tags, high-radiation area access key control, and the operating procedure for filling the reactor refueling cavity apparently were not followed properly.

The three causal factors listed above are recurring factors that have lead to the numerous unauthorized/improper RV sump entries described in the past related correspondence. As a result of the investigation, the licensee committed to institute the following corrective actions:

1. As a long-term action, the licensee will upgrade the training (and retraining) program for reactor operators and HP technicians to include RV sump area transient radiation hazards (from the incore detector and the RID thimbles). As a short-term action, the plant General Manager

issued a letter to all plant staff, reviewing the RV sump area radiological hazards. Reinforcing this action, the Operations Manager will personally provide upgraded radiological training to shift operations management, focusing on operations overall responsibility for plant worker radiological safety.

2. The licensee will perform a reevaluation and review of other plant areas and operations as requested by IE Circular 76-06. This reexamination effort should help ensure high-radiation areas (particularly transient) are properly identified and controlled. Within 1 day of the incident, known, existing high-radiation areas locking mechanisms were checked and improved when necessary by the licensee.

3. Procedural controls will be reviewed and upgraded to provide more effective, improved access controls to all high-radiation areas. This administrative effort includes a detailed review of pertinent operations procedures (filling reactor refueling cavity, thimble retraction, etc.) to ensure these documents have appropriate radiation protection hold points to protect the workers. These procedures also will be revised to require appropriate notification and hazards description to maintenance, HP, operations, and other personnel when the RID thimbles are retracted. Hazards posting will be provided in the control room and HP control point in containment to help ensure personnel are aware of thimble position and RV sump entry requirements. The radiation work permit (RWP) procedure will be changed to specifically require a special RWP to enter the RV sump area. This location-specific, single-purpose RWP will require approval by the HP/Chemistry Manager.

Discussion:

Irradiated components such as RID thimbles can create radiation fields in a reactor cavity where permissible occupational dose standards can be exceeded in less than 1 minute. These extremely hazardous areas can present life-threatening radiation situations where acute exposures, sufficient to cause serious radiation injury, are possible with just a few minutes exposure. A reactor cavity is often a hostile physical environment (with poor access and limited visibility) and can be a likely place for personal accidents and mishaps to occur.

As a result of a similar event at Salem in 1980, the licensee had initiated corrective actions to improve radiological controls of the RV sump. In an October 3, 1986 letter to Region I describing licensee corrective actions and commitments for programmatic improvements resulting from the 1986 event, the licensee noted that previous actions as a result of the 1980 event ". . . appeared to be effective in the short term, were apparently not incorporated into station programs in a manner that perpetuated their effectiveness . . . ." The 1986 Salem event clearly demonstrates that these unforgiving areas demand continued management efforts and oversight to ensure that adequate controls persist and remain effective.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact the Regional Administrator of the appropriate regional office or this office.

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Attachment: List of Recently Issued IE Information Notices

LIST OF RECENTLY ISSUED IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
86-106	Feedwater Line Break	12/16/86	All power reactor facilities holding an OL or CP
86-105	Potential For Loss Of Reactor Trip Capability At Intermediate Power Levels	12/19/86	All holders of OL or CP for PWR or BWR
86-104	Unqualified Butt Splice Connectors Identified In Qualified Penetrations	12/16/86	All pressurized and boiling-water reactor facilities holding an OL or CP
86-14 Supplement 1	Overspeed Trips Of AFW, HPCI, And RCIC Turbines	12/17/86	All power reactor facilities holding an OL or CP
86-103	Respirator Coupling Nut Assembly Failures	12/16/86	All power reactor facilities holding an OL or CP and fuel facilities
86-102	Repeated Multiple Failures Of Steam Generator Hydraulic Snubbers Due To Control Valve Sensitivity	12/15/86	All power reactor facilities holding an OL or CP
86-101	Loss Of Decay Heat Removal Due To Loss Of Fluid Levels In Reactor Coolant System	12/12/86	All PWR facilities holding an OL or CP
86-100	Loss Of Offsite Power To Vital Buses At Salem 2	12/12/86	All PWRs or BWRs holding an OL or CP
86-99	Degradation Of Steel Containments	12/8/86	All power reactor facilities holding an OL or CP

OL = Operating License
CP = Construction Permit