

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

March 14, 1990

NRC INFORMATION NOTICE NO. 90-19: POTENTIAL LOSS OF EFFECTIVE VOLUME FOR
CONTAINMENT RECIRCULATION SPRAY AT
PWR FACILITIES

Addressees:

All holders of operating licenses or construction permits for pressurized water reactors (PWRs).

Purpose:

This information notice is intended to alert addressees to the possible loss of effective volume for containment recirculation spray caused by the entrapment of water in the refueling canal of PWRs. 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 do not constitute NRC requirements; therefore, no specific action or written response is required. This information notice resolves and completes action on Generic Safety Issue 95, "Loss of Effective Volume for Containment Recirculation Spray."

Description of Circumstances:

In 1983, the NRC staff resident inspector at H. B. Robinson Unit 2 questioned the licensee's practice of leaving the refueling canal drain valve in the closed position during plant operation. The specific concern was that if the refueling canal drain valve in a PWR dry containment is closed during plant operation and the plant experiences a loss-of-coolant accident (LOCA), that fraction of the containment spray which falls into the refueling canal would be prevented from returning to the containment emergency sump. Eventually the entire volume of the refueling canal could be filled with water, preventing that amount of water from being available for the post-LOCA recirculation mode for containment and reactor cooling.

A subsequent investigation by the H. B. Robinson licensee revealed that Westinghouse had intended the refueling canal drain valve to be open during operation. However, operation with the valve closed was found to have negligible safety significance because the maximum volume of water that could be entrapped in the refueling canal was small relative to the large volume of water available from the refueling water storage tank. Nevertheless, the licensee decided to operate the plant with the valve open and revise plant procedures accordingly.

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Concurrence

IDR-11C

The staff reviewed the licensee's response and corrective action (operation with the drain valve open) and found them acceptable. Further, the staff considered the potential generic implications of this issue. Of particular concern was whether there are large spaces that might entrap the recirculation water and whether this water can be adequately drained to the containment sump. The staff addresses this concern in the design review under Standard Review Plan (SRP) Section 6.2.2, "Containment Heat Removal System." However, there are PWR plants that were not reviewed under SRP Section 6.2.2 to determine if the entrapment of containment recirculation water could occur. There are 27 PWR plants licensed before SRP Section 6.2.2 was issued. Other PWR plants were reviewed under SRP Section 6.2.2, but plant procedures may not have been explicitly evaluated for this safety matter.

Safety Significance:

The principal concern is the potential for the entrapment of containment spray water in operating PWRs. The concern arises because if a sufficient volume of spray water is prevented from returning to the containment emergency sump, adequate flow in the containment spray recirculation and emergency core coolant recirculation mode may not be provided. Insufficient flow to the sump can result in inadequate net positive suction head to the containment spray and low pressure safety injection pumps. Subsequently, proper post-LOCA containment cooling and reactor core cooling can be disabled.

In the NRC staff's evaluation of Generic Safety Issue 95, the staff concluded that the safety significance of this issue depends primarily upon whether entrapment of an unacceptable volume of containment spray water could occur during the recirculation phase. Licensees may wish to review the adequacy of their procedures for ensuring proper water drainage to the containment emergency sump. Requiring that the refueling canal drain valves be open while the reactor is operating or other comparable provisions may be appropriate. In this connection, we note that the current plant technical specifications for PWRs with ice-condenser containments include operability and surveillance requirements for the refueling canal drain valve during power operation.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact the technical contact listed below or the appropriate NRR project manager.


Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contact: Chang-Yang Li, NRR
(301) 492-0875

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
90-18	Potential Problems with Crosby Safety Relief Valves Used on Diesel Generator Air Start Receiver Tanks	3/9/90	All holders of OLs or CPs for nuclear power reactors.
90-17	Weight and Center of Gravity Discrepancies for Copes-Vulcan Valves	3/8/90	All holders of OLs or CPs for nuclear power reactors.
89-59, Supp. 2	Suppliers of Potentially Misrepresented Fasteners	3/7/90	All holders of OLs or CPs for nuclear power reactors.
90-16	Compliance with New Decommissioning Rule	3/7/90	All materials licensees.
90-15	Reciprocity: Notification of Agreement State Radiation Control Directors Before Beginning Work in Agreement States	3/7/90	All holders of NRC materials licenses which authorize use of radioactive material at temporary job sites.
90-14	Accidental Disposal of Radioactive Materials	3/6/90	All U.S. NRC byproduct material licensees.
90-13	Importance of Review and Analysis of Safeguards Event Logs	3/5/90	All holders of OLs or CPs for nuclear power reactors.
90-12	Monitoring or Interruption of Plant Communications	2/28/90	All holders of OLs or CPs for nuclear power reactors.
90-11	Maintenance Deficiency Associated with Solenoid-Operated Valves	2/28/90	All holders of OLs or CPs for nuclear power reactors.
90-10	Primary Water Stress Corrosion Cracking (PWSCC) of Inconel 600	2/23/90	All holders of OLs or CPs for PWRs.

OL = Operating License
CP = Construction Permit

The staff reviewed the licensee's response and corrective action (operation with the drain valve open) and found them acceptable. Further, the staff considered the potential generic implications of this issue. Of particular concern was whether there are large spaces that might entrap the recirculation water and whether this water can be adequately drained to the containment sump. The staff addresses this concern in the design review under Standard Review Plan (SRP) Section 6.2.2, "Containment Heat Removal System." However, there are PWR plants that were not reviewed under SRP Section 6.2.2 to determine if the entrapment of containment recirculation water could occur. There are 27 PWR plants licensed before SRP Section 6.2.2 was issued. Other PWR plants were reviewed under SRP Section 6.2.2, but plant procedures may not have been explicitly evaluated for this safety matter.

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In the NRC staff's evaluation of Generic Safety Issue 95, the staff concluded that the safety significance of this issue depends primarily upon whether entrapment of an unacceptable volume of containment spray water could occur during the recirculation phase. Licensees may wish to review the adequacy of their procedures for ensuring proper water drainage to the containment emergency sump. Requiring that the refueling canal drain valves be open while the reactor is operating or other comparable provisions may be appropriate. In this connection, we note that the current plant technical specifications for PWRs with ice-condenser containments include operability and surveillance requirements for the refueling canal drain valve during power operation.

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Document Name: INFO NOTICE - KADAMBI, LI

*SEE PREVIOUS CONCURRENCES

*OGCB:DOEA:NRR

NPKadamb1
02/26/90

*SPLB:DST:NRR

CYL1
03/07/90

*RPB:ADM

TechEd
03/02/90

*C/OGCB:DOEA:NRR

MCHBerlinger
03/7/90

*D/DET:NRR

ATHadani
03/7/90

D/DOEA:NRR

CERosst
03/8/90

NPK
03/08/90

Per Telephone call from Bob Colman (PTSB) spoke with T. King of RES to confirm that this IN meets with RES approval. N.P. Kadambari

3/8/90 ✓

The staff reviewed the licensee's response and corrective action (operation with the drain valve open) and found them acceptable. Further, the staff considered the potential generic implications of this issue. Of particular concern was whether there are large spaces that might entrap the recirculation water and whether this water can be adequately drained to the containment sump. The staff addresses this concern in the design review under Standard Review Plan (SRP) Section 6.2.2, "Containment Heat Removal System." However, there are PWR plants that were not reviewed under SRP Section 6.2.2 to determine if the entrapment of containment recirculation water could occur. There are 27 PWR plants licensed before SRP Section 6.2.2 was issued. Other PWR plants were reviewed under SRP Section 6.2.2, but plant procedures may not have been explicitly evaluated for this safety matter.

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In the NRC staff's evaluation of Generic Safety Issue 95, the staff concluded that the safety significance of this issue depends primarily upon whether entrapment of an unacceptable volume of containment spray water could occur during the recirculation phase. In order to resolve this potential safety problem, licensees may wish to incorporate procedures to ensure proper water drainage to the containment emergency sump, such as requiring that the refueling canal drain valves be open while the reactor is operating or consider other comparable provisions. In this connection, we note that the current plant technical specifications for PWRs with ice-condenser containments include operability and surveillance requirements for the refueling canal drain valve during power operation.

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NPK Kadambi CYLI TechEd CHBerlinger
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D/DST:NRR D/DOEA:NRR
ATHadani CERossi
03/7/90 03/ /90

AT 3/7
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02/26/90	03/7 /90	03/02/90	03/ /90	03/ /90

3/6/90

The licensee's response and corrective action (operation with the drain valve open) were reviewed and found acceptable by the staff. Further, the staff considered the potential generic implications of this issue. Of particular concern was whether there are large volumes that might entrap the recirculation water and whether these volumes can be adequately drained to the containment sump. Because of the lack of specific guidance, those PWR plants that were not reviewed under SRP Section 6.2.2, "Containment Heat Removal System," may need to be reviewed carefully to determine if entrapment of containment recirculation water could occur. There are 27 PWR plants licensed before SRP Section 6.2.2 was issued. Other PWR plants were reviewed under SRP Section 6.2.2 but plant procedures may not have been explicitly evaluated for this safety matter.

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The principal concern is the potential for containment spray water entrapment in operating PWRs. The concern arises because if a sufficient volume of spray water is prevented from returning to the containment emergency sump, adequate flow in the containment spray recirculation and emergency core coolant recirculation mode may not be provided. This can result in inadequate net positive suction head to the containment spray and low pressure safety injection pumps and subsequent inability to provide proper post-LOCA containment and reactor core cooling.

In the NRC staff's evaluation of Generic Safety Issue 95 the staff concluded that the safety significance of this issue depends primarily upon whether entrapment of an unacceptable volume of containment spray water could occur during the recirculation phase. In order to ameliorate this potential safety problem, licensees may wish to incorporate procedures to ensure proper water drainage to the containment emergency sump, such as requiring that the refueling canal drain valve(s) be open while the reactor is operating or consider other comparable provisions. It is noted that the current plant technical specifications for PWRs with ice-condenser containments include operability and surveillance requirements for the refueling canal drain valve during power operation.

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