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

January 22, 1990

NRC INFORMATION NOTICE NO. 90-02: POTENTIAL DEGRADATION OF SECONDARY CONTAINMENT

Addressees:

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

Purpose:

This information notice is intended to alert addressees to potential problems involving degradation of secondary containment as a result of unforeseen interactions with various normal plant ventilation systems and inadequate surveillance testing of secondary containment integrity. 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.

Description of Circumstances:

Duane Arnold Energy Center

During a reactor building exhaust ventilation inspection, an Iowa Electric system engineer discovered a large hole in the duct work (see Figure 1). This hole allowed the main plant ventilation system to communicate directly with the reactor building ventilation system, thus bypassing the standby gas treatment system (SGTS) and providing a direct path for an untreated release of radioactive effluents to the environment. This pathway would have existed even with an automatic Engineered Safety Feature (ESF) isolation of the reactor building ventilation system and an autostart of the SGTS. The licensee discovered that its normal secondary containment integrity surveillance test (which requires a measurement of 0.25 inch water vacuum with one train of SGTS operating) was still apparently satisfied with the main plant ventilation fans running. This has been the test configuration used at the plant since initial startup in 1974. However, upon conducting the test with the SGTS operating as designed and the main plant ventilation secured, the 0.25-inch vacuum could not be achieved because of numerous secondary containment leaks. A 10 CFR 50.72 4-hour notification was made to the NRC upon this discovery.

The licensee determined that during the performance of the secondary containment integrity surveillance as it was previously conducted, the main plant

IDTR-11C

Concurrence

ventilation, turbine building ventilation, and the radwaste building ventilation exhaust fans had aided the SGTS in drawing the required vacuum. Because surveillance tests performed since initial unit startup usually indicated that the required negative pressure had been obtained, numerous secondary containment integrity deficiencies went undetected and uncorrected. The maintenance to correct this overall degradation of the secondary containment required more than 3 weeks of effort to locate and repair numerous door seals, electrical penetrations, steam tunnel boot seals, dampers, building seals, and duct systems. These repairs resulted in an improvement in the measured secondary containment vacuum from less than 0.08 inch of water to greater than 0.25 inch of water, as determined by retesting with a new surveillance test procedure. This test now requires all major plant exhaust ventilation fans that potentially communicate with secondary containment to be secured.

Continued testing after repairs has shown that one main plant exhaust ventilation fan can still draw an approximate 500 to 1000 standard cubic feet-per-minute (SCFM) volume from the reactor building ventilation system (the secondary containment boundary) when the ESF-required isolation is in effect. As this circumstance could result in an untreated ground-level release under certain accident scenarios, the licensee developed alarm response procedures designed to secure the main plant ventilation fans when secondary containment isolation is initiated and main plant exhaust ventilation radiation monitors reach specified values. Iowa Electric is also considering long-term corrective action involving hardware modifications that would prevent main plant ventilation from drawing air out of the reactor building under accident conditions.

Monticello

As a result of the secondary containment deficiencies identified at Duane Arnold, the NRC resident inspector contacted the licensee for the Monticello plant concerning the procedures and practices for testing the secondary containment system.

The licensee had normally tested the secondary containment integrity with the main plant exhaust fans running and isolated both supply and exhaust fans in the reactor building. However, on October 14, 1989, the licensee conducted the secondary containment integrity test with the main plant exhaust fans secured and was not able to maintain the 0.25-inch water vacuum required by the technical specifications. The vacuum reached in the reactor building was only 0.1 inch of water. Preliminary investigation revealed that failure of the test was due to leaks in the reactor building supply and exhaust system dampers and various other secondary containment leaks. The licensee also believes that the operation of the main plant exhaust fans assisted the SGTS in drawing the required vacuum on the secondary containment, thus establishing a path that bypassed the SGTS. A 10 CFR 50.72 notification was made to the NRC.

Discussion of Safety Significance:

Plant heating, ventilation, and air conditioning (HVAC) systems are diverse among boiling water reactors. Interactions between these systems and the standby gas treatment system could mask degradation of the secondary containment boundary during surveillance testing and could exacerbate such degradation by diverting flow from the SGTS following an accident.

For those plants discussed above, a portion of the secondary containment boundary is formed by the ductwork and isolation dampers of the reactor building ventilation system. This system exhausts to a common plenum area within the reactor building, but outside secondary containment, where ventilation flows from other plant HVAC systems are also directed. The high-capacity main plant ventilation exhaust fans take suction from the plenum area and discharge the flow through the reactor building roof stacks. Because of the high capacity of the main plant exhaust fans and their proximity to the reactor building ventilation system components that form part of the secondary containment boundary, the potential exists for air flow to bypass the SGTS even when the secondary containment is isolated. Further, if the main plant ventilation fans are operated during surveillance testing, degradation of secondary containment could go undetected as the main plant fans and the SGTS fans could collectively draw the required vacuum.

In view of the possibility of the main plant ventilation systems masking deficiencies in SGTS and/or secondary containment integrity and of creating possible untreated release paths under accident conditions, licensees for other BWR plants may wish to review the design and operation of major plant ventilation systems and to review their secondary containment integrity surveillance procedures.

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

Charles E. Rossi

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(708) 790-5574

John A. Kudrick, NRR
(301) 492-0871

James R. Hall, NRR
(301) 492-1391

Attachments:
1. Figure 1 - Reactor Building Ventilation
2. List of Recently Issued NRC Information Notices

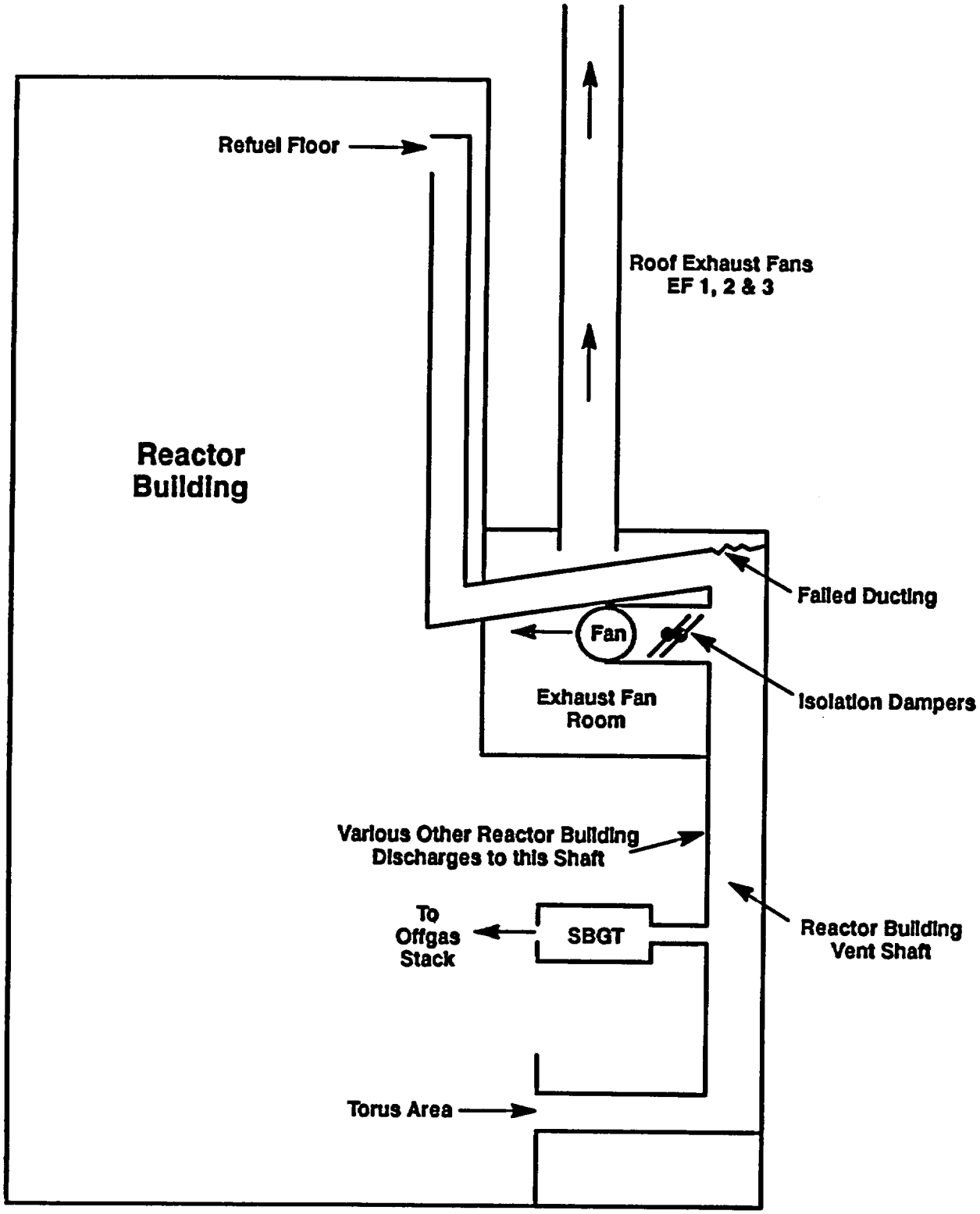

Figure 1
Reactor Building Ventilation

LIST OF RECENTLY ISSUED NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
90-01	Importance of Proper Response to Self-Identified Violations by Licensees	1/12/90	All holders of NRC materials licenses.
89-90	Pressurizer Safety Valve Lift Setpoint Shift	12/28/89	All holders of OLs or CPs for PWRs.
89-89	Event Notification Worksheets	12/26/89	All holders of OLs or CPs for nuclear power reactors.
89-88	Recent NRC-Sponsored Testing of Motor-Operated Valves	12/26/89	All holders of OLs or CPs for nuclear power reactors.
89-87	Disabling of Emergency Diesel Generators by Their Neutral Ground-Fault Protection Circuitry	12/19/89	All holders of OLs or CPs for nuclear power reactors.
89-45, Supp. 2	Metalclad, Low-Voltage Power Circuit Breakers Refurbished with Substandard Parts	12/15/89	All holders of OLs or CPs for nuclear power reactors.
89-86	Type HK Circuit Breakers Missing Close Latch Anti-Shock Springs.	12/15/89	All holders of OLs or CPs for nuclear power reactors.
89-85	EPA's Interim Final Rule on Medical Waste Tracking and Management	12/15/89	All medical, academic, industrial, waste broker, and waste disposal site licensees.
89-84	Failure of Ingersoll Rand Air Start Motors as a Result of Pinion Gear Assembly Fitting Problems	12/12/89	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
CP = Construction Permit

For those plants discussed above, a portion of the secondary containment boundary is formed by the ductwork and isolation dampers of the reactor building ventilation system. This system exhausts to a common plenum area within the reactor building, but outside secondary containment, where ventilation flows from other plant HVAC systems are also directed. The high-capacity main plant ventilation exhaust fans take suction from the plenum area and discharge the flow through the reactor building roof stacks. Because of the high capacity of the main plant exhaust fans and their proximity to the reactor building ventilation system components that form part of the secondary containment boundary, the potential exists for air flow to bypass the SGTS even when the secondary containment is isolated. Further, if the main plant ventilation fans are operated during surveillance testing, degradation of secondary containment could go undetected as the main plant fans and the SGTS fans could collectively draw the required vacuum.

In view of the possibility of the main plant ventilation systems masking deficiencies in SGTS and/or secondary containment integrity and of creating possible untreated release paths under accident conditions, licensees for other BWR plants may wish to review the design and operation of major plant ventilation systems and to review their secondary containment integrity surveillance procedures.

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Document Name: INFO NOTICE - JACKIW, KIESSEL

*SEE PREVIOUS CONCURRENCES

	D/DOEA:NRR	*C/OGCB:DOEA:NRR	*RPB:ARM	*D/DST:NRR
	CERossi	CHBerlinger	TechEd	AThadani
	01/16/90	01/10/90	12/21/89	12/18/89
*OGCB:DOEA:NRR	*RIII	*PD33:DRSP:NRR	*SPLB:DST:NRR	*C/SPLB:DST:NRR
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11/16/89	11/21/89	11/16/89	12/12/89	12/12/89

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