

## LICENSEE EVENT REPORT (LER)

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TITLE (4) **Inadequate Design or Consideration of Circuits Involved in Achieving Dedicated Shutdown**

EVENT DATE (5)			LER NUMBER (6)				REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)				
MON	DAY	YR	YR	SEQUENTIAL NUMBER		REVISION NUMBER	MON	DAY	YR	FACILITY NAMES		DOCKET NUMBER (8)		
03	07	97	97	-	0 0 5	- 0 1	05	12	97			0	5	0 0 0
												0	5	0 0 0

OPERATING MODE (9) **4**

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR. (11)

POWER LEVEL (10) **0 0 0**

10 CFR 50.73(a)(2)(i)(B)  
 OTHER - License Condition 2.C.9  
 (Specify in Abstract below and in text, NRC Form 366A)

LICENSEE CONTACT FOR THIS LER (12)

**Norm Peterson - Compliance Supervisor**

TELEPHONE NUMBER  
AREA CODE **313** NUMBER **586-4258**

**COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)  YES (If yes, complete EXPECTED SUBMISSION DATE)  NO

EXPECTED SUBMISSION DATE (15)

MONTH      DAY      YEAR

ABSTRACT (16)

During an engineering review of the Emergency Equipment Cooling Water (EECW) system, it was discovered on March 7, 1997, that the Reactor Building Closed Cooling Water (RBCCW) to EECW return and supply isolation valve interlocks are installed in the EECW makeup tank isolation valve circuit between the Dedicated Shutdown Panel transfer switch and the opening coil. The interlocks are not bypassed when the valve is in local control at the Dedicated Shutdown Panel. There is no assurance that the RBCCW to EECW return and supply isolation valves will close because they are not valves that can be operated from a Dedicated Shutdown Panel and are not protected from fire induced hot shorts.

During a subsequent review of dedicated shutdown procedure circuits being performed as corrective action to the above, it was discovered on April 12, 1997, that smoke/CO<sub>2</sub> shutoff dampers in the Division 2 Battery Charger Room may not close, or may re-open during use of the Dedicated Shutdown Procedure. This could hamper access to areas needed to complete the Dedicated Shutdown Procedure. Dedicated Self Contained Breathing Apparatus (SCBA) units have been staged at the dedicated shutdown equipment area in the Radwaste Switchgear Room, and surveillance procedures have been revised to assure the availability of the SCBAs for Dedicated Shutdown Procedure use.

The event was caused by inadequate design or consideration of these circuits. Contributing factors were inadequate cross discipline review and inadequate post modification testing. Currently, process barriers are in place to minimize the chance that this type of event can occur.

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Initial Plant Condition:

Operational Condition: 4 (Cold Shutdown)  
 Reactor Power: 0 Percent  
 Reactor Pressure: 0 psig  
 Reactor Temperature: 121 degrees Fahrenheit

Description of the Event:

A. Background

The Emergency Equipment Cooling Water (EECW) [BI] system provides cooling water to equipment required to be cooled under accident conditions. During normal plant operation, EECW loads are cooled by Reactor Building Closed Cooling Water (RBCCW) [CC]. Following an automatic start signal, the EECW pump [BI][P] starts, the RBCCW to EECW return and supply isolation valves [BI][ISV] close, and the EECW makeup tank [BI][TK] isolation valve opens. The EECW makeup tank isolation valve is interlocked so that it will not open until the RBCCW to EECW return and supply isolation valves are fully closed. Of these three valves, only the EECW makeup tank isolation valve can be operated from the Dedicated Shutdown Panel [JL][PL].

Two center-tapped 260-V batteries [EJ][BTRY] are provided for Class 1E loads, designated as 2PA for Division 1 and 2PB for Division 2. The batteries are located in separate rooms in the Auxiliary Building [NF]. The chargers and related equipment for the Class 1E batteries are located outside the battery rooms, in accordance with the separation criteria required for redundant systems. The Cable Tray Room serves primarily as a cable routing area for Division 2 cables although some Division 1 cables are also routed through this area. The Division 2 Battery Charger Room (Fire Zone 11AB) and Cable Tray Room (Fire Zone 8AB), per Updated Final Safety Analysis Report (UFSAR) Section 7.5.2.5, utilize the Dedicated Shutdown System and Dedicated Shutdown Procedure to safely shutdown the reactor in the event of a fire of sufficient magnitude to cause multiple division fire damage to the equipment in either of these zones. Dedicated shutdown is required because there are unprotected shutdown cables and/or equipment of both divisions in these zones. Appendix R, Section III.G.3.b of 10 CFR 50 requires a fixed suppression system and fire detection in zones where an alternate shutdown (i.e., dedicated shutdown at Fermi 2) is used. The Dedicated Shutdown System and Procedure provide "defense in depth" in the event that the fire suppression system is ineffective in preventing the fire damage to the divisional shutdown circuits.

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### B. Description

During an engineering review of the EECW system, it was discovered on March 7, 1997 that the RBCCW to EECW return and supply isolation valve interlocks [BI][IEL] are installed in the EECW makeup tank isolation valve circuit between the Dedicated Shutdown Panel transfer switch [JL][HS] and the opening coil [JL][20][CL]. The interlocks are not bypassed when the valve is in local control at the Dedicated Shutdown Panel. There is no assurance that the RBCCW to EECW return and supply isolation valves will close because they are not valves that can be operated from a Dedicated Shutdown Panel and the control circuits [BI][ISV][CBL3] are not protected from potential fire damage such as hot shorts. As a result, there is no assurance that the EECW makeup tank isolation valve can be operated properly from the Dedicated Shutdown Panel if the RBCCW to EECW return and supply isolation valves cannot be verified closed from the panel.

Technical Specification 3.7.11.d requires an operable Appendix R "Alternative Shutdown" EECW makeup tank isolation valve control circuit. Therefore, because this circuit has been in place since 1987, this event is reportable in accordance with 10CFR50.73(a)(2)(i)(B) as a condition prohibited by Technical Specifications. This event is also reportable as a violation of License Condition 2.C.9 and is reported in accordance with License Condition 2.F. An Event Notification was made on March 6, 1997 at 1230 hours.

Additional circuit review revealed on April 12, 1997, that in the event of a design basis fire in the Division 2 Battery Charger Room (Fire Zone 11AB) and an assumed loss of offsite power that renders the Division 2 AC power sources unavailable, all fourteen smoke/CO<sub>2</sub> dampers, including smoke/CO<sub>2</sub> dampers [VF][BDMP] T4100F167 and T4100F165, open because of the loss of Division 2 power. The opening of these two smoke/CO<sub>2</sub> dampers provides a pathway to the small room adjacent to the Division 2 Battery Charger Room which contains circuits that require positioning or position verification during shutdown from the Dedicated Shutdown Panel. Additional investigation revealed that the Cable Tray Room below the Division 2 Battery Charger Room could also introduce CO<sub>2</sub> and smoke to the Auxiliary Building through its dampers which are opened into the Auxiliary Building. These are the only areas in the Auxiliary Building that are dedicated shutdown zones with CO<sub>2</sub> suppression [LW]. Because CO<sub>2</sub> is not assumed to be effective during a dedicated shutdown event, the escape of smoke and CO<sub>2</sub> gas into the Auxiliary Building could create an uninhabitable atmosphere for operators using the Dedicated Shutdown Procedure. For example, the small room adjacent to the Division 2 Battery Charger Room contains the Division 2 Distribution Panel 2PB-2 [EJ][PL]. This distribution panel is required to be accessed during the dedicated shutdown event to ensure Division 2 safety circuits are verified to be deenergized in order to prevent any spurious actions in Division 2 systems, and to verify the circuit to Safety Relief Valve "G" [AD][RV] is energized. In this case and the general case related to the Cable Tray Room, the operators would not be expected to enter rooms and/or areas in the Auxiliary Building if they are full of smoke and/or CO<sub>2</sub>. Self Contained Breathing Apparatus (SCBA) units had not been identified as dedicated shutdown equipment, and other SCBA units may not have been readily available in areas where emergency lighting is provided. If rooms or

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areas could not be entered because of the uninhabitable environment, the Dedicated Shutdown Procedure could not be completed as written which is reportable as a violation of License Condition 2.C.9. An event notification describing the deficiency was made on April 12, 1997, at 1044 hours.

Cause of the Event:

The event was caused by inadequate design of the EECW makeup tank isolation valve, Division 2 Battery Charger room, and Cable Tray Room damper circuits. For the EECW makeup tank isolation valve, in 1986 a modification package was developed to relocate the EECW makeup tank isolation valve from the EECW main flow path to the makeup tank line. This package received a multi-disciplinary review which included a fire protection review. In 1987 a subsequent revision to the modification package added the RBCCW to EECW return and supply isolation valve interlocks to the EECW makeup isolation valve circuit. The interlocks were located between the Dedicated Shutdown Panel transfer switch and the opening coil.

Contributing factors were inadequate design review and inadequate post modification testing. When the revision to the modification package was issued to install the interlocks with the RBCCW to EECW return and supply isolation valves, a fire protection review was not performed. Post modification testing did not verify that the circuit would operate properly under all the possible system configurations listed in the Updated Final Safety Analysis Report.

Surveillances performed to check the function of Dedicated Shutdown Panel controls did not identify a problem because the procedure tests the EECW makeup tank isolation valve when Division 1 EECW is operating, i.e., isolated from RBCCW so that the interlock contacts are closed. The surveillance is performed with EECW operating to minimize the impact of testing on plant operation.

The Division 2 Battery Charger Room and Cable Tray Room damper operation were originally an integral part of the overall Auxiliary Building Heating, Ventilating and Air Conditioning (HVAC) System [VF] and fire suppression system design. During a design basis fire and assumed loss of offsite power, the fire suppression system design has been shown to work properly and is acceptable. However, upon imposition of dedicated shutdown assumptions, the loss of Division 2 AC power will cause the smoke/CO<sub>2</sub> dampers in the Division 2 Battery Charger Room or the Cable Tray Room to open. This could create an uninhabitable atmosphere in Auxiliary Building areas that may need to be accessed by operators in performing the Dedicated Shutdown Procedure. No consideration of this type of atmosphere was made during the dedicated shutdown modifications or procedure development. This was caused by an inadequate cross disciplinary review between the design team revising the Appendix R designs and the design discipline group(s) responsible for the design of the fire suppression system and smoke/CO<sub>2</sub> dampers.

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Analysis of the Event:

The Abnormal Operating Procedure for control of the plant from the Dedicated Shutdown Panel directs operators to take local control at the Dedicated Shutdown Panel and to open the EECW makeup tank isolation valve. If this cannot be performed from the dedicated shutdown panel, then the valve can readily be opened by other means. Due to the ease of access to the EECW makeup tank isolation valve and its close proximity to the Dedicated Shutdown Panel where it would be normally operated, the valve could have been successfully operated, if required, without significantly impacting response time to the design basis event. Therefore, this aspect was of minimal safety significance.

The Dedicated Shutdown Procedure directs operators to areas where manual actions must be taken. In the event that an area was inaccessible because of the damper operation allowing smoke and CO<sub>2</sub> release to create an inhabitable area, it is reasonable to assume that the operators would have sought SCBA units to enable access to the area. These units are readily available at several locations in the plant. Therefore, this aspect of the LER was of minimal safety significance.

Corrective Actions:

A. Immediate Corrective Actions

Dedicated SCBA units have been staged at the dedicated shutdown equipment area in the Radwaste Building Switchgear Room.

B. Corrective Actions to Prevent Recurrence

A modification to the plant has been installed to ensure that the operation of the EECW makeup tank isolation valve meets the operability requirements of Technical Specifications. Appropriate changes to the dedicated shutdown procedure have also been made.

A review of the Dedicated Shutdown Panel circuits has been completed to assure that there are no other similar concerns.

Procedures have been revised to designate that the SCBAs staged at the dedicated shutdown equipment area in the Radwaste Building Switchgear Room are for Dedicated Shutdown Procedure use. No new communications issues have been introduced by the need to use SCBAs in these areas.

Currently, process barriers are in place to minimize the chance that these types of events can occur. The Engineering Support Conduct Manual procedure for the conduct of design verification contains a checklist that requires a fire protection review when changes to circuitry occur. Furthermore, the Engineering Support Conduct Manual procedure for the preparation and control

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of engineering design packages requires that design acceptance tests "verify that the objectives of the modification are in fact met functionally, and to confirm that critical design parameters to the modification are satisfied. These functional requirements shall include test objectives, prerequisites, functional testing requirements, and acceptance criteria."

### Additional Information

#### A. Failed Components

None

#### B. Previous LERs on Similar Problems

##### LER 96-008

Following a plant housekeeping tour, a concern was raised about the fire wrap in the Auxiliary Building Basement, elevations 551 feet and 562 feet. This prompted a review of the 10CFR50, Appendix R assumptions used for this area. This review which was completed on May 13, 1996 revealed an incorrect assumption used in the Appendix R Fire Hazards Analysis. Further investigation identified a portion of Division 2 cable trays which are not fire-wrapped in their entirety and these trays are located near equipment which can be considered intervening combustibles, i.e., combustible material within 20 feet of redundant shutdown divisions. The cause of this event was inadequate cross disciplinary communication during the period in 1984 when there was an ongoing effort to provide a justification for an alternate shutdown procedure to be in place until a Dedicated Shutdown Panel was installed during the first refueling outage. An engineering design modification was subsequently installed to bring this area into compliance with 10CFR50, Appendix R.

##### LER 96-019

On November 15, 1996 a Deviation Event Report (DER) was initiated to investigate the adequacy of the water supply for the Standby Feedwater (SBFW) system for an Appendix R application. The water supply for SBFW is from a nine foot standpipe in the Condensate Storage Tank (CST). Technical Specification (TS) 3.7.11 requires an operable SBFW system consisting of two operable SBFW pumps and an operable flow path from the CST to the reactor vessel. The cause of this event was an inadequate design review of the Appendix R Dedicated Shutdown Method during design development in 1984. Appropriate Operating procedures were revised to maintain the required volume of water in the CST at greater than 22 feet.