Entergy Operations

Entergy Operations, Inc.
P.O. Box B
Killona, LA 70066
Tel 504-739-6660

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November 23, 1994

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Subject: Waterford 3 SES
Docket No. 50-382
License No. NPF-38
Reporting of Licensee Event Report

Gentlemen:

Attached is Licensee Event Report Number LER-94-014-00 for Waterford Steam Electric Station Unit 3. This report is submitted as a Voluntary Licensee Event Report.

Very truly yours,

R.S. Starkey
Acting General Manager
Plant Operations

RSS/RTK/tjs
Attachment

cc: L.J. Callan, NRC Region IV
C.P. Patel, NRC-NRR
G.L. Florreich
J.T. Wheelock - INPO Records Center
R.B. McGehee
N.S. Reynolds
NRC Resident Inspectors Office
Administrator - LRPD

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NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

(See reverse side for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Waterford Steam Electric Station Unit 3	05000 382	1 OF 10

TITLE (4)
Hot Leg Injection Isolation Valve Circuit Breaker Left in the Open Position

EVENT DATE (5)			LER NUMBER (6)			REPORT NUMBER (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									N/A	05000
06	10	94	94	--014--	00	11	23	94	FACILITY NAME: N/A	DOCKET NUMBER: 05000

		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR§: (Check one or more) (11)					
OPERATING MODE (9)	1		20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)
POWER LEVEL (10)	100		20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)
			20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)	X	OTHER
			20.405(a)(1)(iii)		50.36(c)(2)(i)		50.73(a)(2)(viii)(A)		(Specify in Abstract below and in Text, NRC Form 366A)
			20.405(a)(1)(iv)		50.36(c)(2)(ii)		50.73(a)(2)(viii)(B)		
			20.405(a)(1)(v)		50.36(c)(5)(iii)		50.73(a)(2)(x)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Are Code)
D.C. Matheny, Operations Superintendent	(504) 464-3178

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)				EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines (16)

On June 21, 1994, Waterford 3 was in Mode 1 at 100% power when the circuit breaker for the Hot Leg 2 Injection Isolation Valve was discovered to be open. An investigation revealed that this circuit breaker had been opened eleven days earlier to comply with the Technical Specifications when the Hot Leg 2 Injection Flow Control Valve was declared inoperable due to a mispositioned valve stem anti-rotation device. When the flow control valve was declared operable, the circuit breaker for the isolation valve was inadvertently left in the open position.

The root cause of this event is personnel error. Procedure requires that an Equipment Out of Service Checklist be initiated unless restoration will occur prior to the end of the shift. The Control Room Supervisor (CRS) did not initiate this checklist prior to shift turnover. Corrective actions included counseling the CRS in accordance with the Improving Human Performance (IHP) Program and the on-shift Shift Supervisors have reviewed this event with their operating crews. This event did not compromise the health and safety of the public. This report is being submitted as a voluntary LER.

REPORTABLE OCCURRENCE

On June 10, 1994, Waterford 3 was operating in Mode 1 at 100% power when the Reactor Coolant Hot Leg 2 Injection Flow Control Valve SI-506B (EIIS Identifier BQ-FCV) was declared inoperable when it was discovered that the anti-rotation device on the valve stem was mispositioned. The circuit breaker (EIIS Identifier BQ-BKR) for the Reactor Coolant Hot Leg 2 Injection Isolation Valve SI-502B (EIIS Identifier BQ-ISV) was opened for this event to comply with Technical Specification 3.6.3 Action "b" which states "With one or more of the isolation valve(s) inoperable, maintain at least one isolation valve operable in each affected penetration that is open and isolate each affected penetration within 4 hours by use of at least one deactivated automatic valve secured in the isolation position". When the flow control valve was repaired and declared operable, the circuit breaker for the isolation valve was inadvertently left in the open position until this situation was discovered eleven days later.

The components of the subsystems which comprise the Safety Injection System (SIS) are arranged in two redundant trains. Each train is capable of performing 100 percent of the system's design requirements following an accident. The Hot Leg 2 Injection Isolation Valve is a component in a subsystem of the "B" train of the SIS. The redundant "A" train subsystem was not affected by this event.

The primary function of the High Pressure Safety Injection System (HPSI; EIIS Identifier BQ) is to inject borated water into the Reactor Coolant System (RCS; EIIS Identifier AB) if a break occurs in the RCS pressure boundary. Technical Specification 4.5.2.a requires that each Emergency Core Cooling

System (ECCS) subsystem be demonstrated as operable by verifying at least every twelve hours that the Hot Leg Injection Flow Control Valves and the Hot Leg Injection Isolation Valves are key-locked closed. The Hot Leg 2 Injection Flow Control Valve and the Hot Leg 2 Injection Isolation Valve were closed as required by Technical Specification 4.5.2.a throughout this event. With these valves closed, the HPSI pumps would have discharged into the four RCS cold legs in the event of a LOCA and the primary function of the system would have been performed.

Hot and cold leg injection is initiated two to four hours after a LOCA occurs to prevent precipitation of boric acid in the reactor vessel. The initiation of simultaneous hot and cold leg injection provides a substantial core flushing flow. The Hot Leg 2 Injection Flow Control Valve and the Hot Leg 2 Injection Isolation Valve are manually realigned from the Control Room for Hot Leg Injection and receive no automatic open signals. The circuit breaker for the Hot Leg 2 Injection Isolation Valve was open from June 10, 1994, to June 21, 1994, but remained available to be closed during this time period. This circuit breaker is located in a switch gear room outside the Radiation Controlled Area (RCA). If a LOCA had occurred during the time period that the circuit breaker was open and had Hot Leg Injection been required, an Operator could have locally closed the circuit breaker. This evolution would have had minimal impact on plant operations, could have been performed in a timely manner, and would not have resulted in increased personnel radiation exposure. Additionally, analysis indicates that even with no core flushing flow, the boric acid would not begin to precipitate until after eight hours post-LOCA. Therefore, the manually initiated Hot Leg 2 Injection flow path remained operable during the time period that the circuit breaker was open

and the provisions of Technical Specification 3.5.2 stating that "two independent Emergency Core Cooling Systems (ECCS) subsystems shall be operable" were maintained.

Based on the above, this event does not meet the reporting threshold of 10CFR50.73. However, Waterford 3 feels that this issue may be of generic concern and this report is being provided as a voluntary LER.

INITIAL CONDITIONS

At the start of this event on June 10, 1994, Waterford 3 was in Mode 1 at 100% power. No procedures specific to this event were being performed at the time of this event. Major equipment out of service specific to this event consisted of the Hot Leg 2 Injection Flow Control Valve. Technical Specification Limiting Conditions for Operation (LCO's) in effect specific to this event were the Action Statements associated with Technical Specifications sections 3.5.2 and 3.6.3. Action Statement "a" associated with Technical Specification 3.5.2 states that "With one ECCS subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours". Technical Specification 3.6.3 Action Statement "b" states that "With one or more of the isolation valve(s) inoperable, maintain at least one isolation valve OPERABLE in each affected penetration that is open and isolate each affected penetration within 4 hours by use of at least one deactivated automatic valve secured in the isolation position".

EVENT DESCRIPTION

Simultaneous hot and cold leg injection is initiated for both small and large break Loss of Coolant Accidents (LOCA's) in a time interval of two to four hours after the start of the LOCA. In this mode, the High Pressure Safety Injection Pumps (HPSI; EIIS Identifier BQ-P) discharge lines are manually realigned so that the total injection flow is divided equally between the hot and cold legs. Simultaneous injection into the hot and cold legs is used as the mechanism to prevent the precipitation of boric acid in the reactor vessel following a break that is too large to allow the Reactor Coolant System to refill. Injecting to both sides of the reactor vessel ensures that fluid from the reactor vessel (where the boric acid is being concentrated) flows out the break regardless of the break location and is replenished with a dilute solution of borated water from the other side of the reactor vessel. On June 10, 1994, at 1033 hours, the Hot Leg 2 Injection Flow Control Valve was declared inoperable due to a mispositioned valve stem anti-rotation device. Technical Specifications 3.5.2 "ECCS Subsystems" and 3.6.3 "Containment Isolation Valves" were entered. At 1200 hours on June 10, 1994, the power supply breaker for the Hot Leg 2 Injection Isolation Valve was opened to comply with Technical Specification 3.6.3 Action Statement "b" which requires "With one or more of the isolation valve(s) inoperable, maintain at least one isolation valve OPERABLE in each affected penetration that is open and isolate each affected penetration within four hours by use of at least one deactivated automatic valve secured in the isolation position". The status of this circuit breaker was placed on the Control Room Supervisor (CRS) Turnover Sheet and Checklist under the "Action" section for LCO's. This practice is considered an acceptable tracking mechanism in lieu of initiating a breaker deviation sheet.

At 1830 hours on June 10, 1994, shift turnover commenced. The Shift Supervisor (SS) and Nuclear Plant Operator (NPO) Turnover Sheets did not reflect the status of the Hot Leg 2 Injection Isolation Valve circuit breaker and subsequently this item was not discussed during the shift turnover. On June 10, 1994, at 2345 the Hot Leg 2 Injection Flow Control Valve was declared operable and Technical Specifications 3.5.2 and 3.6.3 were exited. At this point the CRS failed to realize that the Hot Leg 2 Injection Isolation Valve circuit breaker was still open.

There are two sets of open/close status lights for the Hot Leg 2 Injection Isolation Valve provided on Control Panel 8 (CP-8) in the Control Room. One set is powered from a 480 Volt Alternating Current (VAC) Motor Control Center (MCC) and the other set is powered from a vital 120 VAC Fower Distribution Panel (PDP). When MCC power is available, a relay is energized to align MCC power to its associated set of open/close lights and to isolate vital PDP power to its associated set of open/close lights. If MCC power is lost or removed, then the relay de-energizes causing its contacts to toggle. This results in power being supplied from the PDP to its associated set of status lights and isolates the MCC powered set of lights. The consequence of losing MCC power is that valve position indication is still available from the status lights associated with the vital PDP. However, this valve cannot be operated from the Control Room without MCC power.

On June 21, 1994, at 0900 hours the Hot Leg 2 Injection Flow Control Valve was declared inoperable for Valve Operator Test and Evaluation System (VOTES) testing. Technical Specifications 3.5.2 and 3.6.3 were entered. Action Statement "a" for Technical Specification 3.6.3 requires that an inoperable containment isolation valve be restored to operable status within 4 hours.

At 0945 hours the CRS questioned why the circuit breaker for the Hot Leg 2 Injection Isolation Valve was open as indicated on CP-8 by the MCC indicating lights being extinguished and the indicating lights supplied from the vital PDP being illuminated. Discussions with Electrical Maintenance personnel and Operations personnel revealed that the circuit breaker had not been manipulated during the current shift. Furthe investigation by the Control Room staff indicated that the circuit breaker for the Hot Leg 2 Injection Isolation Valve had been left open from the maintenance performed on the Hot Leg 2 Injection Flow Control Valve eleven days earlier. At 0950 hours on June 21, 1994, Operations closed the breaker for the Hot Leg 2 Injection Isolation Valve and normal indications for this valve were received in the Control Room. On June 21, 1994, at 1058 hours the Hot Leg 2 Injection Flow Control Valve was declared operable and Technical Specifications 3.5.2 and 3.6.3 were exited.

CAUSAL FACTORS

The root cause of this event was personnel error in that a plant procedure was not properly followed. Procedure OP-100-010 "Equipment Out of Service" requires an Equipment Out of Service Checklist be completed for equipment taken out of service unless restoration will occur prior to the end of the shift. The opening of the circuit breaker for the Hot Leg 2 Injection Isolation Valve was documented on the Control Room Supervisor Turnover Sheet and Checklist. However, the CRS did not direct the closing of this circuit breaker and an Equipment Out of Service Checklist was not initiated. The cognizant Control Room Supervisor performed an inadequate review of the Control Room Supervisor Turnover Sheet and Checklist.

A contributing cause of this event was that a wrong assumption was made. The CRS assumed the circuit breaker for the Hot Leg 2 Injection Isolation Valve was being controlled via the clearance for the Hot Leg 2 Injection Flow Control Valve. This information was not verified during the clearance removal process.

IMMEDIATE CORRECTIVE MEASURES

When it was discovered on June 21,1994, that the circuit breaker for the Hot Leg 2 Injection Isolation Valve was open and no reason for the breaker to be open could be established, a Nuclear Auxiliary Operator (NAO) was sent to the switch gear to check on the status of the breaker. The NAO found that the breaker had been turned off and was not tripped. The CRS instructed the NAO to close the circuit breaker and normal indications for the Hot Leg 2 Injection Isolation Valve were received in the Control Room. A second NAO was sent to the Radiation Controlled Area (RCA) to check the physical status of the isolation valve. This NAO found the valve to be intact. During the June 21-22, 1994, 1900-0700 hours shift, the Reactor Auxiliary Building watchstander performed a walkdown of the "A", "AB", and "B" switch gear areas verifying that no other breakers were inadvertently left open. No breakers were found mispositioned during this walkdown.

ACTIONS TO PREVENT RECURRENCE

The cognizant CRS has been counseled in accordance with the Waterford 3 Improving Human Performance (IHP) Program. Also, the on-shift Shift Supervisors have reviewed the Condition Report and Root Cause Analysis Report which were generated as a result of this event with their operating crews.

SAFETY SIGNIFICANCE

The Safety Injection System (SIS) is designed to provide core cooling in the event of a LOCA. The SIS is not an individual system but is composed of the following three separate subsystems: the High Pressure Safety Injection System (HPSI), the Low Pressure Safety Injection System (LPSI; EIIS Identifier BP), and the Safety Injection Tanks (SITs; EIIS Identifier BP-TK). The components of these subsystems are arranged in two redundant trains, each of which is capable of performing 100 percent of the system's design requirements following an accident. This event involved only the circuit breaker for the Hot Leg 2 Injection Isolation Valve, which is an ECCS train "B" subsystem component. The redundant "A" train ECCS subsystems were not affected by this event.

The Surveillance Requirements of Technical Specification (TS) 4.5.2.a require that each ECCS subsystem be demonstrated as operable at least once per twelve hours by verifying that the Hot Leg Injection Isolation Valves and the Hot Leg Injection Flow Control Valves for both trains are key-locked closed. Throughout the time period from June 10, 1994, to June 21, 1994, the Hot Leg 2 Injection Isolation Valve was closed so the requirements of this TS were maintained regardless of the position of the circuit breaker for this valve.

The primary function of the HPSI train "B" subsystem of supplying borated water to the RCS via cold leg injection in the event of a LOCA was not affected because the HPSI "B" subsystem was properly aligned throughout this event for cold leg injection as required by the TS.

The recovery actions of Emergency Operating Procedure OP-902-002 "Loss of Coolant Accident Recovery Procedure" requires initiation of simultaneous hot and cold leg injection two to four hours after a LOCA occurs to prevent precipitation of boric acid in the reactor vessel. The initiation of simultaneous hot and cold leg injection at two to four hours post-LOCA provides a substantial core flushing flow. The procedure requires remote manual manipulation of the Hot Leg Injection Flow Control Valves and the Hot Leg Injection Isolation Valves in order to initiate Hot Leg Injection. These valves receive no automatic open signals for Hot Leg Injection. During the time period from June 10, 1994, to June 21, 1994, the circuit breaker for the Hot Leg 2 Injection Isolation Valve was open with the valve being in the closed position. If a LOCA had occurred during this time period and had Hot Leg Injection been required, the indicating lights for the Hot Leg 2 Injection Isolation Valve would have alerted the Operator to the status of the circuit breaker for this valve. At this point an Operator could have been dispatched to close the breaker which is located in a switch gear room outside the Radiation Controlled Area (RCA). This evolution would have had minimal impact on plant operations, could have been performed in a timely manner, and would not have had an effect on personnel radiation exposure. Also, analysis indicates that even with no core flushing flow, the boric acid would not begin to precipitate until after eight hours post-LOCA. Therefore, the Hot Leg 2 Injection flow path remained operable during the time period from June 10, 1994, to June 21, 1994. In addition, Hot Leg Injection could have been initiated via the redundant train "A" subsystems.

On the basis of the information above, this event did not compromise the health and safety of the public.

SIMILAR EVENTS

None