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D. F. Packer
General Manager
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Waterford 3

Ref: 10CFR50.73(a)(2)(ii)

W3B5-92-0005
A4.05
QA

January 20, 1992

U.S. Nuclear Regulatory Commission
ATTENTION: 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-91-023-00 for Waterford Steam Electric Station Unit 3. This Licensee Event Report is submitted pursuant to 10CFR50.73(a)(2)(ii) and 10CFR50.73(a)(2)(v).

Very truly yours,

D.F. Packer
General Manager - Plant Operations

DFP/HIC/rk
Attachment

cc: Messrs. R.D. Martin
G.L. Florreich
J.T. Wheelock - INPO Records Center
E.L. Blake
N.S. Reynolds
NRC Resident Inspectors Office

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NRC FORM 366
(6-89)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

APPROVED OMB NO 3150-0104
EXPIRES 4/30/92

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-630), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Waterford Steam Electric Station Unit 3	0 5 0 0 0 3 8 2	1 OF 0 9

TITLE (4)

Valve out of Position due to Inadequate Position Indication Labeling

EVENT DATE (5)			LER NUMBER (6)					REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR		SEQUENTIAL NUMBER		REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
1 2	2 0	9 1	9 1	-	0 3 3	-	0 0	0 1	2 0	9 2	N/A	0 5 0 0 0
											N/A	0 5 0 0 0

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)								
POWER LEVEL (10)	1 0 0		20.402(b)		20.405(c)		50.73(a)(2)(iv)	X	73.71(b)	
			20.405(a)(1)(i)		50.36(c)(1)	X	50.73(a)(2)(v)		73.71(c)	
			20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		OTHER (Specify in Abstract below and in Text, NRC Form 366A)	
			20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)			
			20.405(a)(1)(iv)	X	50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)			
			20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)			

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
D.W. Vinci, Operations Superintendent	AREA CODE: 5 0 4 — 4 6 4 - 3 1 3 4

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				

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

At 2203 hours on December 20, 1991, Waterford Steam Electric Station Unit 3 was operating at 100% power when a Nuclear Auxiliary Operator (NAO) discovered component cooling valve CC-304 A, cross connect inlet to AB chiller, open. This valve misposition was identified while verifying positions of accessible locked valves per OP-100-009, Control of Valves and Breakers. Investigation determined that the valve was operated on December 1, 1991, at 1528 hours while replacing the B chiller with the AB chiller, requiring CC-304 B open and CC-304 A closed. With CC-304 A and B open, Component Cooling Water (CCW) loops A and B were cross connected at the inlet of the chillers. This cross connection defeats the two redundant, separate train design and results in operation of the system outside design basis.

The root cause of the event was inadequate position indication labeling of CC-304 A. The inadequate labeling caused a misinterpretation of the valve actual position, allowing the valve to be mispositioned. Contributing to the event was the inappropriate action taken by three operators who intended on two separate occasions to correctly position or check the position of CC-304 A.

REPORTABLE OCCURRENCE

On December 20, 1991, Waterford Steam Electric Station Unit 3 was operating at 100% power when a Nuclear Auxiliary Operator (NAO) discovered Component Cooling valve CC-304 A, cross connect inlet to AB chiller, (EIIS Identifier-CC-V) open. This valve misposition was identified while verifying positions of accessible locked valves per OP-100-009, Control of Valves and Breakers. Since the AB chiller (EIIS Identifier-KM-CHU) was replacing the B chiller, CC-304 B was open. With CC-304 A and B open, Component Cooling Water (CCW) loops A and B were inadvertently cross connected at the inlet of the chillers. This configuration defeats the two redundant, separate train design and results in operation of the system outside the design basis. A potentially reportable event report was initiated at 2300 hours, followed by a one hour notification via the Emergency Notification System (ENS) at 2328 hours on December 20, 1991, in accordance with 10CFR50.72(b)(1)(ii). This event is reported under 10CFR50.73(a)(2)(ii) and 10CFR50.73(a)(2)(v).

INITIAL CONDITIONS

Mode 1, 100% power

Procedure being performed:

OP-100-009, Control of Valves and Breakers

EVENT SEQUENCE

The Component Cooling Water (CCW) system (EIIS Identifier - CC) provides cooling water to essential equipment which is used for the safe shutdown of the reactor, or to prevent or mitigate the consequences of various accidents. The Waterford 3 component cooling water system consists of two redundant cooling water loops which each include a pump, heat exchanger, surge tank, and associated valves, piping and controls. Each cooling water loop provides cooling for its associated division of essential equipment. The system also serves non-essential equipment. Non-essential cooling loads are automatically isolated in the event of an accident.

Butterfly valve CC-304 A is located on +46 foot elevation of the Reactor Auxiliary Building (RAB)(EIIS Identifier-NF). Position indication is provided by a raised arrow on the valve. The raised lettering on this valve indicating open or closed is located behind a plate on which the closed position indicating limit switch mounts and cannot be seen while positioning the valve. At the time of the incident a self adhesive letter was mounted on the plate at the closed position location. The self adhesive letter was actually a letter C, indicating closed, which had dirt and paint smeared on it and upon close examination appeared to be a letter O, indicating open.

Major Events:

On December 1, 1991 - two operators where assigned to perform the valve line - up to replace Essential chiller unit B with Essential chiller unit AB in accordance with OP-002-004, Chilled Water System. This lineup requires independent verification that CC-304 A closed. A computer printout on this day indicates that valve CC-304 A was opened vice closed at approximately 1528 hours. CC-304 A was not properly verified in accordance with OP-100-009, Control of Valves and Breakers, which stated that the proper method of checking valve position is by physically moving the valve.

On December 5, 1991, surveillance procedure OP-903-049, CCW and ACC Loop Operability Check, was being performed. This procedure does not require independent verification. The operator checked CC-304 A and initially thought the valve to be in the incorrect position. The operator requested permission from the Control Room to properly position the valve. A computer printout on this day indicates that CC-304 A was closed at 2102 hours and then reopened at 2104 hours. The operator reopened the valve since he determined his initial assessment of the valve position was incorrect. Adding to the confusion about the valve position of CC-304 A is a valve stem collar which is rotated 90 degrees from all the other collar type valves in this area. The split stem collar generally lines up with system flow for most similar valves, but not for CC-304A. Also, CC-304 A has a handwheel which is mounted below the valve. Therefore, the valve could have been opened while the operator thought he was closing the valve.

When the operator informed the Control Room that a valve was incorrectly positioned, a Locked Valve/Breaker Deviation Sheet was not initiated as required by OP-100-009. The Shift Supervisor granted permission to re-position the valve. Step 4.1.2. of OP-100-009 states that any positioning or re-positioning of this valve shall be documented on the Locked Valve/Breaker Deviation Sheet. The entry shall be signed by the authorizing SS/CRS before the status of the valve is changed. If this action had been performed, a second operator would have been required to verify the correct position of CC-304 A.

On December 20, 1991, an operator was verifying positions of accessible locked valves per OP-100-009, Control of Valves and Breakers, during which CC-304 A, CCW loop A inlet isolation to AB chiller, was found open. At 2203 hours valve CC-304 A was locked closed.

On December 24, 1991, OP-903-049, Component Cooling Water and Auxiliary Cooling Water Loop Operability Check, and OP-903-062, Chilled Water System Valve Lineup Check were performed. These surveillance procedures were performed to ensure that no other valves were mispositioned. Both surveillance procedures were completed satisfactorily.

CAUSAL FACTORS

Root cause:

1. The root cause of this event is inadequate position labeling on CC-304 A.

Contributing Causes:

1. Contributing to the event was the inappropriate action by the operators in not performing valve checks in accordance with OP-100-009.

CORRECTIVE MEASURES

Root Cause:

1a. The accessible and inaccessible butterfly valves of this type associated with the CCW system and chilled water system will be checked for sufficient valve position labels. Valves identified to be lacking adequate valve position labels will be adequately labeled.

Estimated Completion Date: February 29, 1992 for accessible valves.
End of Refuel 5, for inaccessible valves.

1b. The Operations department will identify accessible and inaccessible valves which, if mispositioned, will cross-connect two safety trains. These identified valves will be checked to ensure adequate valve position labels.

Estimated Completion Date: June 1,1992, for accessible valves.
End of Refuel 5, for inaccessible valves.

Contributing Causes:

1a. The personnel involved will be counseled per the Improving Human Performance program.

Estimated Completion Date: January 31, 1992.

1b. A training request has been generated to provide additional operator training on the proper use of OP-100-009, Control of Valves and Breakers.

Estimated Completion Date: April 30, 1992

SAFETY SIGNIFICANCE

The first case involves an analysis of the post-accident performance of the CCW and Auxiliary Component Cooling Water (ACC) systems following either a Loss of Coolant Accident (LOCA) or a Main Steam Line Break (MSLB) inside the containment. The CCW pipe leakage that could affect both CCW trains is not postulated to occur concurrently with either of these accidents. The limiting failure in this case is the worst single failure of a CCW or ACC component, which is assumed to be the failure of one CCW or ACC pump (EIIS Identifier - CC-P). This failure will result in only one train of CCW/ACC operating and attempting to remove post-accident heat loads with valve CC-304 A open. With CCW heat exchanger outlet temperature below 102 degrees Fahrenheit, the essential chillers are cooled by CCW at a design flow rate of 850 gallons per minute (gpm) per chiller from their respective CCW train. With the CC-304A cross-connect valve open and one CCW train not operating, some CCW from the operating train will be directed through the non-operating train back to the operating pump suction via the CCW Surge Tank (EIIS Identifier-CC-TK). Preliminary analysis indicates that the magnitude of this flow diversion is small enough that the Emergency Diesel Generator (EDG) (EIIS Identifier-EK), SDC heat exchanger (EIIS Identifier-BP), safeguard pump coolers (EIIS Identifier-P-CLR) and containment fan coolers (EIIS Identifier-BK) remain capable of removing design heat loads with CCW temperature at or below 105 degrees Fahrenheit. The diversion reduces the CCW flow to the operating essential chiller to the extent that, without operator action, the design basis heat load would not be removed by the operating essential chiller.

However, several factors provide an additional safety margin or mitigation of the event:

a. Chilled water and ambient temperatures are relatively cool at the start of the accident.

b. The essential chiller continues to remove about 80% of design heat load.

c. Design heat loads are not introduced into most rooms until the post-accident recirculation phase; near normal chilled water temperature should be maintained until design heat loads are approached.

d. If one Engineered Safety Features train is not operating, then the earliest initiation of recirculation will occur later (about 40 minutes post-accident versus 20 minutes post-accident).

When CCW heat exchanger outlet temperature reaches 102 degrees Fahrenheit in the operating loop CCW and ACC valves realign so that the ACC system furnishes cooling water to the essential chillers. Since the CCW-304 A cross-connection is within the boundary of this realignment, the net effect once realignment occurs would be to divert some ACC flow from the operating ACC train to the non-operating CCW or ACC train. The magnitude of this flow diversion with CC-304 A open will also require further analysis since the operation of the ACC system is required to remove design basis heat loads for more severe accident conditions such as a major LOCA or MSLB.

In either CCW or ACC flow diversion, the component most affected is the essential chiller in the operating train. In either scenario the essential chiller will continue to operate, but at a reduced capacity. Even with the degraded chiller heat transfer capability, it is estimated that it would take several hours for areas supplied by the chilled water system to heat-up greater than design temperatures. In actuality, operator action to realign valve CC-304A could be taken prior to ambient room temperature exceeding design temperatures. Control Room indication of essential chiller CCW flow rates, CCW and ACC system flow rates and Water Cooling Tower (WCT) (EIIS Identifier-BS) basin and CCW surge tank level indication and alarm would

provide ample information to identify the problem and realign the system to the standby essential chiller. Realignment of the standby chiller combined with the unusual flow and level indications observed should enable operations to identify and correct the improper valve alignment.

The second case involves CCW pipe leakage as the postulated accident with no concurrent LOCA or MSLB. Preliminary calculations indicate that a maximum leakage of 480 gpm could be expected. In this case leakage does not exceed the capacity of one CCW make-up pump so no loss of CCW would be expected to occur. Total leakage should not exceed the capacity of the Condensate Storage Pool before the leak could be located and isolated. Since the plant could have been shutdown and cooled down if necessary without experiencing a loss of the CCW or ACC systems, this case is not safety significant and posed no threat to public health or safety.

If further analysis indicates a greater adverse effect, the effects will be discussed in a supplement to this report.

SIMILAR EVENTS

None