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W3F1-2002-0038
A4.05
PR

April 26, 2002

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 (LER) 2002-004-00 for Waterford Steam Electric Station Unit 3. This report provides details of activities that could result in the release of radioactive water from the Containment Spray System to atmosphere during certain maintenance activities on the Low Pressure Safety Injection System.

This condition is being reported pursuant to 10CFR50.73(a)(2)(v)(C), as an event or condition that could have prevented fulfillment of a safety function required to control the release of a radioactive material.

There was no actual event that resulted in a release of radioactive material due to the condition. This condition had minimal safety significance. There are no commitments contained in this submittal. Actions described herein are tracked via the Waterford 3 Corrective Action Program.

Very truly yours,

Robert D Peters

R.D. Peters
Acting Director,
Nuclear Safety Assurance

RDP/GCS/cbh
Attachment

IE22

cc: E.W. Merschoff, (NRC Region IV), N. Kalyanam, (NRC-NRR),
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J. Smith, N.S. Reynolds, NRC Resident Inspectors Office,
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NRC FORM 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

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

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
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4. TITLE

Potential Leakage Path through open Low Pressure Safety Injection System during maintenance.

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									N/A	N/A
02	25	2002	2002	– 004 –	00	04	26	2002	FACILITY NAME N/A	DOCKET NUMBER N/A

9. OPERATING MODE	1
10 POWER LEVEL	100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)
20.2203(a)(1)	50.36(c)(1)(i)(A)	50.73(a)(2)(iv)(A)	73.71(a)(4)
20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)
20.2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER Specify in Abstract below or in NRC Form 366A
20.2203(a)(2)(iii)	50.46(a)(3)(ii)	X 50.73(a)(2)(v)(C)	
20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(D)	
20.2203(a)(2)(v)	50.73(a)(2)(i)(B)	50.73(a)(2)(vii)	
20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)	
20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)	

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Gregory Scott, Licensing Engineer	(504) – 739-6703

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

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

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

On February 25, 2002, with the plant operating in Mode 1 at 100% power, it was determined that valves used to isolate the Containment Spray System from the Low Pressure Safety Injection System had a potential to leak during operation of the Containment Spray Pump and when the Low Pressure Safety Injection System was open to the atmosphere for maintenance activities. It was determined that bonnet bypasses installed to prevent pressure locking on the valves used for isolation of these systems could result in a potential leakage path. The Root Cause for installing bonnet bypasses on the Safety Injection valves without considering the potential leakage path to atmosphere during maintenance is misjudgment and making the wrong assumptions. As interim immediate corrective action, Operational Impact Statements in the Work Management System were updated to state that these valves are not suitable for an isolation boundary.

This condition is being reported pursuant to 10CFR50.73(a)(2)(v)(C) as an event or condition that could have prevented fulfillment of a safety function required to control the release of a radioactive material. There was no actual event that resulted in a release of radioactive material due to the condition. Therefore, the condition did not compromise the health and safety of the general public.

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TEXT *(If more space is required, use additional copies of NRC Form 366A) (17)*

REPORTABLE OCCURRENCE

On February 25, 2002, it was determined that valves used to isolate the Containment Spray System (CS) [BE] from the Low Pressure Safety Injection System (LPSI) [BP] had a potential to leak during operation of the CS Pump and when the LPSI System was open to the atmosphere for maintenance activities. This condition created a leakage path for potentially radioactive fluids to atmosphere through the open LPSI System. Accordingly, this event is being reported pursuant to 10CFR50.73(a)(2)(v)(C) as an event or condition that could have prevented fulfillment of a safety function required to control the release of a radioactive material.

INITIAL CONDITIONS

Upon discovery of this condition, Waterford 3 was operating in mode 1 at 100% reactor power. There were no major systems, structures or components that were inoperable at the time of discovery that contributed to the event.

EVENT DESCRIPTION

On December 18, 1996, an ultra-sonic examination discovered voiding/gas bubbles in the Low Pressure Safety Injection piping. Corrective Action document CR-96-1965 was initiated to document this condition. Shortly afterwards, on December 20, 1996, the Safety Injection System Engineer identified that valves SI-125B and SI-412B (Shutdown Cooling Heat Exchanger "B" Inlet and Outlet Valves) may be susceptible to pressure locking as described in Generic Letter (GL) 95-07, Pressure Locking and Thermal Binding of Safety Related Power-Operated Gate Valves, due to pressure transients caused by LPSI voiding. To alleviate this concern, bonnet bypasses were installed on valves SI-125A(B) and SI-412A(B). Installation of bonnet bypasses on valves SI-125B and SI-412B (Shutdown Cooling Heat Exchanger "B" Inlet and Outlet) was completed on December 23, 1996. Installation of bonnet bypasses on valves SI-125A and SI-412A (Shutdown Cooling Heat Exchanger "A" Inlet and Outlet) was completed on January 30, 1997. The Work Authorization (WA) Repair did not address the potential leakage path from CS into an open LPSI system during maintenance activities.

On February 25, 2002, questions from the NRC Resident prompted Operations to investigate whether valves SI-125A(B) and SI-412A(B) would provide adequate isolation. Entergy concluded that bonnet bypass lines installed on valves SI-125A(B) and SI-412A(B) could provide a leakage path from CS to atmosphere when the LPSI system is opened for maintenance. CR-W3-2002-0322 was generated on February 25, 2002 to address this issue and was classified as significant requiring a root cause and review by the Corrective Action Review Board (CARB).

Engineering subsequently provided the following explanation for the valve leakage:

By design, a gate valve has two disc/seat interfaces (upstream and downstream) which provide sealing capability. The bonnet bypass eliminates one of these interfaces by allowing communication between the valve bonnet and the Safety Injection piping. If a high pressure develops on the Containment Spray side of the valve, the seating surface on the opposite side is relied upon to provide sealing. This would create leakage from Containment Spray into the bonnet. The bonnet bypass would then allow leakage into the LPSI system.

CAUSAL FACTORS

Root Cause:

The Root Cause for installing bonnet bypasses on the Safety Injection valves without considering the potential leakage path to atmosphere during maintenance is misjudgment and making the wrong assumptions. The WA package that added bonnet bypass lines incorrectly assumed that the valves would maintain their sealing capability during maintenance. Since it was assumed that the valves would not leak, leakage during maintenance was not addressed.

The WA Repair package did not address a potential leakage path from Containment Spray into the Controlled Ventilation Area System (CVAS) boundary, which is an area serviced by safey-related filtration systems. The paragraph below indicates that the WA did mention the potential of leakage between the CS and LPSI system, but it was dispositioned as being maintained at the one disc/seat interface. Therefore, leakage to the CVAS boundary would then not be an issue. Personnel

assumed if leakage occurred, it would be neglible and contained within the system. The WA Repair states the following:

"By design, a gate valve has two disc/seat interfaces (upstream and downstream) which provide sealing capability. This repair will eliminate one of these interfaces by allowing communication between the valve bonnet and the Safety Injection piping. However, the valves will maintain sealing capability at the one disc/seat interface. Therefore, the valves will remain capable of performing their closed safety function following the implementation of this WA repair package."

The WA Repair did not consider the higher differential pressure across these valves when the LPSI system is open during maintenance activities with same train of Containment Spray remaining operable. For this condition, the valve's ability to seal at that disc/seat interface would be reduced if a Containment Spray Actuation occurred. This incorrect assumption resulted in overlooking the potential leakage path into the Controlled Ventilation Area System.

Contributing Causes:

Perceived time pressure was a contributing cause to this condition. The potential pressure locking of SI-125B and SI-412B caused the plant to enter a 72 hour action statement on the Friday before a holiday week. The WA Repair package was prepared, reviewed, and approved on the same day the pressure locking concern was identified. A quick turnaround was necessary to allow installation of the modification before the 72 hour action statement expired.

Inadequate review of design change is also a contributing cause. Time pressure apparently impacted the level of detail during review. No critical comments were documented. A critical review may have been performed if more time were allowed. A rigorous questioning attitude during the review process could have identified leakage concerns.

CORRECTIVE ACTIONS

The Operational Impact Statements in the Work Management System (WMS) Database were

updated to state that valves SI-125A(B) and SI-412A(B) are not suitable for an isolation boundary. Operators refer to operational impact statements prior to using valves as tagout boundary.

Other valves that were modified to address GL 95-07 pressure locking concerns were identified. These valves and their applications were investigated to determine whether potential leakage could violate plant design basis during maintenance of adjacent systems. These are the Hot Leg Injection Drain valves and the Safety Injection Tank (SIT) Leakage Drain valves. The valves provide an isolation boundary between safety related and non-safety related piping. These valves are double-disc gate valves with a small pilot hole drilled in the upstream disc to relieve bonnet pressure. The pilot hole is located in the disc on the safety related piping side of the valve. This configuration allows Safety Injection Tank pressure on the Class 1 side of the valve to assist in seating the disc such that the pilot hole does not prevent the valves from providing an adequate isolation boundary. Furthermore, these valves are located within containment, such that these valves will not be used as an isolation boundary for maintenance during plant operation (i.e. breaching of the non-safety piping). Therefore, a generic concern does not exist for these valves.

Additional corrective actions to preclude recurrence have been entered, and are being tracked in the plant's corrective action program. (Reference Condition Report CR-WF3-2002-322)

SAFETY SIGNIFICANCE

Valves SI-125A(B) and SI-412A(B) are Anchor Darling 10" flex wedge gate valves. By design, a gate valve has two disc/seat interfaces (upstream and downstream) which provide sealing capability. The bonnet bypass installed under WA Repair 01153606 eliminates one of these interfaces by allowing communication between the valve bonnet and the Safety Injection piping. If a differential pressure develops on the Containment Spray (CS) side of the valve, the seating surface on the opposite side is relied upon to provide sealing. This would create leakage from CS into the bonnet. The bonnet bypass would then allow leakage into the LPSI system.

CS is initiated, following a major LOCA or MSLB in the containment, by a containment spray actuation signal (CSAS). The CSAS results from the combination of a high-high containment pressure signal and a SIAS. If required, the operator can manually actuate the system from the main control room.

If a CS Pump starts while the associated LPSI train is out of service and open to atmosphere, the discharge head of the CS pumps would create a differential pressure across SI-125A(B) and SI-412A(B). This differential pressure would cause leakage into the open LPSI system. When the water level in the RWSP (Refueling Water Storage Pool) falls to a predetermined level, a recirculation actuation signal (RAS) is generated which shifts suction of the CS pumps to the SI sump by opening the sump outlet isolation valves. Upon a recirculation actuation signal (RAS), containment sump water would be allowed to leak into the Safeguard Rooms and -35 Reactor Auxiliary Building Wing Area, resulting in higher levels of radioactivity within the areas serviced by CVAS. In addition, water inventory would be lost through the LPSI system breach. This condition could impact the internal flooding analysis, dose, RWSP inventory, and CS flow diversion.

Entergy has reviewed Safety Injection tagouts performed since the installation of bonnet bypasses on valves SI-125A(B) and SI-412A(B). Three occurrences were discovered where the Safety Injection system boundary had been breached and valves SI-125A(B) and SI-412A(B) were relied upon for isolation (Clearances WF-02-0100, WF-00-1142, and WF-99-1598). Therefore, the Safety Significance of this condition is being evaluated based on the three occurrences listed above when bypass leakage could exist.

CR-WF3-2002-0339 identified a LPSI over pressurization event caused by check valve SI-142A leakage. The CR concluded that thermal relief valve SI-132A could discharge approximately 10 gpm into the RAB Wing area as a result of overpressurization. Although it is not expected that LPSI overpressurization potential existed prior to Refuel 10, this evaluation conservatively assumes 10 gpm discharge from valve SI-132A. This discharge flow is in addition to SI-125A(B) and SI-412A(B) leakage.

Flooding Impact

Attachment 3 of Root Cause Determination Report CR-W3-2002-0322 has determined the combined leakage from both SI-125A(B) and SI-412A(B) would be 36 gpm. As a result, maximum expected leakage into the CVAS areas due to bonnet bypass and SI-132A leakage is 46 gpm. This leak rate poses no significant flooding impact since it is bounded by the flooding analysis outside containment, per Calculation MN(Q)-3-5.

Dose Impact

Attachment 1 of Root Cause Determination Report CR-W3-2002-0322, "Flooding Alarm Volumes," provides an estimated flooding volume for the Safeguard Rooms and the -35 Reactor Auxiliary Building Wing Area. At the volumes listed, operators would be alerted to flooding in the affected area by a Control Room Alarm. For the purpose of dose determination, Operator action is conservatively assumed to isolate the leakage one hour after the alarm.

The additional dose impact of CS to LPSI leakage is evaluated in Attachment 2 of Root Cause Determination Report CR-W3-2002-0322, "Dose Impact Evaluation". This evaluation is based on the estimated leakage rate provided in Attachment 3. The evaluation concludes that dose impact will not exceed 10CFR100 and GDC 19 limits. Therefore, the dose impact of this condition is not safety significant.

RWSP Inventory

The RWSP capacity will support at least 20 minutes of full flow of all HPSI, LPSI, and CS pumps prior to reaching a low level (10%) switch over to the Safety Injection (SI) sump for the recirculation phase. The RWSP capacity will also ensure adequate safety injection sump liquid level to support the recirculation mode of the HPSI pump and CS pump.

The time to isolate the leakage from SI-125 and SI-412 is calculated to be 3.43 hours after LOCA. The duration for the flow out of SI-132 is conservatively assumed to be 12 hours. This corresponds to the longest time following a small break LOCA to reach shutdown cooling conditions, which is well

below the SI-132 setpoint. Therefore, a total leakage of 46 gpm is assumed for the first 3.43 hours and 10 gpm leakage is assumed from 3.43 hours to 12 hours. This results in a total RWSP inventory loss of 14,609 gallons. RWSP inventory margin was determined by Calculation EC-M98-008. This margin includes operator action time to secure the RWSP purification system:

RWSP Inventory Margin (Modes 1 – 4)	28,877.4 gallons
Total Leakage into CVAS Areas	14,609 gallons

Based on the available margin, sufficient RWSP inventory is available to allow for the total leakage. This analysis bounds the justification provided in NRC Submittal W3F1-2001-0007, Request for Review and Approval of Design Basis Change Regarding Realignment of Refueling Water Storage Pool (RWSP) Boundary Isolation Valves to RWSP Purification System.

CS Diversion

This section discusses the impact of the CS flow leakage on the post-LOCA and Main Steam Line Break (MSLB) containment pressure response. The following limiting cases are evaluated:

LOCA Peak Pressure

Hot leg break is the limiting LOCA for containment peak pressure. The peak pressure for this event occurs very early into the event (during the blowdown phase of the LOCA), about 13 seconds. Since CS flow reaches containment after 32 seconds, the peak pressure is not impacted by the CS flow rate.

LOCA Worst 24 Hour Pressure

This event was analyzed with 50 gpm reduction in CS flow for the 24 hour period. The 24 hour pressure increased by 0.20 psi. The 24 hour pressure was found to be less than one half of the peak pressure for this event and therefore acceptable.

MSLB Peak Pressure

This event was analyzed with 50 gpm reduction in CS flow. The increase due to this reduction was found to be negligible (0.07 psi).

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TEXT *(If more space is required, use additional copies of NRC Form 366A) (17)*

Based on the above, the results of the bonnet bypass leakage has minimal safety significance. This event is not considered a Safety System Functional Failure (SSFF).

SIMILAR EVENTS

A review of LERs from 1999 to present did not indicate an event where an inadequate design review resulted in a condition that could have prevented the fulfillment of a safety function.

ADDITIONAL INFORMATION

Energy Industry Identification System (EIIS) codes are identified in the text within brackets [ ].