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D. F. Packer
General Manager
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Waterford 3

W3F1-92-0194
A4.05
QA

August 7, 1992

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-92-006-00 for Waterford Steam Electric Station Unit 3. This Licensee Event Report is submitted pursuant to 10CFR50.73 (a)(2)(iv).

Very truly yours,

D. F. Packer
General Manager - Plant Operations

DFP, TWG/ssf
Attachment

cc: J.L. Milhoan, NRC Region IV
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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LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), 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)

Waterford Steam Electric Station, Unit 3

DOCKET NUMBER (2)

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PAGE (3)

TITLE (4)

Reactor Shutdown due to Reactor Coolant System Leakage in excess of Technical Specification

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)		
07	11	92	92	006		08	07	92	N/A		0 5 0 0 0		
									N/A		0 5 0 0 0		
OPERATING MODE (9)			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)										
1			20.402(b)			20.405(c)			50.73(a)(2)(i)			73.71(b)	
POWER LEVEL (10)			20.406(a)(1)(i)			50.36(a)(1)			50.73(a)(2)(ii)			73.71(c)	
110.0			20.406(a)(1)(ii)			50.36(a)(2)			50.73(a)(2)(iii)			OTHER (Specify 360A)	
			20.406(a)(1)(iii)			3(a)(2)(i)			50.73(a)(2)(iv)(i)			Abstract NRC File	
			20.406(a)(1)(iv)			4(a)(2)(i)			50.73(a)(2)(iv)(ii)				
			20.406(a)(1)(v)			4(a)(2)(ii)			50.73(a)(2)(v)				

LICENSEE CONTACT FOR THIS LER (12)

NAME

J.G. Hoffpauir, Maintenance Superintendent

TELEPHONE NUMBER

AREA CODE

5 0 4 4 6 4 - 3 1 3 8

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC

SUPPLEMENTAL REPORT EXPECTED (14)

YES (if ver. complete EXPECTED SUBMISSION DATE)	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
<input checked="" type="checkbox"/>	<input type="checkbox"/>				

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

ABSTRACT

At 1703 on July 11, 1992, Waterford Steam Electric Station Unit 3 declared an Unusual Event as a result of unidentified reactor coolant system leakage greater than the Technical Specification 3.4.5.2 limit of one gallon per minute. The reactor was shut down and the source of the leakage determined to be the packing area of Reactor Coolant Hot Leg Sample Valve RC-104.

This event resulted from the failure of a temporary leak repair made to RC-104 after the valve's packing gland studs failed due to boric acid corrosion on March 25, 1992. As a result, the root cause of this event and the earlier failure are the same: the use of a material for the studs in an application for which it proved to be inadequate. That is, the valve was installed in a system where possible packing leakage could expose the studs to boric acid despite the fact that the studs were made of a material that is susceptible to boric acid corrosion. RC-104 will be repaired or replaced during the next refueling outage. Also, the stud material for similar valves will be evaluated. All leakage resulting from this event was confined to the Reactor Containment Building and therefore, the health and safety of the public and plant personnel were not compromised.

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TEXT (If more space is required, use additional NRC Form 305A's.) (17)

REPORTABLE OCCURRENCE

At 0703 on July 11, 1992, Waterford Steam Electric Station Unit 3 entered Technical Specification (TS) 3.4.5.2. Action Statement 'b' as a result of Reactor Coolant System (RCS; EHS Identifier AB) unidentified leakage greater than the limit of one gallon per minute. In accordance with the action statement, a reactor shutdown commenced at 0658. The reactor was manually tripped in accordance with Operating Procedure OP-010-001, "General Plant Operations," at 1027. 10CFR50.73(a)(2)(i)(A) indicates that the completion of any nuclear plant shutdown required by the plant's Technical Specifications is a reportable event.

INITIAL CONDITIONS

Plant Power:	100%
Mode:	1
Procedures Being Performed Specific to this Event:	None
Technical Specification LCO's in Effect Specific to this Event:	None
Major Equipment Out of Service Specific to this Event:	None

EVENT SEQUENCE

At 0634 on July 11, 1992, Off-Normal Procedure OP-903-023, "Reactor Coolant System (RCS) Leak," was entered based on a number of indications which pointed to the existence of a RCS leak: decreasing level in the Volume Control Tank (VCT), a mismatch between equilibrium charging flow and combined letdown and reactor coolant pump controlled bleedoff flow, and a high leak rate indication from the Containment Liquid Leak Recorder (SP-IFR-6710). At 0658, a water inventory balance performed over a period of 13 minutes indicated the presence of a leak of about 7.65 gallons per minute (gpm).

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TEXT (If more space is required, use additional NRC Form 366A's) (11)

At 0703, Waterford 3 declared an Unusual Event and entered Technical Specification (TS) 3.4.5.2, "Reactor Coolant System; Operational Leakage," as a result of RCS unidentified leakage greater than the limit of one gallon per minute. Boration for the required reactor shutdown began at 0658; the shutdown was complete at 1027.

At 0727, personnel entered the Reactor Containment Building (RCB; EIIS Identifier NH) to perform a RCS inspection. A video camera installed to monitor RC-104 after the March event was checked but steam in the area and/or condensation on the camera lens prevented it from providing useful information. At 0734, RC-104 was identified as the source of the leak based on the RCS inspection.

RC-104 is a 3/4 inch diameter globe valve with a pneumatic operator. The valve is located in the Reactor Containment Building in piping connected to the RCS loop 1 hot leg. Only a flow-restricting orifice separates RC-104 from the RCS. The valve is operated remotely from a panel in the Reactor Auxiliary Building (RAB; EIIS Identifier NF) and functions to isolate the RCS from the Primary Sample System (EIIS Identifier AB). In addition, the RCS loop 1 hot leg, via RC-104, is also the source of reactor coolant samples to be analyzed by the Post-Accident Sample System (PASS; EIIS Identifier IP). Two containment isolation valves (EIIS Identifier JM-ISV), Reactor Coolant Sample Header Inside Containment Isolation Valve PSL-105 and Reactor Coolant Sample Header Outside Containment Isolation Valve PSL-107, are located in the piping downstream of RC-104.

As described in Waterford 3 LER 92-002, RC-104 failed previously on March 25, 1992. In that event, packing gland stud corrosion from exposure to boric acid led to stud failure, loss of packing material, and eventually to a reactor shutdown because of unidentified RCS leakage greater than that allowed by Technical Specifications. Evaluation later revealed that the cause of the stud failure was that the studs were made from carbon steel (a material that is susceptible to boric

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TEXT (If more space is required, use additional NRC Form 386A's) (17)

acid corrosion) and used in an application where exposure to boric acid was possible. RC-104 was eventually leak repaired by sealant injection and left in the open position in order to obtain reactor coolant samples from the RCS loop 1 hot leg. As reflected in LER 92-002, permanent corrective action- either repair or replacement- is scheduled for the upcoming refueling outage.

In this most recent event, with the source of the leakage identified and the magnitude of the leak rate understood, efforts focused on reducing the leakage from the damaged valve until repairs could be made. The primary objective of these efforts was to close RC-104 in order to isolate the leaking packing area from RCS pressure. This process was complicated to a certain extent by the temporary repairs made after the March 25, 1992 event but the valve was eventually shut at 2215. Shutting RC-104 reduced but did not eliminate the leakage from the packing area, in part because the RC-104 valve stem is bent (noted during the March event; see LER 92-002).

With the valve now closed and the leak rate reduced, leak repair efforts began. RC-104 had been left open after the March event to provide a coolant sample path. A strongback and a clamp assembly were installed to hold the packing and packing retainer plate in place and a leak repair sealant was injected into the packing area by means of an existing threaded connection (Condition Identification/Work Authorization 279662/01091834). The strongback and clamp assembly were still installed when the temporary leak repair performed after the March event failed.

Given the failure of the first leak repair, the decision was made to perform the second leak repair with RC-104 closed. This approach takes advantage of the RC-104 mainseat which, with the valve shut, provides a barrier between the RCS and the damaged parts of the valve. Because of valve damage identified after the first event, the mainseat does not provide absolute isolation. Nevertheless, it will serve to limit any future leakage and increase the integrity of the temporary leak repair sealant. A temporary sample path was identified by which PASS

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samples may be obtained from the pressurizer surge line (EHS Identifier AB-PZR). In any event, with RC-104 closed, leak repair sealant was injected into the packing area through an existing threaded connection. The leak repair to RC-104 was complete by 0000 on July 12, 1992. At 0507 on July 12, Operating Procedure OP-903-024, "Reactor Coolant System Water Inventory Balance," was completed indicating a total RCS leak rate of 0.527 gpm of which 0.067 gpm was identified leakage and 0.460 gpm was unidentified leakage.

At 0508, with repairs to RC-104 complete and the unidentified leakage rate less than the Technical Specification 3.4.5.2 limit, Waterford 3 exited the action statement and terminated the Unusual Event.

EVENT CHRONOLOGY

July 11, 1992

- 0634 Entered Operating Procedure OP-903-023, "Reactor Coolant System (RCS) Leak," based on leak indications provided by lowering VCT level and mismatch between charging and letdown flow.
- 0658 Leak rate calculation performed over 13 minutes indicates presence of 7.65 gpm leak. Commenced boration for reactor shutdown.
- 0703 Declared Unusual Event as a result of the RCS leakage. Entered TS 3.4.5.2.
- 0727 Personnel entered Reactor Containment Building for RCS inspection.
- 0734 RCS inspection revealed RC-104 as the source of the leak.
- 0830 Attempt made to close RC-104 remotely is unsuccessful.
- 1027 Reactor shutdown complete.

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- 1135 Commenced reducing RCS pressure.
- 1226 Personnel enter Reactor Containment Building to evaluate the scope of the necessary repairs.
- 1907 Commenced RCS cooldown.
- 1934 Completed OP-903-024. Total RCS leakage: 10.0031 gpm, Unidentified leakage: 9.9478 gpm, Identified leakage: 0.0553 gpm.
- 2130 Secured RCS cooldown.
- 2215 RC-104 closed by remote indication.
- 2250 RC-104 verified closed.

July 12, 1992

- 0000 (approx) Leak repair of RC-104 complete.
- 0507 Completed OP-903-024. Total RCS leakage: 0.527 gpm, Unidentified leakage: 0.460 gpm, Identified leakage: 0.067 gpm.
- 0508 Exit TS 3.4.5.2. Secure from Unusual Event.

CAUSAL FACTORS

The RCS leak and subsequent reactor shutdown described in this PRE is an outgrowth of the RC-104 failure that occurred on March 27, 1992. As such, the root causes of the two events are the same. As described in LER 92-002, the packing gland studs on RC-104 failed due to boric acid corrosion because they were made from material that was not appropriate for the application. The July

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11, 1992 unidentified leakage and subsequent reactor shutdown were caused by the failure of a temporary repair made to RC-104 after the earlier event. Although an element of risk was known to exist, it was anticipated that the temporary leak repair made to RC-104 would be sufficient to allow operation of the plant until the valve could be reworked during the upcoming refueling outage. Given the difficulty involved in repairing or replacing RC-104 (for example, the valve is non-isolable from the RCS without a freeze seal), the decision to delay permanently repairing RC-104 to allow for thoughtful work and contingency planning was in the best interests of safety.

CORRECTIVE MEASURES

RC-104 was closed and leak repaired by sealant injection (Condition Identification/Work Authorization 279796/01096110). The strongback and the clamp assembly installed after the March 25, 1992 failure are still installed. The leak repair sealant was injected into the packing area through an existing threaded connection.

Temporary Alteration Request (TAR) 92-020 was installed to provide a temporary flowpath around RC-104 to obtain routine reactor coolant samples as well as samples for the Post Accident Sampling System (PASS). Both PASS and routine coolant samples will be drawn from the pressurizer surge line until RC-104 is repaired or replaced (This approach was discussed with NRC representatives after the March, 1992 failure of RC-104 but was not implemented at that time.). RC-104 will remain closed to isolate the damaged area of the valve until permanent corrective action can be taken. An engineering evaluation performed as part of the development of TAR 92-020 demonstrated that the pressurizer surge line was an acceptable alternative to the RCS loop 1 hot leg for obtaining PASS samples.

No additional corrective action beyond that described in LER 92-002 is necessary to address this event. As discussed there, RC-104 will be permanently repaired or replaced during the next refueling outage. Also discussed there are plans to prioritize and then evaluate other valves whose studs may be susceptible to boric

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acid corrosion and can possibly be exposed to boric acid leakage.

SAFETY SIGNIFICANCE

Plant operators took appropriate action to shutdown the reactor, stabilize RCS parameters, minimize RCS leakage, and ensure that individuals and organizations were notified of the event in a timely manner. As a result, leakage was confined to the Containment Building. The health and safety of the public and plant personnel were not compromised by this event.

SIMILAR EVENTS

LER 92-002 reported a failure of RC-104. The event described in this LER is an outgrowth of the earlier event. Details of that earlier event are included throughout this LER.

LER 91-008 reported unidentified RCS leakage of approximately 20 gpm while in Hot Shutdown. TS 3.4.5.2 was entered and an Unusual Event was declared. Leakage was determined to be from a bonnet bolt hole on Pressurizer Spray Check Valve (EHS Identifier AB-V) RC-303 and was caused by improper assembly of the gasket retaining ring due to underdeveloped maintenance training. There is no similarity in causal factors.

LER 88-015 reported unidentified RCS leakage of 4 gpm which was attributed to leakage past two in-series Reactor Coolant Loop Drain Valves (EHS Identifier AB-DRN) RC-206A and RC-207A. The valves had been hand closed and were not fully shut. After shutting both valves with a valve wrench, the leakage dropped to within TS limits. This event is similar only by the fact that it also required entry into TS 3.4.5.2 and declaration of an Unusual Event.

LER 85-018 reported unidentified RCS leakage of 6.1 gpm which was later determined to be from the packing glands of Pressurizer Spray Valves (EHS Identifier AB-FCV) RC-301A and RC-301B. TS 3.4.5.2 was entered and the reactor was shutdown. Station Modification 926 was issued to improve the

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reliability of the packing design on these valves by utilizing a different type of packing and adding additional rings of packing. There is a similarity in the leakage source but the root cause of the leakage is different. There were no generic concerns identified in LER 85-018.

LER 85-013 reported unidentified RCS leakage of 1.7 gpm which was later attributed to failure of Letdown Volume Control Tank Relief Valve (EHS Identifier AB-V) CVC-115 to properly seat after it inadvertently lifted a day before. CVC-115 was subsequently repaired. This event is similar only by the fact that it also required entry into TS 3.4.5.2 and declaration of an Unusual Event.