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D. F. Packer
General Manager
Plant Operations
Waterford 3

W3F1-94-0138
A4.05
PR

September 9, 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-94-010-00 for Waterford Steam Electric Station Unit 3. This report is submitted as a voluntary Licensee Event Report.

Very truly yours,

D.F. Packer
General Manager
Plant Operations

DFP/DFL/tjs
Attachment

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

IE22
1/1

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 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 07

TITLE (4)
Boron Dilution While Purging Letdown Radiation Monitor

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	07	94	94	010	00				FACILITY NAME: N/A	DOCKET NUMBER: 05000

		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (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)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		(Specify in Abstract below and in Text, NRC Form 366A)
			20.405(a)(1)(iv)		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 (Include Area Code)
D.C. Matheny, Operations Superintendent	(504) 464-3100

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 7, 1994, Waterford 3 was at 100% power when a purge of the Letdown Radiation Monitor was initiated. Personnel performing the purge were unaware that the purge flow was routed back to the Chemical Volume & Control System. This resulted in an inadvertent boron dilution in the Reactor Coolant System (RCS) and an increase in reactor power.

The root cause of this event was an inadequate review of the Station Modification Package (SMP) which installed the monitor. Contributing causes which resulted from the SMP are inadequate procedures, drawings, and training which all led to false assumptions regarding the purge water flow path. Corrective action includes reviewing previous SMP's on systems that can alter the boron concentration of the RCS for the potential to cause such an event.

This event did not compromise the health and safety of the public and plant personnel in that no Technical Specification limits were exceeded and the event was resolved expeditiously. No similar events have been reported as LER's. This report is being submitted as a voluntary LER.

REQUIRED NUMBER OF DIGITS/CHARACTERS
FOR EACH BLOCK

BLOCK NUMBER	NUMBER OF DIGITS/CHARACTERS	TITLE
1	UP TO 46	FACILITY NAME
2	8 TOTAL 3 IN ADDITION TO 05000	DOCKET NUMBER
3	VARIES	PAGE NUMBER
4	UP TO 76	TITLE
5	6 TOTAL 2 PER BLOCK	EVENT DATE
6	7 TOTAL 2 FOR YEAR 3 FOR SEQUENTIAL NUMBER 2 FOR REVISION NUMBER	LER NUMBER
7	6 TOTAL 2 PER BLOCK	REPORT DATE
8	UP TO 18 -- FACILITY NAME 8 TOTAL -- DOCKET NUMBER 3 IN ADDITION TO 05000	OTHER FACILITIES INVOLVED
9	1	OPERATING MODE
10	3	POWER LEVEL
11	1 CHECK BOX THAT APPLIES	REQUIREMENTS OF 10 CFR
12	UP TO 50 FOR NAME 14 FOR TELEPHONE	LICENSEE CONTACT
13	CAUSE VARIES 2 FOR SYSTEM 4 FOR COMPONENT 4 FOR MANUFACTURER NPRDS VARIES	EACH COMPONENT FAILURE
14	1 CHECK BOX THAT APPLIES	SUPPLEMENTAL REPORT EXPECTED
15	6 TOTAL 2 PER BLOCK	EXPECTED SUBMISSION DATE

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15	6 TOTAL 2 PER BLOCK	EXPECTED SUBMISSION DATE

REPORTABLE OCCURRENCE

On June 7, 1994, Waterford 3 was operating at 100% power. A purge of the Letdown Radiation Monitor (PRMIRE0202; EIIS Identifier CB-MON-RA) heat exchanger was initiated to lower radiation dosage levels in preparation for a leak repair to the heat exchanger under Work Authorization (WA) 01125055. Operations shift personnel and the technician performing the evolution were unaware that the purge for the radiation monitor is routed to the Chemical Volume and Control System (CVCS; EIIS Identifier CB) and as such diluted the borated water solution being injected into the Reactor Coolant System (RCS; EIIS Identifier AC). Off-Normal Procedure OP-901-104, "Inadvertent Positive Reactivity Addition", was entered due to an uncontrolled addition of approximately 285 gallons of water to the RCS. Reactor power increased to a maximum of 100.5% and was returned to < 100% within 20 minutes. It has been determined that 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

Plant Power: 100%

Mode: 1

Procedures Being Performed Specific to this Event:
OP-901-104, "Inadvertent Positive Reactivity Addition"

Technical Specification LCO's in Effect Specific to this Event: None

Major Equipment Out of Service Specific to this Event:
Letdown Radiation Monitor (PRMIRE0202)

EVENT SEQUENCE

On June 7, 1994, Maintenance Planning initiated Work Authorization (WA) 01125055 to repair a leak in the Letdown Radiation Monitor heat exchanger. The Instrumentation & Controls (I&C) technician who was to be performing the work requested that Operations purge the radiation monitor with Primary Makeup Water (PMU; EIIS Identifier CB) to lower radiation dosage levels at the work site. The Primary Nuclear Plant Operator (PNPO) granted the request and the radiation monitor was declared out of service at 1028 hrs as the I&C technician prepared for a 30 minute purge. Valve PMU-120 (EIIS Identifier CB-V), normally locked closed, was then opened to line up purge flow to the radiation monitor.

The PMU purge was initiated but was unsuccessful due to a low flow alarm on the radiation monitor. The I&C technician removed the alarm by changing the flow setpoint to zero, and the purge was successfully started at 1234 hours. Concurrently, and for reasons not associated with this event, the PNPO commenced a blended makeup to the Volume Control Tank (VCT; EIIS Identifier CB-TK). At 1306 hours a second 30 minute purge was initiated. Operations shift personnel and the I&C technician involved with the process were unaware that the purge for the radiation monitor enters the CVCS and dilutes the borated water being injected into the RCS.

At 1310 hours the PNPO noted increased reactor power and temperature. Analysis of the situation was complicated by the recently completed blended makeup and problems with the Auxiliary Protection Cabinet (APC) muxsite toggling. Both of these events masked the effects of the dilution that was taking place from the radiation monitor purge. Blended makeups tend to result in inexact mixtures of acid and water which can cause a slight increase or decrease in power. Toggling by the APC muxsite creates changes in the Core Operating Limit Supervisory System (COLSS) calculations which

affect the operator's indication of calculated power operating limits. The PNPO notified the Control Room Supervisor (CRS) and the Shift Supervisor (SS) of the problem with reactor power and temperature and commenced adding boric acid to the RCS.

At 1325 hours Procedure OP-901-104, Inadvertent Positive Reactivity Addition, was entered. The SS questioned an I&C technician, who was not involved with the Letdown Radiation Monitor purging, about the flow path of the purge water from the Letdown Radiation Monitor. The technician replied that the water was injected into the CVC system, a fact not known by any of the Control Room personnel on shift or the I&C technician involved with the evolution. At 1335 hours, purge was secured to the Letdown Radiation Monitor by the PNPO at the control panel in the Control Room. PMU-120 was then closed in accordance with OP-901-104 to further isolate purge water to the Letdown Radiation Monitor. The PNPO continued to borate the RCS with power peaking at 100.5% at 1342 hours and dropping below 100% by 1400 hours. OP-901-104 was exited at 1415 hours. It was determined, based on the total purge time and flow rate, that approximately 285 gallons of PMU was inadvertently added to the VCT during this event.

CAUSAL FACTORS

The root cause of this event was an inadequate technical review of the Station Modification Package (SMP-1817) which installed the Letdown Radiation Monitor in June, 1988. The package contains a flow diagram which incorrectly indicates that the purge flow is routed to the waste system via a floor drain and does not indicate that it also goes to the CVCS. A vendor drawing which correctly indicates that purge flow is routed back to the process is included in the SMP as an attachment. The conflicting information in the SMP was not realized by the originator and was not recognized and resolved during the SMP review process. This situation

resulted in inadequate procedures, training, and controlled drawings, which are considered contributing factors to this event. Had the SMP clearly indicated the correct purge flow path, there would have been greater opportunity for this information to be picked up during reviews and included in plant procedures, drawings, and training programs.

Operations personnel in the Control Room and the I&C technician involved in the purge believed the purge water was discharged to a floor drain. There is no procedural guidance warning the operator about the flow path for the Letdown Radiation Monitor purge. The NSSS flow diagram for the CVCS does not show all monitor connections, including the purge flow path, nor does it reference the vendor drawing. The Architectural Engineering flow diagram for the PMU system only indicates that the purge flow goes to a floor drain and does not indicate that it is normally routed to the CVCS. Because purging a radiation monitor is considered a routine evolution which occurs automatically at the touch of a button in the Control Room, a concern was not recognized prior to initiating the process. Valve PMU-120 was unlocked and opened based on the assumption that it was locked closed to prevent sample dilution during the monitor's normal operation. This is consistent with other radiation monitors in the plant of the same design, although these monitors are in systems where a boron dilution event is not possible.

The most recent Radiation Monitoring System (RMS; EIIS Identifier IL) training was given to Operations personnel during a 1992 Licensed Operator Requalification training cycle. The instructor who gave the RMS lectures was unaware that the purge flow path for the Letdown Radiation Monitor returned to CVCS piping. He assumed that purge flow went to a floor drain. Neither the RMS Lesson Plan nor the RMS System Description describe the purge flow path. The operator training lesson plan presented during 1988,

when SMP-1817 was installed, did not emphasize that purging the Letdown Radiation Monitor could dilute the RCS; however, a drawing which correctly indicates the flow path is attached to the lesson plan. The technician who was questioned during the event and identified the correct purge flow path gained this knowledge from on-the-job training.

IMMEDIATE CORRECTIVE MEASURES

Once the source of the RCS dilution was realized, the purge was secured to the Letdown Radiation Monitor by the PNPO in the Control Room. PMU-120 was then closed to further isolate purge water to the Letdown Radiation Monitor. RCS boration was continued until reactor power level dropped below 100%.

ACTIONS TO PREVENT RECURRENCE

Waterford 3 has implemented or will implement the following corrective actions to prevent recurrence:

A danger tag (94-1124) was placed on PMU-120 and a note placed on the tagout sheet to alert personnel to the potential to dilute the RCS while purging the Letdown Radiation Monitor. The problem was also noted on the Shift Supervisor turnover sheet.

Previous design changes on systems that can alter the boron concentration of the RCS will be reviewed for the potential to cause a similar event.

The appropriate flow diagrams will be revised to clarify the purge flow paths for the radiation monitors installed under SMP-1817.

The appropriate design base documents will be revised to include information on the purge flow paths for radiation monitors.

Operations and Plant Maintenance Instrumentation & Control (PMI) technicians lesson plans will be revised to include information on purge flow paths for radiation monitors.

Waterford 3 will evaluate if additional engineering guidance is necessary to assist the engineering staff in determining the level of detail to be included on flow diagrams for new or changed "skid" mounted equipment.

The appropriate system descriptions will be revised to include information on purge flowpaths for radiation monitors.

This event will be included in an Industry Events Seminar for Operations, Maintenance and Engineering personnel emphasizing the importance of attention to detail, maintaining a questioning attitude and performing good technical reviews.

This event will be incorporated into the Engineering Support Personnel orientation course, "Industry Experience Program Overview", W116-000.

SAFETY SIGNIFICANCE

This event did not compromise the health and safety of the public. The operating crew recognized an abnormal increase in reactor power and responded quickly to prevent exceeding the licensed power limits. No equipment failures were observed during this event and all systems functioned as designed. It should be mentioned that the Letdown Radiation Monitor is the only monitor with the potential to dilute the RCS during a purge process.

SIMILAR EVENTS

There have been no similar events at Waterford 3 reported as LER'S.