



**Entergy
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W3F1-97-0064

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April 8, 1997

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-97-007-00 for Waterford Steam Electric Station Unit 3. This Licensee Event Report is submitted voluntarily due to possible generic concerns and industry interests.

Very truly yours,

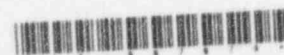
T.R. Leonard
General Manager
Plant Operations

TRL/WDM/tjs
Attachment

cc: E.W. Merschoff, NRC Region IV
C.P. Patel, NRC-NRR
A.L. Garibaidi
J.T. Wheelock - INPO Records Center
R.B. McGehee
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NRC Resident Inspectors Office
Administrator - LRPD

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LICENSEE EVENT REPORT (LER)

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

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), 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.

FACILITY NAME (1)

WATERFORD STEAM ELECTRIC STATION UNIT 3

DOCKET NUMBER (2)

05000 382

PAGE (3)

1 OF 7

TITLE (4)

VOLUNTARY LER ON RWSP LEVEL INDICATION INACCURACIES

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 NAME	DOCKET NUMBER
03	09	97	97	007	00	04	08	97	N/A	05000
									N/A	05000

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

OPERATING MODE (9)	1	20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(viii)
POWER LEVEL (10)	100	20.2203(a)(1)	20.2203(a)(3)(i)	50.73(a)(2)(ii)	50.73(a)(2)(x)
		20.2203(a)(2)(i)	20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71
		20.2203(a)(2)(ii)	20.2203(a)(4)	50.73(a)(2)(iv)	<input checked="" type="checkbox"/> OTHER
		20.2203(a)(2)(iii)	50.36(c)(1)	50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
		20.2203(a)(2)(iv)	50.36(c)(2)	50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME

T.J. GAUDET, LICENSING MANAGER

TELEPHONE NUMBER (include Area Code)

(504) 739-6666

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)

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

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

On March 9, 1997, at 0436 hours, Waterford 3 conservatively made a four hour notification to the Nuclear Regulatory Commission in accordance with 10CFR50.72(b)(2)(iii)(D). Waterford 3 has determined that in an accident condition with the worst case Controlled Ventilation Areas System (CVAS) effect on Refueling Water Storage Pool (RWSP) level instrumentation, the Recirculation Actuation Signal (RAS) setpoint is protected and the minimum assumed volume of borated water from the RWSP is available for emergency core cooling. There is no violation of Technical Specifications and the ability of the Emergency Core Cooling System to mitigate the consequences of an accident is not affected. Due to the initial concern, all four channels of RWSP level transmitters were recalibrated to compensate for this condition and Condenser off-gas exhaust has been failed in the "Atmosphere" position. A design change is planned for Refueling Outage 8 which will re-route the low pressure side of the level transmitter to the RWSP. Waterford 3 is submitting this Licensee Event Report voluntarily due to possible generic concerns and industry interests. This event did not compromise the health and safety of the public.

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

REPORTABLE OCCURRENCE

On March 9, 1997, at 0045 hours, Waterford 3 determined that, as a result of the design of the Refueling Water Storage Pool (RWSP) level transmitters, the Recirculation Actuation Signal (RAS) to the Plant Protection System (PPS; EIS Identifier - JC) is affected when both trains of Controlled Ventilation Area System (CVAS) are running. This condition was conservatively reported in accordance with 10CFR50.72(a)(2)(iii)(D) as a condition that alone could have prevented the fulfillment of the safety function of a system needed to mitigate the consequences of an accident. However, additional reviews of design calculations have determined that the RAS function was not jeopardized by this condition and that a Technical Specification (TS) violation did not occur. Due to possible generic concerns and industry interests, however, this condition is being voluntarily reported.

INITIAL CONDITIONS

At the time this event occurred, Waterford 3 was operating in Mode 1 at approximately 100% power. There was no major equipment out of service specific to this event and no TS Limiting Conditions for Operation (LCO) were in effect specific to this event.

EVENT DESCRIPTION

On February 23, 1997, a 2% increase in RWSP level indication occurred when the CVAS system was started. The Control Room staff initially contacted personnel from Instrumentation and Control (I&C) Maintenance. This event was pursued by the Shift Technical Advisor and by I&C personnel to determine the significance. During a discussion of calibration techniques between I&C personnel, this condition was elevated and brought to the attention of Waterford 3 management and a Condition Report was generated on March 8, 1997.

The high pressure side of each RWSP level transmitter is connected to the RWSP which is vented to the suction of the Reactor Auxiliary Building (RAB, EIS Identifier -

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NF) normal ventilation units. Conversely, the low pressure side of each transmitter is vented to an area of the RAB that is filtered by CVAS. Therefore, factors other than tank level can affect the differential pressure between the high and low sides of the transmitters thereby affecting the indicated level of the RWSP.

While evaluating the impact of RAB ventilation changes on RWSP level, it was initially determined that RWSP level could possibly drop below the level at which vortexing has been calculated to occur, prior to the RAS signal being generated. In consequence, on March 8, 1997, at 2349 hours, CVAS Train B was declared inoperable and a 7-day LCO for TS 3.7.7, "Controlled Ventilation Area System," was entered. As a precautionary measure, the supply breaker for CVAS Train B was opened and a Caution tag was added to alert operators that CVAS Train B can be restarted if CVAS Train A does not start automatically on a Safety Injection Actuation Signal (SIAS).

Testing was performed with both trains of CVAS operating in the accident configuration to determine the offset in calibration required to ensure the RWSP level transmitters would be accurate in an accident lineup. The level transmitters were calibrated using this test data and CVAS Train B was returned to service on March 15, 1997, at 0510 hours.

On March 17, 1997, at approximately 1100 hours, as part of testing initiated to determine the effects of various RAB ventilation lineups on indicated RWSP level, an additional impact was discovered when the non-safety related Condenser off-gas (EHS Identifier - SH) exhaust was shifted to the "Filtered Exhaust" position. Level indications on all four PPS channels were noted to increase by approximately 1.5%. When the Condenser off-gas exhaust was shifted back to the "Atmosphere" position, RWSP level returned to the original level.

The RWSP vent ties into the same header as the diverted Condenser off-gas exhaust, through a non-safety related check valve. This provides the potential, while in the "Divert" mode, for the Condenser Air Evacuation pump discharge header pressure change to communicate with the RWSP, affecting the high pressure side of the level

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transmitter. To compensate for this effect, the Condenser off-gas exhaust valves were failed in the "Atmosphere" position to prevent discharge to RAB normal ventilation system (EIS Identifier - VF). To minimize the effects of an unfiltered release to the atmosphere, the Operations department off-normal procedure for Steam Generator tube leakage was temporarily changed to provide instructions to commence a plant shutdown when primary to secondary leakage reached 0.1 gpm in either Steam Generator.

Revised calculations show that at expected ECCS pump flow rates, vortex formation begins at 5.40% RWSP level. Waterford 3 also recalculated the total loop uncertainty for the RWSP level instruments based on expected temperatures at the location of the level instruments. Based on these revised calculations, the effects of the most limiting CVAS lineup coupled with Condenser off-gas being diverted to RAB normal ventilation, would not have prevented the RAS signal from being generated before vortexing occurred in the RWSP.

CAUSAL FACTORS

The design of the RWSP level transmitters, with the high pressure side connected to the RWSP and the low pressure side vented to atmosphere that is controlled by CVAS, makes it possible for changes in RAB ventilation to affect level indication.

CORRECTIVE MEASURES

1. The following interim actions have been put in place until final resolution can be completed during the refueling outage scheduled to begin on April 11, 1997:
 - The RWSP level transmitters were calibrated using data obtained with ventilation systems in the accident configuration with the worst case single failure. The impact of less severe failures would result in conservative indication.

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- Condenser off-gas was failed in the "Atmosphere" position to prevent diverting exhaust to the RAB normal ventilation.
 - OP-901-202, "Steam Generator Tube Leakage or High Activity," has been changed giving the Control Room staff instructions to commence a plant shutdown when Steam Generator tube leakage exceeds 0.1 gpm.
2. As part of the follow-up investigation, all other tanks at Waterford 3 identified as being susceptible to this same type of error were evaluated with the following results:
- Boric Acid Makeup (BAM) Tank level was observed to increase by approximately 3.8% when RAB normal ventilation was secured. With RAB normal ventilation running, the difference between indicated and actual level is in the conservative direction.
 - The Plant Monitoring Computer indication for the Condensate Storage Pool (CSP) was observed to increase by approximately 0.5% when RAB normal ventilation was started. This effect was not discernible on the level instrument used to satisfy compliance with TS 4.7.1.3.1.
3. During the upcoming refueling outage, the low pressure leg of the level transmitter will be re-routed from the RAB (CVAS) atmosphere to the top of the RWSP.

SAFETY SIGNIFICANCE

The RWSP capacity ensures adequate liquid capacity to support Emergency Core Cooling System (ECCS, EIS Identifiers - BE, BP, BQ) functions. The post-accident function of the RWSP low level actuation is to perform a transfer of the suction for the ECCS pumps from the RWSP to the Safety Injection sump. This is accomplished at a level high enough to prevent vortexing and subsequent loss of pump suction.

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The CVAS system provides fission product control by maintaining a portion of the RAB at a negative pressure following a design basis accident and by providing filtration. Air is exhausted from a controlled ventilation area following a LOCA at a rate required to create and maintain a negative pressure below 0.25 inches water gauge relative to the surrounding areas. The CVAS is designed to provide filtration of exhaust air from this controlled ventilation area of the Reactor Auxiliary Building (RAB).

The non-safety related Condenser Air Evacuation system is designed to remove non-condensable gasses and inleaking air from the steam spaces of the Main Condenser. In the event of excessive steam generator tube leakage, exhaust is automatically redirected upon detection of high radiation. A 10CFR50.59 safety evaluation determined that failing the Condenser off-gas exhaust to the atmosphere does not increase the potential of an uncontrolled, unplanned, or unmonitored release. This is based on the ability to continually monitor Condenser off-gas releases, and that the unfiltered release would still be within 10CFR Appendix I dose limits.

The RWSP vortexing calculation was initially based on runout flow of the Emergency Core Cooling System (ECCS) pumps and determined to occur at a level of 5.7%. The calculation was performed substituting expected flow rates for the ECCS pumps and the RWSP level at which vortexing occurs was determined to be 5.4%.

The RWSP level instrumentation Total Loop Uncertainty (TLU) is affected by the Accident Temperature Effect (ATE) of the level transmitters. TLU is based on the difference between the temperature at the time of calibration and the temperature during accident conditions. The original calculation used a conservatively low assumed calibration temperature of 60°F and a conservatively high accident temperature of 150°F. It has been determined through extensive temperature survey data, that the minimum actual area temperature experiences was 67°F and the maximum temperature was 77°F. The Environmental Zone Maps show that the actual accident temperature is 115°F. A test case was run where TLU was calculated using a conservative calibration temperature of 65°F and the actual accident temperature of 115°F. This resulted in a TLU of 2.13% which represents a net gain of 0.61% of span.

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The total gain from the revised vortexing level (0.3%) and the revised total loop uncertainty (0.61%) is sufficient to ensure that RAS will be initiated prior to the onset of vortexing in the RWSP.

The suction of the ECCS pumps decreases the level of water in the RWSP creating a vacuum condition. The RWSP vacuum breakers have a cracking pressure of 0.18 psi, or approximately 5 inches of water. Although it is impossible to determine the exact amount of vacuum that would be drawn as RWSP level decreases and the vacuum breakers cycle, it is expected that these valves will maintain from 0 to 5 inches of vacuum. This vacuum will cause indicated level to move closer to the actual level. Although no credit is taken in the vortexing calculations, this vacuum provides further confidence that RWSP vortexing would not have occurred in a RAS condition.

With the change to the instrument calibration for the RWSP level transmitters, the TS 3.3.2 RAS setpoint is protected and the minimum required RWSP level will be maintained. The change compensates for the most limiting condition of two CVAS trains operating and a failed makeup damper creating a negative pressure on the reference leg of the transmitter. By incorporating the effects of normal RAB ventilation operation, CVAS operation, and a single failure of a make-up damper in the CVAS, the RAS setpoint is protected and the minimum assumed volume of borated water from the RWSP is available for ECCS. This event did not compromise the health and safety of the public.

SIMILAR EVENTS

LER 95-005-01 reported a condition in which the static span shift had been misapplied in the calibration of Rosemount transmitters used for level indication for the Safety Injection Tanks and the Steam Generators.

There have been no other similar conditions reported at Waterford 3 in which unknown conditions other than actual tank level have affected the indicated level.