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10CFR50.73 (a)(2)(ii)(B)

W3F1-2004-0045

June 1, 2004

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
Licensee Event Report 2004-003-00

Gentlemen:

Attached is Licensee Event Report (LER) 2004-003-00 for Waterford Steam Electric Station Unit 3. This report concerns the identification of a different worst-case single failure for the small break loss of coolant accident that could have conservatively resulted in exceeding 10CFR50.46 acceptance criteria. This condition is being reported pursuant to 10CFR50.73 (a)(2)(ii)(B) as an unanalyzed condition that significantly degraded plant safety. There are no commitments contained in this submittal. If you have any questions, please contact Michael E. Mason at (504) 739-6673.

Very truly yours,

A handwritten signature in black ink, appearing to read "G. Sen".

G. Sen
Manager, Licensing

GS/MEM/ssf

Attachment

JE22

cc: Mr. Bruce S. Mallett
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1. FACILITY NAME: **Waterford Steam Electric Station, Unit 3**

2. DOCKET NUMBER: **05000 382**

3. PAGE: **1 OF 4**

4. TITLE: **10CFR50.46 Acceptance Criteria Exceeded for Small Break Loss of Coolant Accident Analysis**

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
03	31	2004	2004	003	00	06	01	2004	N/A	N/A
									N/A	N/A

9. OPERATING MODE	10. POWER LEVEL	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)											
1	100	20.2201(b)	20.2201(d)	20.2203(a)(1)	20.2203(a)(2)(i)	20.2203(a)(2)(ii)	20.2203(a)(2)(iii)	20.2203(a)(2)(iv)	20.2203(a)(2)(v)	20.2203(a)(2)(vi)	20.2203(a)(3)(i)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)

12. LICENSEE CONTACT FOR THIS LER

NAME: **Michael E. Mason** TELEPHONE NUMBER (Include Area Code): **(504) - 739-6673**

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

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

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

On March 31, 2004, with the plant operating at 100% power, Waterford 3 identified a different worst-case single failure for the small break loss of coolant accident (SBLOCA) analysis that could have conservatively resulted in exceeding a 10CFR50.46 acceptance criterion for peak cladding temperature (PCT) of ≤ 2200 degrees Fahrenheit (F). Per 10CFR50.46(a)(3)(ii), any change or error discovered in an acceptable evaluation model that results in the calculated ECCS performance not conforming to the criteria of part 'b' for PCT is a reportable event per 10CFR50.72 and 10CFR50.73. The different worst-case single failure is the failure of a direct current (D.C.) bus with a coincident loss of offsite power (LOOP) which potentially results in the inability to inject charging water flow into the reactor coolant system as a supplement to high pressure safety injection flow. Upon identification of this condition, Waterford 3 initiated an evaluation that demonstrated with reasonable assurance that Waterford 3 continued to satisfy the 10CFR50.46 PCT acceptance criterion. Reanalysis of the SBLOCA event, incorporating the different worst-case single failure and taking credit for additional high pressure safety injection flow, was performed and demonstrated compliance with the 10CFR50.46 acceptance criteria. The two primary causes for this event were that (during construction) 1) an inadequate evaluation of the change in charging loop isolation valve design from a fail open air operated valve to a fail closed solenoid valve was performed resulting in conflict with the SBLOCA analysis assumptions, and 2) communication was ineffective in implementing competing design requirements (SBLOCA analysis vs. safe shutdown analysis). The major corrective action for this event is the reanalysis of the SBLOCA event, which has already been completed. The condition described in this LER represents an inaccurate assumption in the SBLOCA analysis. There was no actual occurrence which resulted in exceeding safety limits; accordingly, this condition does not compromise the health and safety of the public. This is not a safety system functional failure.

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

REPORTABLE OCCURRENCE

This report identifies a different worst-case single failure for the small break loss of coolant accident analysis that could have conservatively resulted in exceeding a 10CFR50.46 acceptance criterion, peak cladding temperature (PCT) of ≤ 2200 degrees Fahrenheit (F). Per 10CFR50.46(a)(3)(ii), any change or error discovered in an acceptable evaluation model that results in the calculated ECCS performance not conforming to the criteria of part 'b' for PCT is a reportable event per 10CFR50.72 and 10CFR50.73

INITIAL CONDITIONS

Prior to the identification of this event, the plant was operating at 100% in Mode 1. There were no procedures being implemented specific to this event. There were no Technical Specification Limiting Conditions of Operation specific to this event in effect. There was no major equipment out of service specific to this event.

EVENT DESCRIPTION

On March 31, 2004, as part of an extended power up-rate (EPU) review Waterford 3 (W3) personnel identified a different worst-case single failure for the small break loss of coolant accident (SBLOCA) analysis. The existing licensing basis for the SBLOCA analysis worst-case single failure was failure of an emergency diesel generator (EDG) [EK-C29] with a coincident loss of offsite power (LOOP), which would result in the loss of an entire train of AC powered safety related equipment, including a high pressure safety injection (HPSI) pump [BQ-C4]. The SBLOCA analysis of record assumed charging flow to the reactor coolant system (RCS) [AB]. The charging flow to the RCS through one charging loop isolation valve was assumed to be spilled to containment through the assumed postulated broken RCS leg and an assumed charging flow through the other charging loop isolation valve of 18 gpm was credited to supplement the HPSI flow. This supplemental charging flow was credited in the SBLOCA analysis to meet 10CFR50.46 acceptance criteria.

The different worst-case single failure is the failure of a class 1E direct current (D.C.) bus [EJ-C37] with a coincident LOOP that would result in the inability of one EDG to start with consequent loss of an entire train of AC powered safety related equipment and one charging loop isolation valve failing closed resulting in the inability to inject charging water flow into the RCS as a supplement to high pressure safety injection flow. The charging loop isolation valve powered from the respective bus fails closed on failure of D.C. power. The other charging flow path to the RCS is on the assumed broken RCS leg, so it is assumed to be spilled to the containment. Therefore, no charging flow is delivered to the RCS, which conflicts with the current SBLOCA analysis of record. This condition of no charging flow delivery to the RCS results in the plant being in an unanalyzed condition. To address this condition, Waterford 3 entered the corrective action process and made an 8 hour notification to the NRC for the identification of an unanalyzed condition that significantly degrades plant safety.

On April 1, 2004, an operability confirmation evaluation was completed and the results demonstrated with reasonable assurance that W3 continued to satisfy the 10CFR50.46 PCT acceptance criterion without charging flow. This conclusion was based upon known conservatism in the SBLOCA analysis of record and reliance on an alternate NRC approved methodology (NOTRUMP model) utilizing the assumptions consistent with the W3 SBLOCA analysis of record without charging flow.

On April 2, 2004, a discussion was held with the NRC staff to communicate information regarding this event.

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On April 30, 2004, the SBLOCA reanalysis was completed. This reanalysis evaluated the different worst-case single failure mode. The reanalysis does not take credit for charging flow, however, it does credit additional HPSI flow derived from the known conservatism in the HPSI pump delivery flow curve calculation for the SBLOCA analysis (this margin comes from an updated flow meter accuracy value and a valve position repeatability factor). The reanalysis resulted in a calculated PCT of 1959 degrees F vs. the 10CFR50.46 acceptance criterion PCT limit of ≤ 2200 degrees F. This reanalysis was submitted to the NRC on May 26, 2004.

CAUSAL FACTORS

One primary cause of this event was inadequate review of the change in charging loop isolation valve design and its impact upon SBLOCA analysis assumptions. During the construction stage of the plant, the charging loop isolation valve was changed by the architectural engineer (A-E) from a fail open to a fail closed valve design to ensure adequacy of auxiliary pressurizer spray to support an emergency cooldown following a safe shutdown earthquake (SSE) with a loss of offsite power (LOOP). This change provided assurance of adequate auxiliary pressurizer spray flow to depressurize the RCS under the postulated scenario. With the charging loop isolation valves open, the required spray flow could be diverted through the charging loops such that depressurization and cooldown to hot shutdown within 36 hours could not be accomplished. The change in the valve design to fail closed was not reviewed by the nuclear steam supply system (NSSS) vendor safety analysis personnel.

Another primary cause of this event was ineffective communication between the A-E and the NSSS vendor in implementing competing design requirements during the construction stage of the plant. The SBLOCA analysis by the NSSS vendor identified the assumption that the charging loop isolation valves were fail open. The safe shutdown design by the A-E concurrently established a fail closed valve design for the charging loop isolation valves.

CORRECTIVE ACTIONS

An operability confirmation evaluation was performed to demonstrate continued operability. This operability confirmation evaluation demonstrated with reasonable assurance that Waterford 3 continued to satisfy the 10CFR50.46 PCT acceptance criterion. This conclusion was based on the known conservatism of the original analysis and on the availability of an alternate analysis methodology, which was run for study purposes during preparations for the EPU project.

Due to the historical nature of the identified causes (i.e. occurring during the plant construction stage of the plant, 1979-1980 timeframe) as part of the Root Cause Analysis (RCA) process, an organizational and programmatic (O&P) weakness evaluation was performed. This evaluation was implemented in two parts, one for the initial organizations and programs that were involved at the inception of the problem and the other as an assessment of the current programs and their ability to prevent a similar design error. The evaluation for the initial organizations and programs noted four O&P causal factors, which were determined to be legacy issues with no required corrective actions. The assessment of the current programs and their ability to prevent a similar design error determined that there were no additional O&M causal factors beyond those determined in the RCA process. The evolutionary changes in the design control programs (e.g. engineering request process, design input control, and design verification control) and the shift in primary responsibility for design control to the Waterford 3 Engineering Department, as opposed to a shared responsibility between the NSSS vendor and A-E, are adequate barriers and processes to prevent

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recurrence of this condition.

The SBLOCA reanalysis was completed for the current cycle which will become the analysis of record. This reanalysis evaluated the different worst-case single failure (credit for charging loop flow was removed) and credits additional high pressure safety injection flow to compensate for the loss of charging flow.

SAFETY SIGNIFICANCE

Reanalysis of the SBLOCA event incorporated the different worst-case single failure and credited additional HPSI flow derived from the known conservatism in the HPSI pump delivery flow curve calculation. The reanalysis calculated a PCT of 1959 degrees F, which is less than the 2200 degrees F PCT acceptance criterion of 10CFR50.46. Since the resulting reanalysis met the 10CFR50.46 acceptance criteria, the identified condition does not and did not jeopardize the public health and safety.

This event is not a Safety System Functional Failure (SSFF).

SIMILAR EVENTS

A similar event for exceeding 10CFR50.46 PCT acceptance criteria was reported to the NRC in LER 97-033-00, dated January 5, 1998. LER 97-033-00 addressed the misapplication of the flow measurement instrument uncertainty value during the performance of the safety injection flow balance test required by technical specifications. The misapplication of the flow measurement instrument uncertainty resulted in the determination that the calculated 10CFR50.46 PCT acceptance criterion was exceeded. To resolve this non-compliance Waterford 3 implemented a different SBLOCA ECCS performance analysis which adequately accommodated the measurement instrument uncertainty. Thus, under the new analysis model, the 10CFR50.46 PCT acceptance criteria were not exceeded.

ADDITIONAL INFORMATION

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