NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

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EXPIRES 04/30/99

LICENSEE EVENT REPORT (LER)

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

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TITLE (4)

Minimum HPSI Flow Used in FSAR Accident Analysis May Be Non-Conservative

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
06	12	97	97	-- 023 --	01	11	24	98	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
			20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
POWER LEVEL (10)	000		20.2203(a)(1)		20.2203(a)(3)(i)	X	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)		OTHER
			20.2203(a)(2)(iii)		50.36(c)(1)	X	50.73(a)(2)(v)		Specify in Abstract below 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	TELEPHONE NUMBER (Include Area Code)
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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 12, 1997, during a review of the High Pressure Safety Injection (HPSI) pump Technical Specifications, it was determined that the actual HPSI System flow delivery to the reactor coolant system (RCS) may be less than the flow assumed in the Final Safety Analysis Report Chapter 14 Loss Of Coolant Accident and Main Steam Line Break accident analyses.

The cause of this condition was the use of non-conservative HPSI system flow assumptions in the original design basis accident analyses and subsequent design verification.

As a result of this condition, the affected accident analyses have been re-evaluated with conservative HPSI delivery rates resulting in the conclusion that the accident acceptance criteria are met.

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

I. Description of Event

On June 12, 1997, during a review of the High Pressure Safety Injection (HPSI) [BQ] pump Technical Specifications (TS), it was determined that the actual HPSI System flow delivery to the reactor coolant system (RCS) [AB] may be less than the flow assumed in the Final Safety Analysis Report (FSAR) Chapter 14 Loss Of Coolant Accident (LOCA) and the Main Steam Line Break (MSLB) accident analyses. At the time of discovery of this condition, the unit was defueled.

The following Non-Conservative assumptions were in the analysis of record for safety injection to the RCS:

1. The analysis of record at the time the condition was identified assumed the same HPSI system flow to each of the four cold legs during a LOCA. However, HPSI flow delivery, calculated on a hydraulic resistance basis, shows significantly more flow could be spilled out the break than the 25 percent assumed. At high HPSI pressures this could result in a flow reduction of up to 70 gpm as compared to the flow assumed by the analysis.

2. The flow transmitters that were utilized at the time the condition was discovered to verify the required Technical Specification HPSI flows had an instrument inaccuracy of approximately plus or minus four percent. Flow instrument inaccuracy was not assumed by the analysis of record at the time the condition was identified.

3. The HPSI pump head/flow performance assumed by the analysis of record at the time the condition was identified was based on the nominal manufacturer's curve without tolerance or allowance for pump degradation. Flow testing, at the time of discovery, showed that the high flow portion of the "A" HPSI pump was less than the manufacturer's curve.

This condition was reported pursuant to 10 CFR 50.73(a)(2)(ii)(B) as a condition that is outside the design basis of the plant.

Based on the effect of the above non-conservative assumptions, when RCS pressures are between HPSI pump shutoff head and approximately 1100 psig, HPSI flow could be less than assumed in the existing accident analyses even with two operating HPSI Trains. Therefore, this event is also being reported in accordance with 10 CFR 50.73(a)(2)(v)(D), any condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident. This criterion required a prompt report which was made on July 8, 1997, in accordance with the requirements of 10 CFR 50.72(b)(2)(iii).

II. Cause of Event

The cause of this condition was the use of non-conservative HPSI system flow assumptions in the original design basis accident analyses and subsequent design verification.

III. Analysis of Event

The HPSI System is part of the emergency core cooling system (ECCS). The primary safety function of the HPSI pumps is to inject borated water into the RCS if a LOCA occurs in the reactor coolant pressure boundary. Following a large or small break (SB) LOCA, the HPSI pumps provide long term recirculation to restore and maintain borated water cover for the core. During a SB LOCA, HPSI pumps are the predominant source of borated water to the RCS since the slow decay of RCS pressures may delay delivery of flow from other ECCS

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components. Therefore, a reduction in HPSI flow delivery directly affects the SB LOCA analysis. Non-conservative assumptions that were used in the analysis of record at the time the condition was identified for safety injection system delivery to the RCS included the quantity of flow lost from RCS pressure boundary rupture, flow instrument inaccuracy, and actual versus assumed pump performance. The revised analysis considers HPSI flow rates and incorporates one injection leg break dumping water into the containment at atmospheric pressure (conservative), and incorporates the worst single failure scenario with one diesel out of service for both the injection and recirculation modes. The revised analysis also includes a HPSI flow rate instrumentation uncertainty of plus or minus 2 percent, which reflects the accuracy of the flow instrumentation now used in the field, and margin for pump degradation.

The non-conservative assumptions related to flow instrument inaccuracy and actual versus assumed pump performance also had the potential to adversely impact the MSLB analysis. The MSLB analysis relies on HPSI for RCS inventory addition and boration. The reduction in RCS boration, as a result of the reduced HPSI flow, could increase the magnitude of the post trip return to power. The impact of these potentially non-conservative assumptions was considered to be more significant for the LOCA than the MSLB. The re-analyses, incorporating the new information presented above, shows that the MSLB analysis results are also within the MSLB accident acceptance criteria.

10 CFR 50.46 requires that the ECCS be designed so that calculated cooling performance following a postulated LOCA conforms to specific criteria, including a peak fuel element cladding temperature (PCT) limit of 2200 degrees F. The current SB LOCA analysis of record, which is based on the existing non-conservative HPSI flow assumptions, has a maximum PCT of 2010 degrees F. Since the analysis of record, at the time the condition was identified, indicated the potential that the HPSI delivery rates could have resulted in the 10 CFR 50.46 criteria being exceeded, this condition was considered to be potentially safety significant. Re-analysis shows that a safety significant condition related to the equipment did not exist.

The HPSI system delivery flow to the RCS has been recalculated and the LOCA analyses have been re-evaluated with the conclusion that the 10 CFR 50.46 acceptance criteria are met. The MSLB analysis has also been re-evaluated and found to be acceptable.

IV. Corrective Action

As a result of this condition, the following action has been performed.

The affected accident analyses have been re-evaluated with conservative HPSI delivery rates resulting in the conclusion that the accident acceptance criteria are met.

V. Additional Information

Similar Events

No previous similar event involving insufficient system flow due to non-conservative assumptions was identified.

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