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

APPROVED OMD NO. 3150-0104
EXPIRES: 04/30/98
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)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Oconee Nuclear Station, Unit One	05000 269	1 OF 7

TITLE (4) Low Temperature Overpressure Protection System Technically Inoperable Due To A Design Oversight

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(S)
											Unit Two	05000 270
06	17	98	98	-	09	-	01	07	20	98	Unit Three	05000 287

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR (Check one or more of the following) (11)			
POWER LEVEL (10)	100%	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	X 50.73(a)(2)(v)(A)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in
		20.405(a)(1)(iii)	X 50.73(a)(2)(i)(B)	50.73(a)(2)(viii)(A)	Abstract below and
		20.405(a)(1)(iv)	X 50.73(a)(2)(ii)(B)	50.73(a)(2)(viii)(B)	in Text, NRC Form
		20.405(a)(1)(v)	50.73(a)(2)(iii)(A)	50.73(a)(2)(x)	366A)

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER	
	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 fifteen single-space typewritten lines) (16)

In June 1997, the Oconee Safety Related Designation Clarification Project identified several items for further review regarding Low Temperature Overpressure Protection (LTOP). Detailed reviews of the LTOP system design determined that the system was not single failure proof for one specific scenario. Failure of a low range Reactor Coolant System pressure transmitter could impact both LTOP trains during an inadvertent actuation of the pressurizer heaters. This transmitter provides the comparison signal for the Power Operated Relief Valve and also alerts the operators of an overpressure event if the pressurizer heaters inadvertently actuate. On June 17, 1998, an operability evaluation concluded that the design basis was not met for single failure criteria of the LTOP system. At 1512 hours, with all three Units at 100% full power, the NRC was notified via the Emergency Notification System. The root cause is inadequate design configuration due to a design oversight. Corrective actions include compensatory actions to designate a LTOP Operator when required and modify the LTOP system to remove the single failure vulnerability.

EVALUATION:

Background

Low Temperature Overpressure Protection (LTOP) is designed to protect the Reactor Coolant System (RCS) [EIIS:AB] from overpressurization at temperatures less than 325 F by providing a relief path. The requirements are outlined in Technical Specification (TS) 3.1.2.9. Two trains of LTOP are required. The first train is an active train which consists of a Power Operated Relief Valve set to relieve at a low pressure setpoint. The second train is a train which consists of the instrumentation and controls necessary to assure that operator action can be taken, during a LTOP event, to prevent overpressurization of the RCS. TS's allow one train to be out of service for four hours without compensatory actions (designating a LTOP Operator) to monitor for indications of a LTOP event.

The requirements of the second train consist of a combination of limits and administrative controls as follows:

1) Limits on RCS pressure and pressurizer level.

2) Deactivation of both Core Flood [EIIS:BP] Tanks.

3) Deactivation of both High Pressure Injection [EIIS:BG] trains.

4) Restrictions on RCS makeup flow.

5) Certain computer alarms must be operable.

6) Controls on the high pressure nitrogen system.

The Oconee Safety Related Designation Clarification (OSRDC) Project was originated in part to clarify the scope of equipment used at Oconee for design basis accident mitigation. In order to scope out the accident mitigation equipment, the project first defined the scope of accidents and transients which were to be reviewed. The LTOP event was among the accidents and transients reviewed.

Description of Event

In order for the Oconee Safety Related Designation Clarification (OSRDC) Project to successfully define the scope of equipment for each postulated event, a number of licensing basis issues had to be resolved. These issues were identified and placed into the corrective action program in mid 1997. For the Low Temperature Overpressurization Protection (LTOP) System, these corrective actions required that seismic, single failure, and loss of instrument air design capabilities of the LTOP System be better clarified.

In May 1998, a detailed licensing review of the LTOP system was completed. A review of the LTOP System design was conducted to determine if there were any single failures which could potentially disable both LTOP trains. The review found that a 0-600 psig low range pressure transmitter originates a high pressure alarm for the LTOP train that generates a requirement for Operator action and also feeds the Power Operated Relief Valve low setpoint in the active LTOP train. This determination creates a single failure vulnerability. A Problem Investigation Process Report was originated to initiate an operability evaluation.

On May 14, 1998, the present operability evaluation concluded that the passive LTOP train on all three units was technically inoperable since a postulated single failure of the low range pressure transmitter could disable both LTOP trains. The susceptibility for a single failure would apply only for inadvertent actuation of the pressurizer heaters. However, Unit 2 was the only unit which required the compensatory action to station a designated LTOP Operator. Units 1 and 3 were not in LTOP mitigation modes. Operational guidance to dedicate a LTOP Operator was provided to Units 1 and 3 should they enter the LTOP mitigation mode.

On June 11, 1998, engineering completed a review of the low range pressure transmitter and concluded that no failures of the transmitter had occurred that would have affected LTOP operability. However, this evaluation did not adequately consider the Technical Specification (TS) 3.1.2 Bases. The TS Bases state that for evaluating LTOP system acceptability the most limiting single failure must be assumed during a LTOP event. Thus, even though it was shown that the system would have been functional in the past, the design basis was not met. As a result, the LTOP mitigation system was classified as being past inoperable on June 17, 1998.

On June 17, 1998, at 1512 hours, the NRC was notified via the Emergency Notification System of the postulated failure scenario. As allowed by TS 3.1.2, compensatory actions consisting of a dedicated LTOP Operator will be put in place on each unit when necessary.

Conclusion

The development and review of the LTOP System design occurred in the mid 1980s following the Three Mile Island Unit 2 (TMI-2) event. Duke addressed the single failure requirement by stating that there were two independent, diverse means (trains) of LTOP available for mitigation of postulated low temperature pressurization events.

Based on a review of the licensing basis documentation and operating procedures it is apparent that the single failure issue associated with Low Temperature Overpressure Protection (LTOP) was not adequately addressed.

The OSRDC project resulted in the identification of a single failure issue related to LTOP. This single failure issue could have impacted the ability to mitigate a LTOP event. The single failure issue involves a failure of the low pressure transmitter while there is no designated LTOP Operator. This could only occur during an unintended low temperature pressurization event caused by spurious operation of pressurizer heaters. All other LTOP events are not impacted since pressurizer level would be available to alert the Operators of an overpressure event.

Therefore, the root cause of this event is an inadequate design configuration due to a design oversight that occurred in the mid 1980s.

A review of LERs and the Operating Experience Data Base for inadequate design configurations over the last two years was conducted. There have been no LERs associated with LTOP inadequate design configurations. There have been LERs with design deficiencies but they were associated with deficient design analysis. Design oversight LERs have not been a recent occurrence. The design processes and procedures in place currently should preclude oversights identified in this event. There was no operating experience associated with LTOP inadequate design configurations. Therefore, this event is considered non-recurring.

This postulated event did not result in personnel injuries, radiation overexposures, or releases of radioactive materials. There were no equipment failures associated with this event.

CORRECTIVE ACTION:

Immediate:

1. Compensatory action guidelines were established. These guidelines require a designated Low Temperature Overpressure Protection (LTOP) Operator to be stationed if a unit enters the LTOP mitigation mode of operation.

Subsequent:

None

Planned:

1. The current design of the LTOP system will be modified to remove the single failure vulnerability.

2. Training of affected personnel will be conducted regarding reportability requirements associated with this event.

Planned corrective action number 1 is considered to be a NRC Commitment Item. This is the only NRC Commitment item contained in this LER.

SAFETY ANALYSIS:

This event involves a postulated failure of the low range pressure transmitter. The transmitter provides the comparison signal for the Power Operated Relief Valve lift setpoint (active Low Temperature Overpressure Protection (LTOP) train), and also feeds the high pressure alarms which alert the operators of a potential LTOP event (passive LTOP train).

The Technical Specification Bases describe seven LTOP initiating events for evaluating the adequacy of the passive LTOP train. The following scenarios have the potential to result in an LTOP event:

1) Makeup control valve (HP-120) fails full open.

2) Erroneous opening of a core flood tank (CFT) discharge valve.

3) Erroneous actuation of the High Pressure Injection (HPI) system.

4) All Pressurizer Heaters erroneously energized.

5) Temporary loss of decay heat removal.

6) Thermal expansion of the Reactor Coolant System (RCS) after starting a Reactor Coolant Pump due to stored energy in the Steam Generator.

7) Erroneous addition of high pressure nitrogen.

Technical Specification 3.1.2.9.2 and administrative procedures require that both CFTs and both HPI trains be isolated from the RCS, thus precluding the occurrence of Scenarios 2 and 3. There are physical restrictions for the position of valve HP-120 which limit RCS makeup flow associated with Scenario 1. The primary LTOP passive train alerting indication in Scenarios 5, 6, and 7 is Pressurizer level, not low range RCS pressure. Therefore, with the exception of Scenario 4, none of the LTOP event scenarios rely on low range RCS pressure indication as the primary alerting indication of an LTOP event.

The LTOP initiating event in which Pressurizer Heaters are inadvertently energized is the only event that credits use of the low range pressure transmitter as the primary alerting instrument for Operators to mitigate a LTOP event. Administrative controls are in place to prevent energizing all of the pressurizer heaters at once. Even if the administrative controls failed, there are conspicuous operator indications in the control room that indicate when Pressurizer Heaters are energized. It is unlikely that this condition would go unnoticed even without a dedicated LTOP Operator. There are also other pressure transmitters that are available to the operator to aid in detection and termination of an LTOP event. The 0-2500 psig (wide

range) pressure transmitter(s) are not utilized for LTOP events but would be available to the operator. They could be utilized if instrument error was appropriately accounted for while operating under the Pressure/Temperature curves.

During unit startups and shutdowns, the ability to mitigate LTOP events is normally required for a brief period of approximately two or three days. There is also a low probability of LTOP events at Babcock and Wilcox (B&W) designed plants since these plants are not normally operated in a water solid condition.

The LTOP scenario involving an energization of all pressurizer heaters, coincident with a failure of the low range RCS pressure transmitter, has never occurred at Oconee. A dedicated LTOP Operator is currently required to be stationed if a unit enters the LTOP mitigation conditions.

The health and safety of the public was not affected by this event.