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SUBJECT: LER 89-008-00: on 891111, low temp overpressure protection commitments to NRC violated due to mgt deficiency.

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 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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DUKE POWER

January 15, 1990

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
Voluntary LER 270/89-08

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report (LER) 270/89-08 concerning low temperature overpressure protection commitments to the NRC were violated due to management deficiency and inadequate policy.

This report is being submitted on a voluntary basis. This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

Joe M. Barron for

H. B. Barron
Station Manager

RSM/ptr

Attachment

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LICENSEE EVENT REPORT (LER)

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TITLE (4) **Low Temperature Overpressure Protection Commitments to NRC Were Violated Due to Management Deficiency, Inadequate Policy**

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 NAMES		DOCKET NUMBER(S)
11	11	89	89	008	00	01	15	90	Oconee Unit 1		0 5 0 0 0 2 6 9
									Oconee Unit 2		0 5 0 0 0 2 8 7

OPERATING MODE (9) **H**

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

20.402(b)	20.408(e)	80.73(a)(2)(iv)	73.71(b)
20.408(a)(1)(i)	90.38(a)(1)	80.73(a)(2)(v)	73.71(c)
20.408(a)(1)(ii)	90.38(a)(2)	80.73(a)(2)(vi)	<input checked="" type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 308A)
20.408(a)(1)(iii)	90.73(a)(2)(i)	80.73(a)(2)(vii)(A)	VOLUNTARY
20.408(a)(1)(iv)	90.73(a)(2)(ii)	80.73(a)(2)(vii)(B)	
20.408(a)(1)(v)	90.73(a)(2)(iii)	80.73(a)(2)(viii)	
20.408(a)(1)(vi)	90.73(a)(2)(iv)	80.73(a)(2)(ix)	

LICENSEE CONTACT FOR THIS LER (12)

NAME Henry R. Lowery, Chairman Oconee Safety Review Group		TELEPHONE NUMBER	
		AREA CODE 8 0 3	8 8 5 - 3 0 3 4

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC
E	BG	- - - V	L 1 7 0	YES					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE) NO

EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

ABSTRACT (Limit to 1000 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

ABSTRACT

On November 11, 1989, Unit 2 was being brought to cold shutdown for repair of a dropped control rod. At 1303 hours, the Reactor Coolant System (RCS) makeup valve, failed closed at a point in the cooldown procedure just prior to entering the Low Temperature Overpressure Protection (LTOP) region. Operations, after referencing Technical Specifications (TS), made a decision to continue cooldown utilizing an alternate valve to provide RCS makeup. To permit use of this valve, a procedure step was performed out-of-sequence. Unit cooldown continued (below 325 degrees F, LTOP region) with a dedicated LTOP operator monitoring specific plant parameters and with the Power Operated Relief Valve operable. Unit 2 was brought to cold shutdown without any additional problems. During a later operator training session, management learned of the above cooldown method and realized the above actions constituted a failure to comply with a commitment to the NRC. This event's root cause is Management Deficiency, inadequate policy. This incident occurred and ended without prompt recognition, however upon identification, management provided a TS Interpretation, and a LTOP Training Package for operators. This report is submitted as a voluntary LER.

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TEXT (If more space is required, use additional NRC Form 388A (17))

BACKGROUND

Normal High Pressure Injection (HPI) [EIIS:BG] supplies makeup and controls changes in the Reactor Coolant System (RCS) [EIIS:AB] during normal operation. Usually, one HPI pump [EIIS:P] takes suction on the Letdown Storage Tank and injects into the RCS A1 and A2 Cold Legs at the Reactor Coolant Pump discharge. The HPI pump discharge pressure is 3050 psi. Normal injection is through HP-120 [EIIS:V](RCS Volume Control Valve) which controls injection flow by comparing pressurizer level with level setpoint and throttling as necessary. HP-120 is a 2.5 inch pneumatic globe valve.

HP-26 is a 4 inch Engineered Safeguards (ES) [EIIS:JE] electric motor operated globe valve designed to open on ES actuation. The operating procedure for shutdown of Unit 2, on November 11, 1989, required HP-26 to be in the closed position prior to dropping RCS temperature below 325 degrees F.

Low Temperature Overpressure Protection (LTOP) is required due to the potential for brittle fracture of RCS components due to excessive pressures at low temperature. Low Temperature Overpressurization (LTO) vulnerability is assumed when any RCS cold leg temperature is less than or equal to 325 degrees F and a RCS vent path equivalent to the Power Operated Relief Valve (PORV) [EIIS:V] is not open. When any RCS cold leg temperature is less than 325 degrees F and the High Pressure Injection pumps are providing RCS makeup through HP-120, a potential for a rapidly progressing overpressure transient exist.

Each Oconee Unit has two LTOP methods/systems to provide protection against damage due to excessive pressures at low temperature. The first method, as stated in Technical Specifications (TS), requires both Train A and B of HPI to be inoperable. The requirements to place the HPI trains in an inoperable mode are defined in the specifications and require HP-26, -27, -409, and -410 to be closed. Other alternate methods to isolate the HPI Trains are also listed. This method of low temperature overpressure protection consists of operator action and is based on an operating philosophy that precludes the plant from being in a water solid condition. Oconee units are operated with a steam or gas space in the pressurizer which allows sufficient time for operator action to terminate an LTO event prior to exceeding the appropriate brittle fracture pressure limits. The second method provides protection through the pressurizer PORV being calibrated to a low pressure relief setpoint of less than or equal to 500 psig for Unit 2. The relief capacity of the pressurizer PORV is sufficient

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TEXT (if more space is required, use additional NRC Form 206A's) (17)

to maintain the RCS pressure below the appropriate brittle fracture pressure limits during LTO events. Assuming an LTO event was to occur at Oconee, and a single failure disables either train, the remaining train must be capable of maintaining RCS pressure below the appropriate brittle fracture pressure limits.

The NRC's position has been that no credit can be taken for operator action until 10 minutes after the operator is aware that a pressure transient is in progress. At Oconee, the 10 minute requirement for no operator action is satisfied for all scenarios except HP-120 failing open. In this case, it is possible that assuming a failure of the PORV to operate (open), there may be less than 10 minutes available before exceeding the pressure-temperature curve. Due to this fact, Oconee has placed in operating procedures a requirement to establish a "dedicated" LTOP operator who is responsible for terminating any LTO event.

EVENT DESCRIPTION

The analyses that form the basis for Oconee's current Low Temperature Overpressurization (LTO) Technical Specifications (TS) were performed by Babcock & Wilcox (B&W) in the late seventies. The NRC issued a Safety Evaluation Report (SER) for the Low Temperature Overpressure Protection (LTOP) system on August 8, 1983. This SER stated that the LTOP system should "provide protection for Oconee, Units 1, 2, and 3 from pressure transients at low temperatures by limiting the pressure of such a transient to below the limits set by 10CFR50 Appendix G." In addition, the SER stated that "the staff position is that no credit can be taken for operator action until 10 minutes after the operator is aware that a pressure transient is in progress."

Station Problem Investigation Report (PIR) 4-088-0252 was prepared by Design Engineering personnel on December 8, 1988. This report identified three proposed TS deficiencies concerning requirements for LTOP. In February 1989, Design Engineering performed an Operability Evaluation and a 10CFR 50.59 Evaluation of the Oconee Unit 1 LTOP system as a result of the station PIR.

This PIR had identified some discrepancies between the B&W LTOP analyses, the NRC LTOP SER, and the present status of the LTOP system at Oconee. In order for Design to assess operability of the LTOP system, several scenarios were evaluated. The evaluation findings revealed that only one of the stated PIR deficiencies required compensatory measures. This deficiency focused on the nonconservatism of ten minutes allowed for operator action to mitigate an LTO transient assuming failure of the Power Operated Relief Valve (PORV) to open. Analysis performed indicated the

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TEXT (if more space is required, use additional NRC Form 308A (11/77))

worst case failure was for HP-120 to fail full open. This valve failure, as analyzed in the evaluation, would cause pressurizer pressure to exceed 500 psig in 4.3 minutes.

The evaluation's proposed resolution to compensate for the shorter time period available for operator action was to have a dedicated licensed operator monitor the Reactor Coolant system pressure and pressurizer level when operating in the LTOP region. This resolution was subsequently incorporated into the appropriate station operating procedures. The procedure changes also included specific operator actions to be taken immediately for mitigation of a low temperature overpressure event. This action was considered a short term resolution and was found acceptable in discussions with the NRC staff. Long term resolutions were not stated at the time, however it was recognized that appropriate corrective actions were needed for all Oconee units. Efforts were then initiated to prepare a proposed TS change.

Oconee LTOP discussions have continued between Station management, Duke Power Company Regulatory Compliance, and the NRC since December 1988. In February 1989, Station management committed to the NRC that the Oconee Units would not be operated with one or more of the RCS cold legs at a temperature less than or equal to 325 degrees F, without having first closed and deactivated valves HP-26, -27, -409, and -410. This action is accomplished by tagging open the valve breakers and tagging the valves in the closed position or by deactivating pumps HP-A, HP-B, and HP-C and tagging the pump breakers open.

On February 7, 1989, Operator Training Package 89-07 "Low Temperature Overpressure Protection" was issued for review by Operations personnel indicating additional measures required to adequately address LTOP concerns at Oconee. This training package is marked attachment # 1 and deals primarily with the dedicated LTOP operator requirements.

On November 11, 1989, at 1303 hours, HP-120, a 2.5 inch pneumatic globe valve, used to control Reactor Coolant (RC) makeup, failed in the closed position. At the time, Unit 2 was being cooled down to allow repair of a dropped control rod [EIIS:AA] and the RC system cold leg temperature was greater than 350 degrees F. Operations prepared Work Request 25009C to repair the valve. Replacement of the upper and lower diaphragms was required and completed by Instrument and Electrical personnel in approximately sixteen hours and the valve was returned to service.

However, between 1303 hours and approximately 1424 hours, Operations supervision discussed the valve failure situation and the need to stop unit cooldown prior to dropping below 325 degrees F (LTOP region). During these discussions, they referenced both the Operations procedure

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OP/2/A/1102/10, "Controlling Procedure For Unit Shutdown" and Technical Specifications 3.1.2.9 and made a decision to continue unit cooldown below 325 degrees F utilizing HP-26, a 4 inch electric motor operated globe valve, to control RC system makeup. Operations supervision's interpretation of the Technical Specification allowed this continuation, in that, the Power Operated Relief Valve (RC-66) would be operable as the required LTOP system. This interpretation, however, did not comply with the commitment made to the NRC which required two operable LTOP systems. A dedicated LTOP operator assignment was made as required by procedure enclosure 4.11. The LTOP operator is required whenever RC system temperature is less than 325 degrees F and an HPI pump is operating. The LTOP operator's sole responsibility is to prevent low temperature overpressurization in the event that the RC Volume Control valve (HP-120) fails open (in this event, HP-26 was to be used as the RC Volume Control valve). Procedure enclosure 4.11 requires continuous monitoring of RC system pressure and pressurizer level. The dedicated LTOP operator was knowledgeable of the fact that HP-120 had failed closed and that HP-26 was to be used for controlling RCS makeup.

Therefore at approximately 1424 hours, with consent of supervision, control room operators performed a procedure step (OP/2/A/1102/10, step 2.9.1 of enclosure 4.2) out-of-sequence. This step required HP-26 to be closed or verified closed. Unit 2 was then successfully operated in the LTOP region with HP-26 open or partially open as required to throttle RCS makeup. This action was contrary to an earlier commitment made to the NRC by station management. HP-26 was not closed until November 12, 1989, at 0506 hours, thereby terminating this event. Unit 2 cooldown was completed without other incidents as a result of these decisions/actions. Guidelines for performing procedure steps out-of-sequence are stated in Operations Management Procedure 1-9, "Use Of Procedures."

On November 15, 1989, a proposed amendment to the Oconee Facility Operating Licenses and revisions to the ONS Technical Specifications was submitted to the NRC. It was stated in the amendment request that a review had been performed with regard to Oconee's LTOP systems and existing Technical Specification requirements including conflicts earlier identified regarding inadvertent actuation of the High Pressure Injection system. These conflicts were classified as unresolved items (URI 50-269, -270, -287/88-34-04). It was stated that the changes within the proposed amendment request would correct these conflicts and assure that the reactor vessel is protected.

On November 21, 1989 during scheduled operator training with attendance including key operators on shift during this event, topics and follow-up discussions involving LTOP requirements resulted in Operations management

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(also in attendance at the training session) becoming aware of a NRC commitment deviation during the November eleventh Unit 2 shutdown. Operations management, upon further review of the events associated with the unit shutdown, concluded that unit cooldown in the described manner had violated earlier commitments to the NRC and a station Problem Investigation Report was prepared.

After station management and resident NRC discussions were conducted relating this event to earlier NRC commitments, a Technical Specification Interpretation was prepared and appropriately routed for inclusion to the Technical Specifications document. In addition, efforts were directed to provide a station Operations training package intended to enhance station operators' knowledge of LTOP requirements.

Station Problem Report 2951 was prepared and approved on November 29, 1989 to install, through the exempt change process, a bypass line around HP-121 (a 2.5 inch isolation valve downstream from HP-120) for use anytime the RCS is under LTOP restrictions. This modification, when installed, will limit flow from HP-120 and avoid the need for a "dedicated" LTOP operator.

An engineering analysis was performed on November 30, 1989 to ascertain the time available for operator action if a spurious actuation of the HPI system had occurred on Unit 2 with plant conditions present when HP-26 was open with the RCS temperature below 325 degrees F. This analysis was documented in calculation file OSC-3795. The analysis results showed that at least 3.0 minutes would have existed between an emergency start of the HPI system and the time the RCS pressure exceeded Unit 2 LTOP pressure limits. Operations management stated in December 1989 that if a low temperature overpressurization event had occurred during the time HP-26 was open, on November 11 and 12, that appropriate operator actions to mitigate the event would have been taken by the "dedicated" LTOP operator within 3 minutes.

CONCLUSION

Operations management verbally committed to the resident NRC Inspector in February 1989 that operation of the Oconee Units would include mandatory implementation of Technical Specification (TS) 3.1.2.9, parts a and b, each time a unit was operated in the Low Temperature Overpressure Protection (LTOP) region. On November 11 and 12, 1989, Unit 2 was operated contrary to the provisions of this commitment.

The root cause of this event is classified as Management Deficiency, inadequate policy. This conclusion is based on the fact that management failed to timely and adequately provide an effective policy for informing

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operators of a new mandatory requirement (NRC commitment) to deactivate both trains of High Pressure Injection (HPI) prior to dropping below 325 degrees Fahrenheit (LTOP region) in one or more of the Reactor Coolant System cold legs. TS 3.1.2.9, on November 11, allowed the above NRC commitment to be an optional requirement. Various DPC management personnel should have jointly developed and provided a TS Interpretation or taken other appropriate actions to clarify and make available the LTOP requirements to station operators. This action should have been taken immediately after the NRC commitment was made. Had the proper requirement been clearly stated and placed in an appropriate document, HP-26 (HPI Train A isolation valve) would have been closed (by requirement) along with HP-27 (HPI Train B isolation valve) making the operator action consistent with earlier management commitments made to the NRC. Without this guidance, Operators were permitted to utilize a TS that required only one LTOP system to be operable. Plant operators, when faced with the events of November 11, 1989, chose the Power Operated Relief Valve as the LTOP system necessary to meet the TS requirements (TS 3.1.2.9, part b).

Operations supervision's decision and follow-up actions, to perform the cooldown procedure step (to close or verify closed HP-26) out-of-sequence, was conducted in accordance with instructions provided in an approved station procedure. A scenario evaluated by Design Engineering in February 1989, as a result of the potential LTOP problems identified in PIR 4-088-0252, addressed erroneous actuation of the HPI system. Design concluded in the evaluation that station procedures required both trains of HPI to be isolated from the Reactor Coolant system over the temperature range at which the LTOP system must be operated. Therefore, they did not consider the scenario a problem. This Unit 2 event however, did challenge their conclusion, and in fact, established a flowpath via the "A" HPI train. Design's evaluation did not take into consideration the possibility of performing a procedure step out-of-sequence as was the case in this event.

The Operations Training Package, prepared for operators in February 1989 to inform them of information relating to LTOP concerns associated with the failure of HP-120, was informative in respect to major LTOP concerns but did not address management's commitment to the NRC in regard to having two methods of Low Temperature Overpressure Protection. Therefore, it was not sufficient to prevent this incident.

Operator actions taken during the course of this event, based on their knowledge and the availability of specific requirements, were deemed adequate and within station procedural guidelines. Corrective actions taken by management as a result of this event should be adequate to prevent a similar event in the future.

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Management, as a result of the operability evaluation findings associated with the December 1988 Problem Investigation Report, had initiated a proposed TS change to better address needed LTOP requirements. This proposed TS was submitted to the NRC on November 15, 1989 after several months of preparation. A higher priority on this task could have possibly prevented this incident.

This event is considered non-recurring. Equipment malfunction did occur in that HP-120 failed in the closed position upon loss of instrument air pressure. This valve failure is NPRDS reportable. HP-120 is a 2.5 inch pneumatic globe valve manufactured by Leslie Company (MFR. Model # 5P23X2JH). There were no radioactive releases, personnel injuries and the health and safety of the public was not jeopardized as a result of this incident.

CORRECTIVE ACTION

Immediate

1. None

Subsequent

1. A Technical Specifications (TS) Interpretation was prepared for TS 3.1.2.9.
2. An Operations Training Package, 89-28, was prepared on Low Temperature Overpressure Protection.
3. An engineering analysis was performed on November 30, 1989 and determined the time available for operator action if a spurious actuation of the HPI system had occurred on Unit 2 with plant conditions present when HP-26 was open with the RCS temperature below 325 degrees F.
4. A Technical Specification amendment request was submitted to the NRC on November 15, 1989 for needed changes relating to LTOP.

Planned

1. Appropriate Operations procedures will be revised providing additional guidance on LTOP requirements.

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- Design Engineering and Station Projects will evaluate the modification request stated in Station Problem Report 2951. Upon proper evaluation, action will be taken to appropriately modify and limit RCS makeup flow during LTOP conditions on all Oconee Units.

SAFETY ANALYSIS

The Design Engineering Operability Evaluation, performed in February 1989, focused on a specific scenario applicable to this event. The scenario examined the effects of HP-120 failing full open and assumed failure of the Power Operated Relief Valve to open. The results of the evaluation did indicate that the pressure limit for Unit 1 (500 psig) would be exceeded in less than 10 minutes. Based on the initial conditions assumed in the evaluation, pressurizer pressure would exceed 500 psig in 4.3 minutes after initiation of the event.

Since these operator action times were less than the NRC required 10 minutes (no operator action rule), Oconee committed to stationing a "dedicated" LTOP operator to monitor RCS pressure and pressurizer level. The high awareness of this operator and the specific procedural instructions given in the Operations shutdown procedure are intended to compensate for the reduction in time available for operator action. This resolution was considered short term. Station Problem Report 2951, submitted in November 1989, requested a bypass line modification for use anytime the Reactor Coolant System (RCS) is under LTOP restrictions. Upon installation, this modification will limit flow from HP-120 and avoid the need for a "dedicated" LTOP operator.

A second scenario evaluated by Design Engineering in February 1989, erroneous actuation of the High Pressure Injection (HPI) system during LTOP conditions, was not considered a problem due to station procedures in place that required both trains of HPI to be isolated from the RCS. This event, however, did establish a flowpath through the "A" HPI Train to the RCS while at LTOP conditions. Due to this flowpath being established, a separate engineering analysis was performed on November 30, 1989 to ascertain the time available for operator action if a spurious actuation of the HPI system had occurred with the conditions present on Unit 2 when HP-26 was open and the RCS temperature was below 325 degrees Fahrenheit. The results of this analysis indicated that at least 3 minutes would have existed between the emergency start of the HPI system injection and the time the RCS pressure exceeded the Unit 2 LTOP pressure limits. Operations management has stated that this amount of time (3 minutes) would have been sufficient for the "dedicated" LTOP operator assigned

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during this incident to have mitigated any low temperature overpressure event.

In addition to this operability evaluation, a supporting 50.59 evaluation was also performed. The safety evaluation showed that the specific safety function of the LTOP systems will be met, provided that the operation of the units complies with applicable restrictions/requirements as stated in the operability evaluation. These restrictions/requirements are properly stated in the appropriate station operating procedures.

The health and safety of the public was not affected by this event. A "dedicated" LTOP operator monitored both RCS pressure and pressurizer level throughout the incident and the PORV was operable. There were no releases of radioactive materials or personnel injuries involved in this incident. Unit 2 was safely brought to cold shutdown conditions, appropriate repairs were made, and the unit was later returned to full power operation.

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TEXT (if more space is required, use additional NRC Form 386A's) (17)

ATTACHMENT #1

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OMP 3-1

ENCLOSURE 6.1

ISSUE DATE: 2-7-89

FILE NUMBER: 89-07

TRAINING

CONTENT: Low Temperature Overpressure Protection

Review Required By:

On Shift SROs X

On Shift ROs X

On Shift NLOs _____

Licensed Staff X

(S)RO Class _____

Commitment Item Yes _____ No X

If Yes, Required Completion Date: _____

Comments: _____

Filed By: _____

Date: _____

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) Oconee Nuclear Station, Unit 2	DOCKET NUMBER (2) 0 5 0 0 0 2 7 0	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
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TEXT (If more space is required, use additional NRC Form 306A's) (17)

Training Package 89-07

Low Temperature Overpressure Protection

Recent analysis has shown that additional measures are now required in order to adequately address Low Temperature Overpressure Protection (LTOP) concerns at Oconee. In the original LTOP analysis a plant had to be able to survive an HPI valve failure or inadvertent ES actuation for 10 minutes without any operator action and not violate it's NDT pressure temperature curve.

Inadvertent ES actuation is prevented by tagging the HPI injection valves on both the normal and emergency headers when RCS temperature is < 325°F. However, with a failure of HP-120 (RC Volume Control) full open, the 10 minute time consideration can't be met prior to NDT curve violation. For this particular case a designated operator will be utilized to monitor RCS pressure and pressurizer level to prevent violating RCS P/T limits. With this Operator's sole responsibility being LTOP monitoring we can justify a shorter period of time than 10 minutes prior to Operator action.

There is an Enclosure to the Startup & Shutdown Procedures that describes what the LTOP Operator is responsible for and what their mitigating actions will be with a failure of HP-120 (RC Volume Control). In addition, there are some pressurizer level restrictions at specific pressure and temperature points prior to 325°F. Remember, the LTOP Operator is not to get involved with other unit activities. Their sole responsibility is to monitor for LTOP conditions. This responsibility is to be transferred along with any turnover. The use of an LTOP Operator is allowing the restart of Unit 1 and the NRC may question the designated Operator to ensure awareness of the LTOP responsibilities.

If there are any questions contact David Deatherage at 3074 or Mark E. Patrick at 3076.

Mark E. Patrick
Mark E. Patrick
Nuclear Production Engineer

MEP/amv