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EXECUTIVE VICE PRESIDENT
ENGINEERING & CONSTRUCTION

(704) 373-4120

October 2, 1987

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
McGuire Nuclear Station
Docket Nos. 50-369 and 50-370
Catawba Nuclear Station
Docket Nos. 50-413 and 50-414
Generic Letter 87-12, Loss of RHR
While the RCS is Partially Filled

Dear Sir:

Attached are the responses to the subject Generic Letter for the three Duke Power nuclear stations.

I declare under penalty of perjury that the statements set forth herein are true and correct to the best of my knowledge.

Very truly yours,

Warren H. Owen

Warren H. Owen

LTP/98/sbn

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OCONEE NUCLEAR STATION
RESPONSE TO GENERIC LETTER 87-12

(1) CIRCUMSTANCES AND CONDITIONS ASSOCIATED WITH DRAINDOWN AND PARTIALLY FILLED REACTOR COOLANT (RC) SYSTEM

(A) Components and Maintenance Work Requiring RC System Drain

Examples of components and maintenance work requiring NC System drain are:

- o Reactor Vessel Head and Plenum Assembly Removal
- o RC Pump Seal Replacement/Repair
- o CF/LPI Check Valve Maintenance
- o Cold Leg RTD Maintenance
- o OTSG Tube Marking and Plugging Operations
- o Control Rod Drive Assembly Maintenance
- o Pressurizer (PZR) Heater Removal
- o RC Pump Internal Component Maintenance
- o "Low Point" Maintenance (RCS Drain Valves, RHR System Suction Isolation Valves)

(B) Summary of Operating Procedures Required to Drain and Associated Cautions

(1) "Controlling Procedure For Unit Shutdown" is used for normal cooldown and de-pressurization.

The procedure terminates when:

- o RCS temperature < 200°F
- o PZR cooldown is complete
- o LPI System is established in normal decay heat removal mode

This procedure provides this warning to the operator: "RCS draining and de-pressurization will affect the LPI pump(s) NPSH and decay heat removal flow". The operator is cautioned to regulate flow as required to prevent excessive flow and pump cavitation. A maximum flow rate of 3000 gpm per LPI pump is established.

At the conclusion of this procedure, the operator initiates the procedure, "Draining and Nitrogen Purging the RC System".

(2) "Draining and Nitrogen Purging of RC System" begins the RCS draining process by establishing required initial conditions while repeating the necessity of regulating decay heat removal flow. Major pre-requisites are:

- o the LPI system is operating in the normal decay heat removal mode
- o the RCS is borated to an appropriate shutdown margin
- o nitrogen overpressure in the PZR is maintaining the RCS full
- o the necessary support systems are available
- o the required precautions for protection of components and personnel are complete
- o the installation of a temporary cold leg level indication if the RCS is drained for RC pump repairs, CF check valve repairs, OTSG tube plugging, etc.

Next, all RCS draining operations must begin by "dropping the loops", a sequence whereby the PZR and RCS hot legs are vented simultaneously to the GWD (Gaseous Waste Disposal) system via the quench tank. As a result, the nitrogen overpressure is released from the PZR, and the PZR and the hot leg levels equalize at a common elevation. The operator is alerted to expect a final PZR level of approximately 375 inches through the use of an explanatory procedural note. If only PZR relief valve or hot leg RTD repair is required, further draining is not necessary, and a PZR level of <380" should be maintained.

Other activities involve the actual reduction of the RCS inventory to establish the appropriate level. Drain valves on the bottom of each cold leg are opened, and a flow path is aligned from the cold legs to the bleed holdup tanks (BHUT's) via the component drain pump. The operator utilizes PZR level as the primary indication of RCS inventory. When a PZR level of 184 $\pm$ 10" is achieved, the reactor vessel head is vented to assure that the primary loops, OTSG primary sides, and reactor vessel drain equally and maintain the same level. At approximately 80" in the PZR, the reactor vessel level instrument (LT-5) is placed in service, and its reference leg filled. LT-5 is used as the primary reactor vessel level indication.

The draining process is continued until the desired level is achieved. Note that additional drain valves located on the PZR surge line are opened to allow complete draining when required by the procedure. The operator is instructed to monitor and maintain the following levels:

Task	Level
Rx Vessel Head Removal, CRD Removal, Internal Vent Valve Removal, Incore Monitor Closure Repair	80 ± 2" on LT-5
PZR Heater Removal	52" to 35" on LT-5 with 0" PZR level

The following compensatory actions and cautions to control and detect level deviations are provided:

- To raise level, the 'A' Bleed Transfer Pump (BTP) is aligned to makeup to the RCS via the normal HPI makeup line.
- To lower level, align the cold leg(s) to the BHUT, and re-start the component drain pump.
- The operator is repeatedly cautioned that LT-5 may fluctuate while pumping the RCS loops.
- Monitoring LPI pump current to ensure suction is maintained.
- Temporary suspension of the draining process is recommended to allow LT-5 to stabilize for an accurate level indication.

The configuration of the RCS prevents the reactor vessel level from decreasing below approximately 18" on LT-5 while lowering the RCS level via the cold leg drain valves; however, the ability to lower cold leg level and reactor vessel level independently is required for several maintenance activities. When continuing to lower the cold leg level below 18" on LT-5, temporary level indication must be installed to verify safe conditions exist prior to commencing RCP, cold leg RTD, or OTSG maintenance. Finally, the reactor level must be lowered below 18" as read on LT-5 to accomplish CF check valve repairs. The discharge of the 'A' LPI pump is aligned directly to the BHUT via a 1" line thereby reducing the RCS inventory slowly until LT-5 indicates 12 ± 2". This operation is controlled manually by an operator in constant communication with the unit control room. Again, the operator is warned that LT-5 may fluctuate, and is instructed that reactor vessel level may be increased via the BTP.

Because of the elevation difference associated with Unit 1's LPI pump suction piping, this procedure for Unit 1 contains an enclosure to guide the operator in regaining reactor vessel level and inventory during CF check valve repairs. The BWST (Borated Water Storage Tank) inventory is aligned to the LPI system suction to refill the line and the reactor vessel.

(3) "Filling and Draining Fuel Transfer Canal". This procedure directs the operator in draining the RCS as well as the Fuel transfer canal.

With the fuel transfer canal at refueling level and refueling activities complete, the LPI system is utilized to lower the canal level and ultimately the reactor vessel level by aligning the "B" LPI header to the BWST. Prior to reducing level below the reactor vessel flange, communication between reactor building personnel and the control room is established to assure proper control of level. At approximately 2 feet (65 $\pm$ 2" on LT-5) below the flange level, the draining process is halted. Guidance for raising or lowering reactor vessel level is provided as follows:

- o To lower level, the discharge of the "A" LPI pump is aligned directly to the BHUT as discussed previously.

- o To raise level, a flow path from the BWST to the reactor vessel via the "B" LPI train is utilized to fill the reactor vessel by gravity flow.

During this operation, the 'A' LPI train continues to operate in the decay heat removal mode.

(C) Time Between Full Power Operation and a Partially Filled Condition

The following are estimated times in hours:

100% to 0% Power	6
Hot Standby - Cold Shutdown	16
Cold Shutdown - RCS Mid (Approximate) Loop	30

(D) Interlocks That May Cause A Disturbance

The following interlocks may affect decay heat removal capability:

(1) Valves LP-1 and LP-2 (LPI RCS Suction) cannot be opened until RCS is <400 psig and <450 psig, respectively. However, failure of this interlock while the RCS is partially drained is not a problem because:

- o The interlock cannot close the valves once they are open

- o Administrative controls prevent closing either valve unless one of the following conditions exist: a) the RCS is filled and both OTSG's are available; b) the unit is in the refueling mode and the fuel transfer canal is flooded; c) core is defueled.

(2) An interlock automatically throttles cooling water flow through the LPI Coolers when flow exceeds 6000 gpm per cooler. The flow is

throttled to approximately 5200 gpm which provides adequate decay heat removal. Once flow has been reduced, the operator can reset this interlock as required to control flow between 5200 gpm and 6000 gpm.

(E) Minimum S/G Level Requirements

The minimum steam generator level that would occur during RC system draindown and partially-filled conditions would be under dry layup conditions (< 0 percent on the Full Range). The steam generators could be in wet layup, in which case they would be full or > 90% on the full range indication (per procedure). Upon a loss of RHR, for the minimum S/G level requirement, feedwater would have to be added to provide enough inventory to establish boiler-condenser heat transfer. This would correspond to the equivalent of 95% operating range level as outlined in the station emergency procedures.

(F) Coordination of Maintenance and Testing Activities

All maintenance and testing activities which could affect the NSSS or the LPI system are subjected to extensive planning and review; furthermore, such activities must be performed within the criteria established by the Tech Specs and station procedures. The following steps assure adequate review of plant evolutions against all Tech Specs and procedural requirements:

- Operations staff and shift licensed personnel participate in the planning, review and implementation of activities affecting unit status
- Staff RO's and SRO's interface with other station groups in the planning stage
- All work requests and procedures are routed to the operations staff for final review prior to implementation
- Shift RO's and SRO's are charged with the responsibility of implementation
- Shutdown and startup of entire systems are performed under approved procedures
- Removal and restoration procedures or other approved procedures are used when a portion of a system is removed from service while the remainder of the system is required to be operable.

(G) Ability of RCS to Withstand Pressurization if Reactor Vessel Head and S/G Manway are in Place

This condition is not applicable to Oconee since procedures require the system to be depressurized prior to draindown and normally the RC System would be open.

(H) Containment Isolation Requirements

Containment isolation is not required for draining of the RCS; however, "Loss of LPI System" instructs the operator to establish containment integrity when a loss of RCS/LPI inventory occurs during decay heat removal.

(I) Time to Replace Equipment Hatch if Needed

The estimated time to install the equipment hatch and secure with 4 bolts is approximately one hour.

(J) Requirements for Re-Establishing RCS Pressure Boundary Integrity

There are no special requirements for re-establishing RCS pressure boundary integrity other than those required for normal restart, or as specified in the abnormal procedure for loss of LPI.

(2) INSTRUMENTATION, ALARMS AND MONITORING CAPABILITY

(A) Instrumentation and Alarms for Operators for Controlling Thermal Hydraulics of the NSSS

Extensive instrumentation exists for monitoring and controlling core thermal hydraulics via the LPI and LPSW systems as shown by the following:

o Level:	Pressurizer level (recorder and computer)
	Reactor vessel level gauge
	Cold leg levels (temporary Tygon tubing)
o Pressure:	RCS low range cooldown pressure gauge
	Decay heat line pressure gauge
	LPI discharge header pressure gauge
	RCS wide range pressure recorder
o Flow:	LPSW flow to 'A' & 'B' LPI cooler gauges
	Decay heat removal flow line 1 & 2 gauges
o Temperature:	Incore thermocouple temperatures (computer)
	LPI pump suction temperature
	LPI cooler outlet temperature
o Miscellaneous:	LPI pump motor amperage
	LPSW pump motor amperage
o Annunciators:	Decay heat cooler A/B flow high
	LPI pump differential pressure low
	LPI decay heat cooler A/B flow high
	LP decay heat loop A/B flow low

LPI pump suction temperature high
LPI loop A/B flow high/low
LP decay heat exchanger outlet temperature low
Cold shutdown temperature high

- Computer Indications: Numerous analog and digital points are available to monitor core thermal hydraulics, LPI system performance and LPSW system performance. The OAC provides the added ability to trend points versus time.

(B) Monitoring Capability for RCS Parameters Upon Loss of DHR

During a loss of decay heat removal (all LPI pumps are off), the Reactor Vessel Level Indicating System (RVLIS) and the Inadequate Core Cooling Monitor (ICCM) should provide the following information to the operator:

- Reactor vessel level
- Average incore thermocouple temperatures
- Reactor vessel level and average incore temperature versus time
- Core and RCS loop subcooling margins

With the RCS filled, the ICCM System will also display hot leg temperature, hot leg level and RCS wide range pressure.

Hot leg level can be plotted against time.

It should be noted that all RVLIS indications of level (reactor vessel and hot leg) are invalid with LPI or RC Pumps running: Also, normal reactor vessel level (LT-5) indication remains operable during a loss of decay heat removal.

(C) Temporary Connections, Piping and Instrumentation

Temporary level monitoring is provided by valving in per procedure a Rosemount 1151DP level transmitter (LT-5) calibrated for a 100 inch of water column span. LT-5 provides a signal to the control room indicator (P-26), and since it is referenced to Reactor Building atmospheric pressure, it is only valved in while the RC System is vented. Temporary tygon tubing is installed per procedure, as needed.

Quality control is assured by administrative requirements described in Section (1)(F) of this response. Additionally, calibrations are performed with reviewed and approved procedures which detail independently verified steps for positioning instrument valves.

(3) PUMPS USED TO CONTROL NSSS INVENTORY

(A) Pumps Required By Technical Specifications or Procedures to be Operable

The following Tech Spec and Procedure provide the only requirements for pump operability:

- Tech Spec 3.8.3: At least one LPI pump and cooler shall be operable during fuel loading and refueling operation.
- "LPI System": Two LPI trains must be operational when only one source of power is available to the main feeder buses.

  Maintenance or hydro tests which remove one LPI train from service should be performed while the fuel transfer canal is filled and a spent fuel pump is taking suction from the canal.

  Do not remove a LPI train from service unless two operable LPI pumps are available to the operable train.

The review and coordination of all activities which may affect unit status includes consideration of maintaining proper core cooling and RCS inventory.

(B) Pumps to be Temporarily Removed for Maintenance and Testing

LPI system maintenance is performed within the restrictions of the operating procedure for the LPI System to ensure redundant components, trains, or flowpaths are available. Frequently, all LPI system maintenance can be accomplished while the core is defueled during refueling outages or reactor vessel internals repair and inspection. In recent years this practice has virtually eliminated the chance of losing core cooling during LPI maintenance.

(C) Other Pumps Used to Control NSSS Inventory

The following list details the other pumps used to control RCS inventory:

- Bleed transfer pump.
- SF cooling pump.
- HPI Pumps.
- SSF Makeup Pumps.

(4) CONTAINMENT CLOSURE REQUIREMENTS WHILE IN A PARTIALLY DRAINED CONDITION

During fuel loading and refueling operations, Tech Spec 3.8, its interpretation, and the appropriate operating procedures establish containment closure requirements.

The Abnormal Procedure "Loss of LPI" addresses containment integrity upon loss of LPI/RCS inventory during decay heat removal.

(5) OPERATING PROCEDURES WHILE RCS IS PARTIALLY FILLED

(A) Summary of Operating Procedures During a Partially Filled RC System

Refer to Section (1) for a summary of Normal Operating procedures associated with draindown of the RCS. The Abnormal procedure, "Loss of LPI" provides guidance to operators for recognizing a loss of decay heat removal indicated by:

- o LPI system abnormalities (Flow, cooler inlet/outlet temperatures, pump discharge pressure, pump motor amperage, valve alignment)
- o RCS incore temperature increasing

Initially, the operator observes LPI pump parameters for abnormalities. Upon failure of a LPI pump or motor, the standby pump will be aligned and started. Next, adequate LPSW flow to the LPI coolers and proper suction valve alignment is verified. As a precaution, any evolutions in progress affecting RCS inventory are halted. If LPI pump cavitation is experienced, the reactor vessel and decay heat lines are filled by gravity flow from the BWST to re-establish decay heat removal flow.

A loss of RCS/LPI inventory requires maintaining inventory via the BWST or BHUT, establishing containment integrity, and locating the leakage source. Isolable and non-isolable leaks are addressed. Compensatory actions include:

- o Isolation of affected LPI header while aligning redundant header
- o Operation of LPI system in the injection mode from BWST
- o Flooding of fuel transfer canal after installation of canal seal plate and removal of transfer tube flanges
- o Operation of LPI system in the recirculation mode to recover leakage from the reactor building emergency sump

A complete failure of the LPI system is mitigated by closing the RCS, filling the RCS via the HPI system, and establishing decay heat removal via the OTSG by natural or forced circulation. RCS cooling may be supplied by HPI via the normal makeup flow path until the OTSG's are available.

If the RCS pressure boundary is not intact, the HPI system is aligned in the injection mode to supply temporary cooling. The BWST may be exhausted prior to restoring the LPI system. In this event, the SFP coolers can be utilized provided the fuel transfer canal is filled.

(B) Analytic Bases for Procedure Development

(1) Vortexing, Entrainment and De-entrainment

Vortexing and air entrainment into the LPI pump suction line can result during normal operation of the decay heat removal system only if RC System level is drained below analytically determined levels. An analysis was performed by B&W to develop a correlation entitled "Minimum Height of Water Required to Avoid Vortex Formation vs. Decay Heat Flow". Comparison of plant operating procedures with the vendor supplied correlation indicates that sufficient margin exists between minimum actual level and minimum required level to avoid vortex formation at normal flow rate.

De-entrainment of air following loss of LPI pump suction is done by normal vent and fill procedures on Units 2 and 3. Abnormal procedures also provide guidance to operators for recovering from loss of LPI. Recovery of Unit 1 LPI pump following loss of suction was difficult using the original suction line due to a high point in suction piping at the containment penetration. This problem was corrected by providing an alternate flow path for use during LPI pump operation at low RCS levels. The new line is available to route flow through a penetration at a lower elevation and is utilized only if LPI flow is lost or degraded.

(2) RC System Level Difference and Effect on Instrumentation

All three units measure RCS level (LT-5) on a cold leg and take LPI pump suction from a hot leg. Therefore, a difference exists between the level indicated on LT-5 and the actual level above the LPI pump suction nozzle that amounts to the pressure drop across the reactor vessel at decay heat removal flowrate. This difference was incorporated into the vendor supplied correlation for "Minimum Height of Water Required to Avoid Vortex Formation vs. Decay Heat Flow". Therefore, the level difference has no effect on RCS level control.

(3) Impact of Air on NSSS and Instrumentation Response

Impact of air during drain down of the RC System can result in erratic indications on Reactor Vessel level instrumentation (LT-5) until the system is properly vented. Since the RC System is initially drained from the suction side of the RC Pumps, the level in the reactor vessel cannot be drained below the bottom of the RCP discharge nozzle. This corresponds to a minimum of nearly 3 feet of water above the DHR suction nozzle on the hot leg.

Therefore, fluctuation in RCS level indication during the initial drain down procedure is of little concern; actual reactor vessel level is sufficient for normal operation of Low Pressure Injection (LPI) pumps in the decay heat removal mode.

Further decreases in level can be accomplished by draining fluid from the decay heat removal loop and are sometimes performed with the reactor vessel head removed. Under these circumstances, LT-5 indication is stable.

(4) Boiling In the Core and Time From Loss of DHR to Core Damage

Calculations to core boiling and core uncovery have been made for various plant configurations, including the partially-filled condition. For a partially-filled RCS condition, the time to reactor vessel saturation after a complete loss of DHR was determined to be approximately 28 minutes. The time to core uncovery was an additional 2.21 hours. The additional time to the onset of core damage from core uncovery is calculated to be approximately fifty minutes. This assumes the onset of core damage to be at 1500°F.

(C) Relation of Analytical Bases to Operation Procedures

With the exception of the time calculations, the analytical information discussed in the preceding Section (5)(B) has been accounted for in the appropriate operating procedures. For example, guidance is provided on level vs. flow requirements.

(6) TRAINING FOR AFFECTED PERSONNEL

(A) Operator Training

Loss of RHR while the RCS is partially drained is covered during License Preparatory Training in the lesson plan titled, "Accident Mitigation: Potentially Damaging Shutdown Operating Conditions". Although not specific to a partially drained condition, simulator exercise guides address loss of RHR flow during this initial training.

As a result of INPO 86-033 "Selected Significant Operating Experience Report Recommendations 1980-1985", continuing training on industry events involving loss of RHR while the RCS is partially drained will be conducted on at least a two year frequency. In addition, a commitment has been made to provide training on SOER 85-4 and SER 17-86 to the licensed operators during Segment VI of the 1987 Requalification Program.

(B) Maintenance Personnel Training

Instrument and Electrical technicians receive generic NSSS training which provides a basic understanding of NSSS components and their

operation under normal and transient conditions. Plant specific training and on-the-job training on NSSS components and systems is also provided.

Mechanical Maintenance and I&E personnel receive specific training on components for which they are responsible. Trainees are instructed not to operate any valves that are not within their jurisdiction and they are instructed specifically not to operate any valve which is red or white tagged.

In addition, these same personnel are taught the Core Damage Mitigation Training lesson plan, which specifically addresses SER 79-84 concerning a loss of RHR due to improper valving or installation/usage of temporary level instruments.

(7) ADDITIONAL RESOURCES PROVIDED FOR OPERATORS DURING DRAINDOWN OPERATIONS

Extensive resources are available to assist operators during normal and abnormal situations. Operations Management Procedures authorize the Operations supervisor to seek assistance from these sources as necessary:

- o Shift engineer/STA (available on-site 24 hours a day)
- o Operations Duty engineer (available 24 hours a day)
- o Supervisors and support personnel from I&E, Mechanical Maintenance, Chemistry, Health Physics (available on-site 24 hours a day)
- o Additional Operations staff personnel (contacted as required by duty engineer)
- o Other station technical personnel (on call 24 hours a day)
- o General office personnel
- o Vendor representatives

(8) COMPARISON OF PROCEDURES/REQUIREMENTS WHEN RCS IS PARTIALLY FILLED VERSUS OTHER MODE 5 OPERATIONS

Tech Specs do not distinguish between a partially drained condition and other cold shutdown conditions with the exception of fuel loading and refueling operations. The requirements for fuel handling operations are outlined in Tech Spec 3.8 and its interpretation.

The procedural requirements for operation with a partially drained RCS are outlined in Section 1 of this document. All necessary deviations from normal operations are discussed including LPI system flow regulation, use of temporary level indications, and cautions.

(9) CHANGES MADE DUE TO CONCERNS ABOUT LOSS OF DHR DURING A PARTIALLY FILLED CONDITION

(A) INPO and NRC Reports

The following list describes actions taken in response to INPO reports, NRC Information Notices and Bulletins.

- SER 77-83

  In February, 1987, a modification was completed to drill a hole in the upstream wedge face of decay heat removal system suction valves from the RC system to prevent excessive pressure buildup in the valve bonnet. Changes were implemented in maintenance procedures to caution against improper reinstallation of valve wedges. This modification was performed to prevent pressure locking of the system suction valves.

- SER 78-81

  In 1984, a standing work request was initiated to have the reference leg of LT-5 (reactor vessel level indication) checked every 14 days during an outage to verify proper water level in the reference leg. The purpose of this change was to prevent reference leg evaporation from causing inaccurate reactor vessel level indication.

- SER 79-84

  Lesson Plans E/P-TC-BEP-SA-04, Core Damage Mitigation Training and E/P-TC-BEP-PC-01, Process Instruments and Control were revised in 1985 to include problems associated with using tygon tubing connected to drain lines as a method of RC System level indication.

- SER 80-84

  In February, 1985, SER 80-84 was added to the information card for the LPI lesson plan.

- SOER 82-1

  Training of operators and technicians was revised to include a discussion of reactor vessel level indication error sources and consequences. This discussion included their relationship to operating and maintenance evaluations (draining, calibration and surveillance). A new objective was added to the lesson plan for LPRO and LPSO. Lesson Plant E/P-TC-SA-04, Core Damage Mitigation - Phase I was revised to include the training recommendations. All students in the Basic I&E class received this training. These changes were implemented in June, 1983.

o SOER 82-4

Valve LP-40 (Return to Borated Water Storage Tank) was changed to a locked closed valve on all three units. The following procedures were changed on all three units:

- OP/1,2,3/A/1104/04 "Low Pressure Injection"

- OP/1,2,3/A/1102/15 "Filling and Draining the Fuel Transfer Canal"

This was done to increase administrative control over a potential leakage path which could result in a loss of Decay Heat Removal.

o SOER 85-4

In August, 1987, after an extensive engineering evaluation, a set of loss of decay heat removal scenarios was developed. Also, the Loss of Decay Heat Removal procedures for all three stations were evaluated and recommendations for procedure changes were made. These results are currently under review for implementation.

o IEN 81-09

This notice was reviewed by all I&E supervisors and technicians, and operations personnel.

o IEN 81-10

This notice was reviewed by appropriate personnel.

o IEB 80-12

All licensed personnel reviewed (during requal training) the circumstances and consequences of events that occurred at Davis Besse. The following procedure changes were made for all Oconee units in 1980, in order to prevent loss of water to the pump or inadvertent closure of the pump suction valves.

- "Controlling Procedure for Unit Shutdown", and "Low Pressure Injection System", were changed to require that LPI pumps suction valves from the reactor building emergency sump are tagged closed with the motor operators' power supply removed.

- "LPI System" had additional Limits and Precautions added, as follows:

  (a) Two LPI trains must be operational when only one source of power is available to the main feeder buses.

  (b) Maintenance or hydro tests which remove one train of Low Pressure Injection from service should be performed when the Fuel Transfer Canal is filled and a Spent Fuel Pump is taking suction from the Canal.

(c) No train of the LPI system may be removed from service unless two (2) operable LPI pumps are available to the operable LPI train being used for decay heat removal.

- LPI System Leakage was changed so that the LPI pump suction lines from the reactor building emergency sump are tested separately. Only one line at a time is allowed to be blank flanged for the leak test.

(B) Oconee Events

The following list describes actions taken as a result of specific station events:

o ONS-1 05/04/78

PT/1,2,3/A/150/15B, "Valve Functional Test (Shutdown)", was revised to prohibit testing of 1LP-1 and 1LP-2 until after one or more Reactor Coolant pumps are in operation during startup. It was also revised to prohibit testing of 1LP-105 while the Reactor Coolant system is drained.

All applicable Operating Procedures were reviewed to ensure that certain critical LPI loop suction valves were not closed during shutdown unless either the RCS is filled and both steam generators' secondary sides are filled so that natural circulation cooling can be established if required, or the unit is in refueling mode with the fuel transfer canal flooded, or the core is defueled.

ATTACHMENT 1
OCONEE NUCLEAR STATION
LIST OF TERMS

BHUT	Bleed Holdup Tank
BTP	Bleed Transfer Pump
BWST	Borated Water Storage Tank
CF	Core Flood
DHR	Decay Heat Removal
ICCM	Inadequate Core Cooling Monitor
LPI	Low Pressure Injection (System)
LPSW	Low Pressure Service Water
OTSG	Once-Through Steam Generator
PZR	Pressurizer
RCS	Pressurizer Relief Tank
RHR	Residual Heat Removal
RVLIS	Reactor Vessel Level Indicating System