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DUKE POWER

August 2, 1991

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

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
LER 269/91-09

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report (LER) 269/91-09 concerning an emergency feedwater initiation circuitry problem.

This report is being submitted in accordance with 10 CFR 50.73 (a)(2)(i)(B). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

H. B. Barron KJSr

H. B. Barron
Station Manager

RSM/ftr

Attachment

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JE22 1/1

NRC FORM 366 (6-89)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

APPROVED OMB NO. 3150-0104
EXPIRES: 4/30/92

FACILITY NAME (1): Oconee Nuclear Station, Unit 1

DOCKET NUMBER (2): 0 5 0 0 0 2 6 9

PAGE (3): 1 OF 1 2

TITLE (4): One of Two Diverse Actuation Systems for Loss of Main Feedwater Mitigation Systems Was Found Inoperable Due to a Design Deficiency

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)
0 7	0 3	9 1	9 1	0 0 9	0 0				Oconee, Unit 2	0 5 0 0 0 2 7 0
									Oconee, Unit 3	0 5 0 0 0 2 8 7

OPERATING MODE (9): N

POWER LEVEL (10): 1 0 0

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

[ ] 20.402(b)	[ ] 20.405(c)	[ ] 50.73(a)(2)(iv)	[ ] 73.71(b)
[ ] 20.405(a)(1)(i)	[ ] 50.36(c)(1)	[ ] 50.73(a)(2)(v)	[ ] 73.71(c)
[ ] 20.405(a)(1)(ii)	[ ] 50.36(c)(2)	[ ] 50.73(a)(2)(vii)	[X] OTHER (Specify in Abstract below and in Text, NRC Form 366A) 50.72(b)(i)(A)
[ ] 20.405(a)(1)(iii)	[X] 50.73(a)(2)(i) (B)	[ ] 50.73(a)(2)(viii)(A)	
[ ] 20.405(a)(1)(iv)	[ ] 50.73(a)(2)(ii)	[ ] 50.73(a)(2)(viii)(B)	
[ ] 20.405(a)(1)(v)	[ ] 50.73(a)(2)(iii)	[ ] 50.73(a)(2)(x)	

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 NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)

[ ] YES (If yes, complete EXPECTED SUBMISSION DATE) [X] NO

EXPECTED SUBMISSION DATE (15): MONTH | DAY | YEAR

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

On July 3, 1991, all Oconee units were operating at 100 percent full power (FP) when Unit 3 tripped due to a loss of feedwater at 1118 hours. A post-trip review showed that feedwater pump discharge pressure remained slightly above the 750 psig setpoint required to actuate the Emergency Feedwater (EFDW) system, the loss of feedwater Reactor Protective System anticipatory trip, and the ATWS Mitigation Safety Actuation Circuit. This prevented the Technical Specification required systems from receiving one of the two initiation signals when Main Feedwater pumps tripped. EFDW did actuate from the independent signal. The problem was caused by the D heater drain pumps (HDP) charging the closed feedwater system. The other two Oconee units were subject to the same potential problem. The root cause of this event was a design deficiency, failure to anticipate the interaction of systems, during the original design of the these systems. Units 1 and 2 reduced power to 72 percent FP to remove the D HDPs from service. Unit 3 increased power to 71 percent FP, but did not place D HDPs in service. Feedwater pump low discharge pressure setpoints were changed to 800 psig on all units prior to allowing HDP operation and a return to 100 percent FP on July 7, 1991.

BACKGROUND

There are three systems at Oconee which are designed to automatically actuate when main feedwater (MFDW) [EIIS:SJ] flow is lost: the Emergency Feedwater (EFDW) [EIIS:BA] system, the Reactor Protective System (RPS) [EIIS:JC], and the ATWS (Anticipated Transient Without Scram) Mitigation Safety Actuation Circuit (AMSAC). The AMSAC system has been installed on Units 2 and 3 and is scheduled to be installed on Unit 1 during the next refueling outage. Each of these systems use diverse means to determine when main feedwater has been lost. System actuations occur when signals are received that both main feedwater pumps can no longer provide feedwater to the steam generators. This condition is sensed by both turbine hydraulic oil [EIIS:JK] pressures dropping below 75 psig or both main feedwater pump discharge pressures dropping below 750 psig.

The EFDW system actuation signal will start the three EFDW pumps and enable a circuit which controls steam generator level [EIIS:JB] at predetermined setpoints. The purpose of this system is to remove decay heat and Reactor Coolant Pump [EIIS:AB] heat following a loss of main feedwater. The RPS system uses the loss of main feedwater signal as an anticipatory trip; the reactor trip occurs prior to Reactor Coolant System (RCS) [EIIS:AB] parameters reaching their own RPS trip setpoints. The AMSAC signal will initiate EFDW in the same way as the normal EFDW system and trip the main turbine [EIIS:TA]. The AMSAC system is intended to mitigate the consequences of an anticipated transient without scram event.

Technical Specifications 3.4 and 3.5 address the EFDW and RPS system respectively. Technical Specification 3.4 requires operable EFDW initiation circuitry. The basis of this specification states that the EFDW system is "...designed to start automatically in the event of loss of both main feedwater pumps or low main feedwater header pressure." Table 3.5.1-1 of Technical Specification 3.5 requires a minimum of three operable RPS loss of MFDW anticipatory trip channels. AMSAC requirements are outlined in the Selected Licensee Commitment manual, Section 16.7.2, and state that both AMSAC channels will be operable when the reactor is critical.

The secondary system at Oconee uses two pairs of heater drain pumps (HDP) [EIIS:SM] to pump condensed extraction steam to the condensate [EIIS:SD] and feedwater systems. The D1 and D2 HDPs combined flow at 100 percent full power is approximately 9,000 gpm. The E1 and E2 HDPs have a combined flow of approximately 900 gpm. Attachments 1 and 2 show the general arrangement of these pumps in the condensate system. Because of the significant amount of flow of the D Heater Drain pumps, they cannot be stopped during power operation unless load is reduced to approximately 72 percent full power. The HDPs will automatically trip when both MFDW pump discharge pressures reach a pre-determined low pressure setpoint.

EVENT DESCRIPTION

On July 3, 1991, all three Oconee units were at 100 percent full power. At 1118 hours, Unit 3 tripped due to a loss of all main feedwater. This event is reported in LER 269/91-09. During the post-trip review, it was discovered from transient monitor data that main feedwater pump discharge pressure remained slightly above the low discharge pressure setpoint of 750 psig despite the trip of both main feedwater (MFDW) pumps. This condition continued until after the D HDPs were manually secured, at which time pressure dropped. Emergency feedwater (EFDW) actuated as required when the diverse initiation signal was received from low hydraulic oil pressure on the MFDWP turbines. The unit was stabilized at hot shutdown conditions.

An investigating team was formed consisting of the Superintendent of Operations, the Superintendent of Technical Services, the Design Engineering Site Manager, and Engineering Support personnel from Technical Services, Operations, and Maintenance departments. Investigation of the failure to reach the low discharge pressure setpoint continued during the afternoon and evening of July 3, 1991. Several possible causes were considered including back pressure from the Main Steam [EIIS:SB] system through leaking check valves, leakage from the EFDW to the MFDW system, and the possibility that the heater drain pumps (HDP) were maintaining pressure in the feedwater system. A review of the trip data suggested that the HDP hypothesis was the most likely. When the D HDPs were secured, MFDW pressure dropped immediately. A review of the data from a Unit 1 trip on August 28, 1990 (LER 269/90-13), which involved a single MFDW pump trip, showed a similar condensate-feedwater pressure response. In this event, the D HDPs did not trip since only one MFDW pump tripped. The discharge check valve on the tripped MFDW pump prevented the upstream components in the condensate system from being pressurized by the operating MFDW pump. This situation presented another opportunity to determine the role of D HDPs in maintaining an elevated feedwater pump discharge pressure. The transient monitor data from that trip showed that the discharge pressure of the tripped MFDW pump stayed at approximately 730 to 760 psig until the D HDPs were secured.

At 2120 hours, station management decided to reduce power on Units 1 and 2 to a point which would allow securing the D heater drain pumps. Unit 1 had reduced power to 72 percent full power by 2215 and stopped both D heater drain pumps at 2226 hours. Unit 2 reduced power to 72 percent full power and secured both D heater drain pumps at 2350 hours. Unit 3 was allowed to return to power operation, but without the use of the D heater drain pumps. Unit 3 achieved criticality on July 3, 1991 at 2310 hours and reached 71 percent full power at 1301 hours on July 4, 1991.

A question arose that perhaps the E heater drain pumps could also maintain an elevated feedwater pressure. An operability evaluation showed that the E HDPs maximum shutoff head pressure was 730 psig while the maximum discharge pressure during shutoff conditions for the D HDPs was 773 psig.

The investigating team decided that the best shor[illegible]m solution to restore the feedwater pump low discharge actuation signals [illegible]s to change the actuation setpoint from 750 psig to 800 psig on pressure switches which sense feedwater pump low discharge pressure. Duke Design Engineering was asked to perform an operability determination for the Reactor Protective System (RPS) anticipatory trip, the EFDW system, and the ATWS Mitigation Safety Actuation Circuit (AMSAC) system based on the new 800 psig setpoints. On July 5, 1991, Design Engineering determined that all three systems would be operable with the new setpoints. The calculations justifying this determination were based on manufacturer's original pump data at shutoff conditions and the relief valve setting serving the D Flash tank. The pump manufacturer has stated that pump casing wear and degradation would tend to decrease the HDP performance over time, especially since they are multistage pumps. The maximum D HDP discharge pressure at shutoff conditions was found to be 773 psig. This is 27 psig less than the new 800 psig setpoint, which provides a margin for instrument drift and calibration tolerance. A condition of operability was that the AMSAC calibration procedure be changed to require a 10 psig as-left tolerance. This is less tolerance than what was previously allowed.

The investigating team discussed the possibility that, if the D HDP recirculation valves were opened, the D heater drain pumps would not be able to develop sufficient pressure to stay above the feedwater pump low discharge pressure setpoint. This aligment would allow a cert in amount of flow to be recirculated back to the D Flash Tanks. Both D heater drain pumps on Unit 1 were operated in this manner on July 4, 1991 for approximately 30 minutes each. Their discharge pressures were 710 psig for 1D1 HDP and 720 psig for 1D2 HDP. Since these tests were not done at shutoff head conditions, these values did not provide adequate margin between the pump discharge pressure and the low MFDW discharge pressure setpoints to ensure loss of feedwater system actuation. Nevertheless, it was decided to operate with a recirculation pathway to the D Flash Tanks throttled open on all three units, since this mode of operation increases the margin between D HDP discharge shutoff pressure and the feedwater pump low discharge pressure setpoint. Operation procedures were changed accordingly.

The setpoint changes and procedure revisions were performed for the EFDW system, the AMSAC system, and the RPS system on all three units by July 6, 1991. As these changes were completed on each unit, the HDPs were returned to service and power increased at the electrical power dispatcher's request. All three units were at 100 percent full power by 0100 on July 7, 1991.

There are a total of eight pressure switches per MFDW pump per unit which sense feedwater pump low discharge pressure. Four of these switches feed the four loss of feedwater anticipatory RPS trip channels. The two pressure switches associated with RPS Channel D also serve as inputs to the start circuitry of the Turbine Driven Emergency Feedwater Pump (TDEFDWP).

Two pressure switches per MFDW pump are used for actuation of the two Motor Driven Emergency Feedwater Pumps. All of these switches have been set at 750 psig since their installation.

One pressure switch per pump is used for alarm indication, Integrated Control System [EIIS:JA] runback signal, feedwater pump recirculation control and, on Units 2 and 3, AMSAC Channel 2. The remaining pressure switch on each pump is an input to Hotwell pump and Condensate Booster pump trip circuitry, main turbine trip, D and E Heater Drain pump feedwater pump low discharge pressure trip and, on Units 2 and 3, AMSAC Channel 1. This last AMSAC-related pressure switch, which also serves to trip the Heater drain pumps, was changed from a setpoint of 800 psig to 750 psig during the installation of the AMSAC modification. This setpoint change was approved on October 10, 1990 on Unit 2 and April 2, 1991 on Unit 3. The modification has not been made on Unit 1 and the setpoint for the AMSAC related pressure switches is still 800 psig.

Design Engineering was asked to perform a past operability evaluation of the loss of feedwater mitigation systems. This evaluation showed that the feedwater pump low discharge pressure portion of the actuation circuitry for the Emergency Feedwater system, the loss of feedwater anticipatory RPS trip, and the AMSAC system on Units 2 and 3, had been technically inoperable while the D HDPs were operating since the systems' original design. This determination was based on the following considerations:

Though the redundant hydraulic oil pressure switches would have actuated the loss of feedwater mitigation systems, each system was designed to include two separate and diverse actuation signals.

Pressure switches which would have tripped the D HDPs upon loss of MFDW pumps were not safety grade. These pressure switches would have been required for operation of the MFDW pump low discharge pressure portion of the EFDW and RPS anticipatory trip systems.

After the AMSAC system was installed on Units 2 and 3, the MFDW pump discharge pressure switches which trip the D HDPs were set below the pressure developed by the HDPs against a closed system.

CONCLUSIONS

The safety systems which respond to a loss of main feedwater receive automatic actuation from the presence of a low Main Feedwater (MFDW) pump discharge pressure or low main feedwater pump hydraulic oil pressure. These systems, though they actuated on the low hydraulic pressure signal, did not immediately receive the low discharge pressure signal when Unit 3 tripped following the loss of both Main Feedwater (MFDW) pumps. The D heater drain pumps (HDPs) remained on following the trip. Their shutoff discharge pressure, when added to the static pressure of the D Flash Tanks on the pump suction, maintained pressure in the feedwater lines above the 750 psig setpoint until the D heater drain pumps were secured.

The result of an operability evaluation performed for this problem was that the feedwater pump low discharge pressure portion of the actuation circuitry of all channels of the Reactor Protective System (RPS) anticipatory loss of feedwater pumps trip, the Emergency Feedwater (EFDW) system, and the ATWS Mitigation Safety Actuation Circuit (AMSAC) were technically inoperable while the D HDPs were operating. RPS, EFDW, and AMSAC systems were declared technically inoperable since their original installation.

The technical inoperability of the systems was not apparent until the operability evaluation was performed. While the evaluation was being performed, conservative actions were taken to reduce power on the operating units and remove the D HDPs from service. These actions were completed within the required times of Technical Specifications 3.5.1, 3.4, and Selected Licensee Commitment 16.7.2. Unit 3 was allowed to start up and increase power but was prohibited from using its HDPs. The operability evaluation showed that securing D HDPs made the loss of feedwater mitigation systems operable when the low main feedwater discharge pressure setpoints were at 750 psig. The corrective actions of resetting low main feedwater discharge pressure setpoints to 800 psig was performed prior to restarting the D HDPs and increasing power.

The root cause of this event is Design Deficiency, unanticipated interaction of systems, design oversight. The design of a major EFDW modification in 1979 which added the motor driven pumps and upgraded the instrumentation and controls did not consider the role of HDPs. Similarly, the installation of the loss of feedwater anticipatory RPS trip in 1981 also did not consider the role of the HDPs. At that time, the non-safety related HDP pressure switch trip setpoint was 800 psig for all units, as it still is on Unit 1. This setpoint should be sufficient to trip the HDPs during a loss of main feedwater transient. However, if excessive calibration drift or even complete switch failure occurs, then the D HDPs could have prevented the main feedwater pump discharge pressure from reaching its low setpoint.

The AMSAC system utilizes the same pressure switches that trip the D and E HDPs on feedwater pump low discharge pressure. The AMSAC design changed the setpoint to 750 psig for these switches to minimize the possibility of inadvertent AMSAC operation prior to EFDW system actuation. The AMSAC system was installed on Unit 2 in October, 1990 and on Unit 3 in April, 1991. Again, when the setpoints were changed, the effects of the lower setpoint on HDP operation and subsequent post-trip feedwater pressure were not considered. By lowering the setpoints, the HDPs would not automatically trip since their shutoff discharge pressure prevented feedwater pressure from reaching the new setpoint.

It is noted that the identification of this problem in the design process requires knowledge of several areas of expertise. The design of the AMSAC system, which changed the D HDP trip setpoint to 750 psig, was performed by the Electrical Section of Design Engineering. A knowledge of the electrical circuitry, the operating parameters of the D HDPs, and the post-trip operation of the condensate-feedwater system would be required to foresee the problem. Integrated Design Reviews, which take a multi-disciplinary approach to Nuclear Station Modification design, are performed for some NSMs where such an approach is deemed appropriate. An Integrated Design Review was performed for the AMSAC modification. Design Engineering personnel will review the criteria used when performing these multi-disciplinary reviews with respect to system interactions.

A review of Oconee Problem Investigation Reports over the last two years indicates that two separate events occurred which involve the EFDW, RPS, or AMSAC systems which have either a root or contributing cause of design deficiency, failure to anticipate the interaction of systems. One event, described in PIR-090-0042, involved the Emergency Feedwater system. In that event, the discharge pressure of the Motor Driven Emergency Feedwater Pumps exceeded the design pressure of the recirculation piping when the pump was run in the recirculation mode. Another event, described in PIR-3-091-0035 and LER 287/91-05 involved the AMSAC system design. A failure to anticipate certain electrical circuit phenomenon of the associated Diverse Scram System led to control rod insertion and subsequent manual reactor trip. None of the loss of main feedwater actuation circuits were involved in these events. This problem is therefore considered non-recurring.

This event did not involve radiation overexposure or release of radioactive material. No personnel injuries were involved. There was no equipment failure which would require reporting to NPRDS.

<u>CORRECTIVE ACTIONS</u>

Immediate

1. Automatic initiation of the Emergency Feedwater (EFDW) system occurred due to the diverse initiation logic from feedwater pump low hydraulic oil pressure.

Subsequent

1. An investigation team was formed to determine the cause of the low Main Feedwater (MFDW) pump discharge pressure initiation channel failure.

2. Units 1 and 2 reduced power and their heater drain pumps (HDP)s were secured.

3. Unit 3 was allowed to restart but was not permitted to use its HDPs.

4. Pressure switches which detect low main feedwater pump discharge pressure and actuate EFDW, Reactor Protective System, and ATWS Mitigation Safety Actuation Circuits were reset to 800 psig following an operability evaluation which justified these setpoints. These setpoints will be maintained until a permanent solution to the problem has been resolved. Instrument and Electrical procedures as well as Operations procedures were revised to reflect the new setpoints.

5. The recirculation flow paths of the D heater drain pumps were aligned such that a larger difference occurs between the D HDP shutoff discharge pressure and the 800 psig setpoint. These alignments are not required to maintain EFDW, RPS, or AMSAC operability, but further increase the margin between the actual pump discharge pressure against shutoff conditions and the revised setpoints.

Planned

1. A Station Problem Report will be initiated which will consider permanent solutions to this problem.

2. Oconee operator training will be enhanced by changing training material to reflect the new MFDW pump discharge pressure setpoints and by making the required setpoint changes to the plant simulator.

3. The Safety Parameter Display System, used by the control room, will be changed to reflect the new MFDW pump discharge pressure setpoints.

4. The EFDW Design Basis Document will be revised to reflect problems discovered in this event.

5. Design Engineering will review the criteria used to perform interdisciplinary reviews of design packages.

SAFETY ANALYSIS

In this event, the low Main Feedwater (MFDW) pump discharge pressure signal, used to detect and mitigate a loss of feedwater, was found to be unable to independently actuate the required systems. The systems affected by this degradation are: the Emergency Feedwater System (EFDW), the Loss of Feedwater Anticipatory Trip of the Reactor Protective System (RPS), and the ATWS Mitigation Safety Actuation Circuit (AMSAC). Each of these systems can be actuated from a separate signal which monitors low hydraulic oil pressure, indicating a tripped condition, on the MFDW pumps. Manual actuation is also possible. The degradation of the MFDW pump discharge pressure portion of the actuation circuitry depends on the discharge pressure of the D heater drain pumps (HDP). When the D heater drain pumps were operating against a shutoff head, the feedwater pressure exceeded the 750 psig setpoint.

There is no safety significance to the inoperability of the low MFDWP discharge pressure signal if the hydraulic low oil pressure signal actuates as designed. The loss of MFDW would be sensed and the appropriate system actuations would take place. There would also be no safety significance if the D heater drain pumps were not operating, as in the case of a loss of power. In this situation, not only would the hydraulic oil pressure signal continue to be available, but the MFDW pump low discharge pressure signal would also function.

During most of the time of technical inoperability, the HDPs had a trip setpoint of 800 psig which should have prevented the problem from occurring. However, wide calibration tolerances and instrument drift may have compromised the switch reliability. When AMSAC modifications were performed in October, 1990 on Unit 2 and April, 1991 on Unit 3, the probability of D HDPs remaining in service following a trip of feedwater pumps was significantly increased.

Each EFDW pump has its own associated hydraulic oil pressure switch so that a failure of one pressure switch will affect only one EFDW pump. If a single failure occurred to a hydraulic oil pressure switch on either MFDW pump turbine during a loss of MFDW while the MFDW pump low discharge pressure signal was inoperable, then the EFDW pump corresponding to that signal would not start. If the EFDW system was degraded in this manner, an automatic start would only occur on two of the three EFDW pumps. The design of the EFDW system is such that only one of the three EFDW pumps is necessary to successfully perform an orderly cooldown of the Reactor Coolant System (see Final Safety Analysis Report Section 10.4.7.1). Either multiple switch failures or a common cause failure of three switches would have to occur to totally prevent feedwater from automatically actuating in these circumstances.

Reactor operators are required by the Subsequent Actions section of the Emergency Operating Procedure (EOP) to check for main feedwater flow. If EFDW has not automatically actuated, they are instructed to follow the Loss of Feedwater procedure, AP/1,2,3/A/1700/19, which has the operator manually start the EFDWPs and verify proper flow. This is done from the control room.

The effect of a failure of a single hydraulic oil pressure switch, while operating with a degraded MFDWP discharge pressure alignment, on the Reactor Protective System is that the associated RPS channel will not trip on loss of main feedwater. The anticipatory reactor trip due to a loss of MFDW will only fail to occur if three of the eight hydraulic oil pressure switches fail in such a manner that three RPS channels do not trip. If the anticipatory FDW trip fails to occur, Reactor Coolant System (RCS) pressure and temperature will increase until the reactor trips at either of these parameters' high setpoint. Furthermore, Operations Management Procedure 2-1, "Duties and Responsibilities of Reactor Operators, Non Licensed Operators, and the Senior Reactor Operator in the Control Room", requires all licensed reactor operators to know from memory that the reactor must be manually tripped if both MFDWPs trip. The result is that the reactor will be tripped, but not as quickly as when the anticipatory trip is operational. The longer delay may result in a higher RCS pressure transient. If pressure reaches 2450 psig (150 psig above the RCS trip setpoint of 2300 psig) then the Pilot Operated Relief Valve (PORV) [EIIS:AB] will open to relieve RCS pressure.

The AMSAC system is designed to ensure that the main turbine trips and emergency feedwater actuates if there is a loss of main feedwater associated with an ATWS event. In this event, the reactor fails to trip when required. Tripping the turbine ensures that power will not increase due to moderator temperature effects. Because of a negative moderator temperature reactivity coefficient, overcooling of the RCS will result in a power increase. Emergency feedwater is actuated as a backup to the normal EFDW system actuation. The AMSAC system uses a two out of two channel initiation logic. A single failure of a hydraulic oil pressure switch while the low discharge pressure signals are inoperable will therefore prevent actuation of the system. The Unanticipated Nuclear Power Production section of the EOP requires that the reactor operator manually trip both the reactor and the main turbine. As previously stated, the Loss of Feedwater procedure has the operator initiate EFDW manually if not already automatically initiated.

Although the AMSAC system is designed specifically for EFDW actuation during an ATWS event, the AMSAC and normal EFDW actuation circuits serve as independent systems to start the EFDW pumps. Both AMSAC and normal EFDW actuation will start the EFDW pumps whether or not an ATWS has occurred. This design aspect is not credited in the basis of Technical Specifications but is present nevertheless.

Modifications are also scheduled to be performed on the EFDW actuation circuits as a result of NRC Generic Letter 89-19. These modifications will start the EFDW system on low steam generator level.

In conclusion, the safety significance of the feedwater pump low discharge pressure setting is minimal. All automatic actions have separate and diverse feedwater pump turbine hydraulic oil pressure signals. More than one hydraulic oil switch must fail to actuate to prevent the normal EFDW or RPS anticipatory trip from occurring. The Emergency Operating procedure and Loss of Feedwater procedures give adequate procedural guidance to initiate manual actuation if automatic actuations do not occur. The RPS feedwater anticipatory trip is backed up by automatic trips on high pressure or temperature. The EFDW start circuitry and AMSAC EFDW start circuitry are redundant.

The health and safety of the public were not endangered by this event. It did not involve the release of radioactive material, overexposure to radiation, or personnel injuries.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

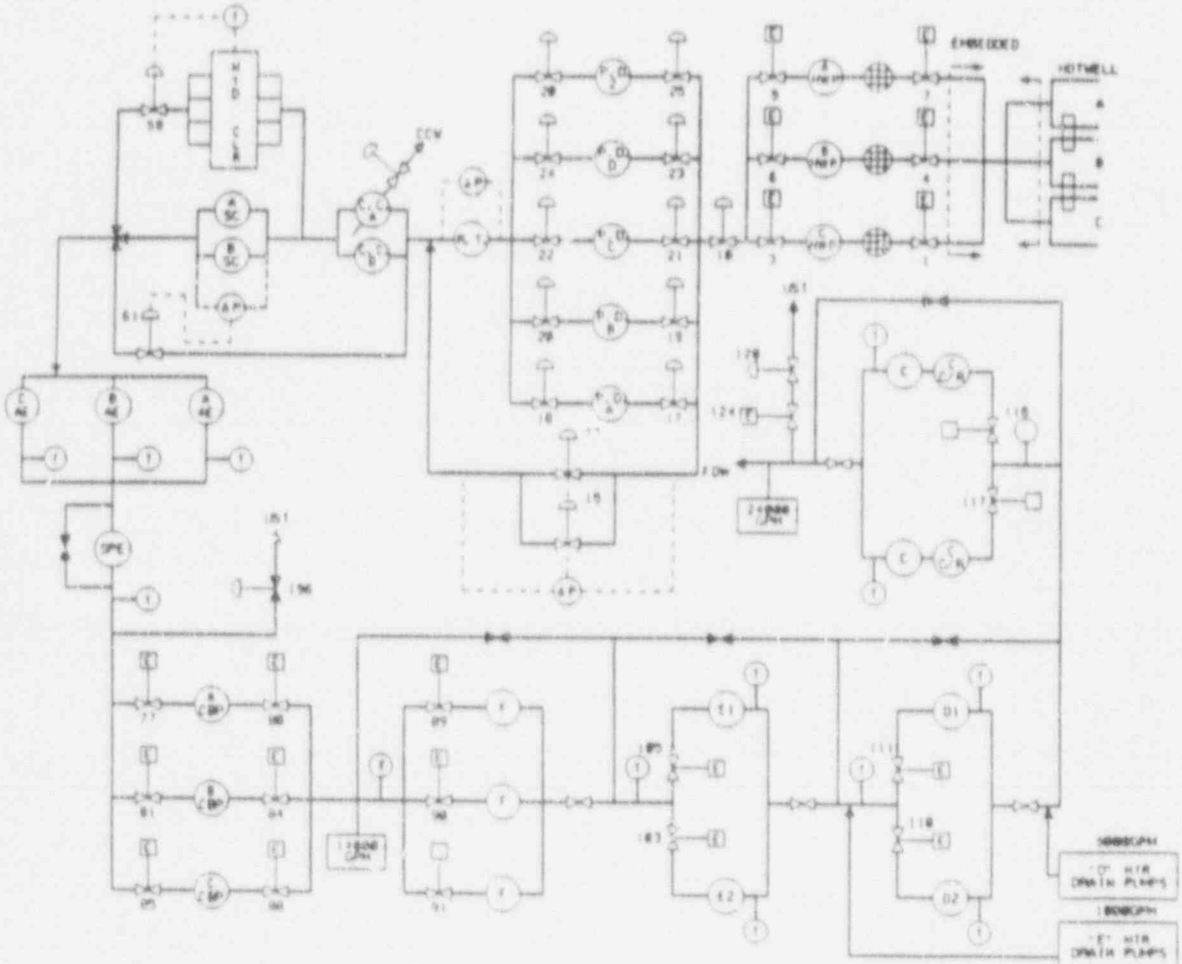
FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	PAGE (3)
Oconee Nuclear Station, Unit 1	0 5 0 0 0 2 6 9	9 1	— 0 0 9	— 0 0	1 1 OF 1 2

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

DUKE POWER COMPANY

ATTACHMENT 1

CONDENSATE SYSTEM ARRANGEMENT



NRC FORM 366A (6-89)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104
EXPIRES: 4/30/92

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

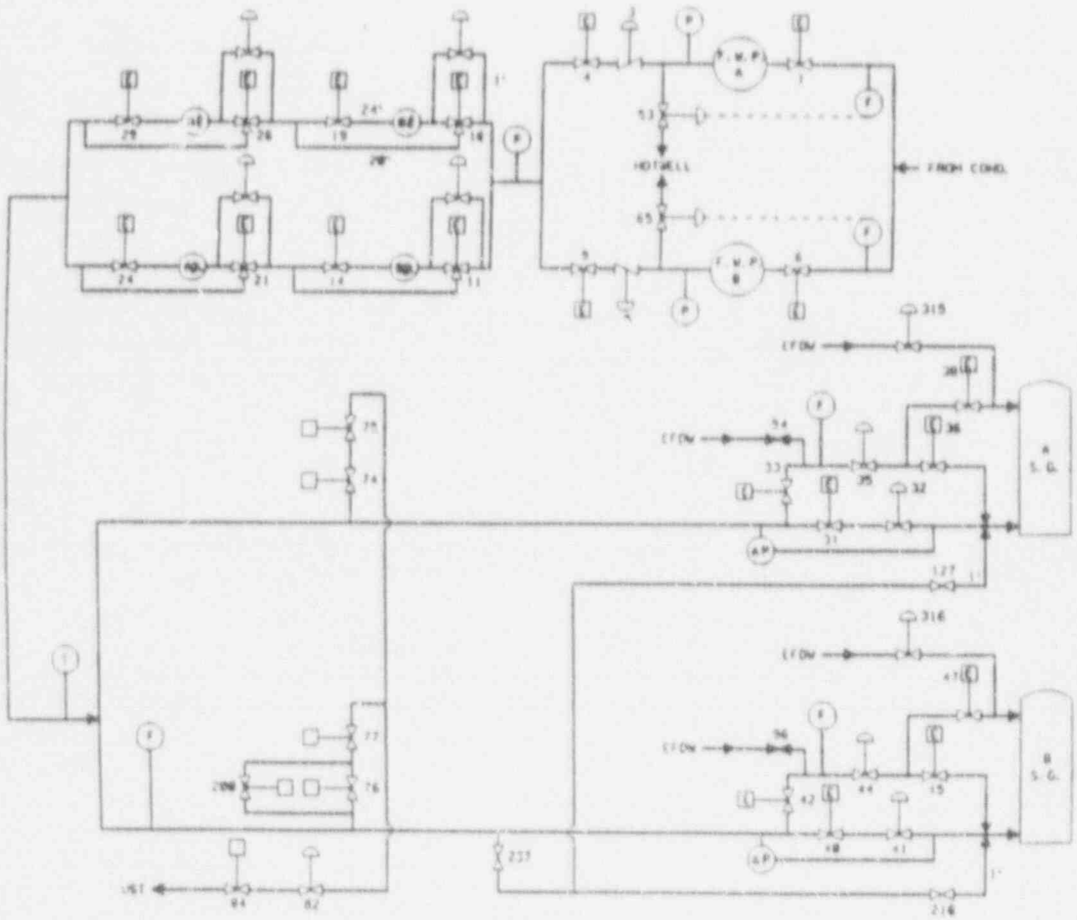
FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	PAGE (3)
Oconee Nuclear Station, Unit 1	0 5 0 0 0 2 6 9	9 1	— 0 0 9	— 0 0	1 2 OF 1 2

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

DUKE POWER COMPANY

ATTACHMENT 2

FEEDWATER SYSTEM ARRANGEMENT



NRC Form 366A (6-89)