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SUBJECT: LER 89-009-01:on 890607,mgt deficiency resulted in incorrect Tech Spec.

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DUKE POWER

August 1, 1989

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

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
LER 269/89-09, Revision 1

Gentlemen:

Pursuant to 10CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report (LER) 269/89-09, Revision 1 concerning inadequate Technical Specification 3.7.1.b.1. This supplement includes further information on root cause and the safety evaluation.

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

Very truly yours,

M. S. Tuckman/RLS

M. S. Tuckman
Station Manager

SWB/ftr

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U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

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

TITLE (4) A Management Deficiency Resulted in an Incorrect Technical Specification Which Allowed a Single Breaker Failure to Prevent the Emergency Power Switching Logic from Functioning

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 6	0 7	8 9	8 9	0 0 9	0 1	0 8	0 1	8 9	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	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	1 0 0	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)	X 50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	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	TELEPHONE NUMBER
	AREA CODE
Henry R. Lowery, Oconee Safety Review Group	8 1 0 3 8 1 8 5 1 - 1 3 0 1 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)		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)

On June 7, 1989, at 1400 hours, with Units 1 and 3 operating at 100% full power and Unit 2 in a refueling outage, it was discovered that Technical Specification 3.7.1.b.1 allowed unrestricted plant operation in a configuration which could allow a single failure of one standby breaker to prevent the Emergency Power Switching Logic (EPSL) System from performing its function under certain accident scenarios. This discovery was made during Design Engineering reviews for the Design Basis Documentation Analysis. The root cause of this event was management deficiency which resulted in an inadequate Technical Specification. The immediate corrective actions consisted of maintaining both Standby Buses operable. In the event that one of the Standby Buses became inoperable, then Technical Specification 3.7.2.a would apply and all Oconee units would enter a 72 hour Limiting Condition of Operation. Subsequent investigation found procedural deficiencies which would prevent EPSL from performing certain functions. The root cause of this was defective procedure. Procedure changes were made to correct this problem.

BACKGROUND

The Emergency Power Switching Logic (EPSL) [EIIS:EK] in conjunction with its associated circuits, provides a means for assuring that power is supplied to the Main Feeder Buses [EIIS:EA] and therefore to the essential plant loads under accident conditions. EPSL monitors the normal and emergency power sources and upon loss of the normal power source, EPSL will seek an alternate source of power. The first priority as the alternate power source is the unit startup transformer [EIIS:XFMR] powered from the plant switchyard. The second is from an emergency power source, the first Keowee hydro unit, via the 230 kV overhead feeder through the startup transformer. In the event the startup source is not available, EPSL will select the standby as the alternate power source with power provided from an emergency power source, the second Keowee hydro unit, via the 13.8 kV underground feeder and through the CT-4 transformer. In the event that the Keowee Hydro units are unavailable for the supply of emergency power, gas turbines at the Lee Steam Station are lined up, via a dedicated transmission line, to supply power to the Standby Buses at Oconee through the CT-5 transformer. If none of the alternate power sources are available, EPSL waits until power is available at one of the sources and then selects that source as the emergency power supply. EPSL will sense that the standby source is an available power source if there is an energized path from either Keowee hydro station or the Lee gas turbines regardless of the state of the Standby Bus breakers (S1 and S2).

Technical Specification 3.7 delineates the requirements for auxiliary electrical systems. Section 3.7.1.b states: "Two independent on-site emergency power paths shall be operable and shall consist of:

1. One Keowee hydro unit; through the underground feeder path; through transformer CT4; and to one 4160V Standby Bus.

2. The second Keowee hydro unit; through the Keowee main step-up transformer; through the overhead path and breaker PCB9; the 230 kV switchyard yellow bus and safety related PCB-18, -27, or -30; through the respective operating unit's startup transformer (CT-1, 2, or 3) or the aligned and connected alternate startup transformer. One startup transformer may not be aligned to supply power to more than <u>one</u> unit."

OP/0/A/1107/03, 100 KV Power Supply, is used to give direction to the operators of the proper ways to provide power to Oconee Nuclear Station from Lee Steam Station. The procedure gives the sequence necessary to perform the electrical lineup and the positioning for control transfer switches.

EVENT DESCRIPTION

In June of 1973, Technical Specification 3.7, "Auxiliary Electrical Systems", was issued for Oconee Nuclear Station in final form for beginning operation of Unit 1. Technical Specification 3.7.1.c stated that two 4160 volt Standby Buses [EIIS:BJ] were required to be operable. This was required as part of the emergency power path from the Keowee hydro unit through the underground feeder to the transformer and to the Main Feeder buses.

Technical Specification 3.7 required two operable Standby Buses until May 2, 1978. At this time, Amendments Nos. 82, 82, and 79 for Licenses DPR-38, Oconee Unit 1, DPR-47, Oconee Unit 2, and DPR-55, Oconee Unit 3, were issued. This Amendment to Technical Specification 3.7 changed the number of operable Standby Buses from two to one and moved this requirement to 3.7.1.b.

In 1988 work on a draft Technical Specification change was introduced as a result of LER 269/87-09, "Two Functional Units of Emergency Power Switching Logic Taken Out of Service Due to a Management Deficiency". This report resulted in a commitment to resolve a conflict existing in Technical Specification 3.7 which allowed one Standby Bus to be inoperable per 3.7.1.b even though Table 3.7-1 required you to have two operable Standby Buses. The commitment was to have the General Office Licensing group submit a change to 3.7 which would allow one Standby Bus to be removed from service. The initial draft of this Technical Specification revision changed the number of operable Standby Buses from one to two due to the Design Engineering concerns that the startup breakers could be overdutied under certain accident scenarios. This was later found not to be a concern and the number of required operable Standby Buses were revised from two to one on the draft Technical Specification. These draft changes to the Technical Specification are documented in letters between the General Office Licensing group, the Station Compliance group, and Design Engineering from September, 1988 to April 10, 1989. The proposed Technical Specification change was sent to the Nuclear Regulatory Commission on May 12, 1989.

On June 7, 1989, during a Design Basis Documentation Analysis, it was discovered that Technical Specification 3.7.1.b, as presently written requiring one operable Standby Bus, allowed a single failure of the single operable Standby Bus breaker to prevent the Emergency Power Switching Logic (EPSL) from selecting a viable power source under certain accident scenarios. The EPSL senses a viable power path through sensing circuits which register voltage on a path on the transformer side of the Standby Bus breakers. By requiring only one standby breaker operable, this

provided the possibility for one breaker being out of service without any limiting condition of operation. If this were the initial conditions and the plant had a simultaneous occurrence of a Loss of Offsite Power (LOOP) and a Loss of Coolant Accident (LOCA) on one unit, the failure of the remaining standby breaker would result in the EPSL sensing voltage on the Standby Bus and not swapping to an alternate power path. This would result in power being lost to the Main Feeder bus which would prevent electrical equipment needed to mitigate the consequences of an accident from functioning.

The immediate corrective actions taken to prevent this scenario were to maintain both Standby Buses operable. In the event that one of the Standby Buses were to become inoperable, Technical Specification 3.7.2.a would apply which would place all Oconee units under a 72 hour limiting condition of operation.

Investigations initiated after the discovery of the single failure concerns discovered an operating procedure with procedural deficiencies which placed the plant in a condition where EPSL would not have performed its function. As a result of LER 269/88-13, "Emergency Backup Power Via Lee Gas Turbines Found to Be Unacceptable in Certain Accident Scenarios Due to a Design Deficiency", an operating procedure was revised to place the standby breaker control transfer switches in the manual position when it was required for the Standby Buses to be energized from the Lee gas turbines. This action was taken to allow manual sequencing of the loads onto Lee and prevent an undervoltage from occurring. This was necessary since the Lee gas turbines could not support the startup loads occurring during an automatic swap. With the control transfer switches in manual, EPSL would not have been able to automatically close the standby breakers to supply emergency power if it became necessary. These procedural deficiencies were corrected and the procedure was reissued. Operations also generated Training Package 89-21 which explained the need to maintain both Standby Buses operable and the changes which were incorporated into the reissued operating procedure.

CONCLUSION

It is concluded that the root cause of the Technical Specification inadequacy is management deficiency. The Technical Specification was initially issued requiring the operability of two Standby Buses. A 1978 revision changed this requirement to one operable Standby Bus, however, the General Office Licensing group could not locate documentation which explained why this change was initiated. The justification was not adequate since the fact that the single failure of the remaining standby

breaker could prevent operation of the Emergency Power Switching Logic, thereby violating single failure criteria, was not recognized and the specification was revised to require only one operable Standby Bus. Based on the above reasoning, the root cause of this event is listed as management deficiency which resulted in an inadequate Technical Specification.

The Technical Specification change which was being pursued as a result of LER 269/87-09 initially changed this requirement back to two operable Standby Buses because of Design Engineering concerns about overdutying the startup breakers. When Design Engineering concerns were resolved a revision to the draft Technical Specification changed this requirement back to one operable Standby Bus. The draft Technical Specification changes and proposed Technical Specification changes are reviewed by General Office Licensing, Station personnel, and Design Engineering. This was a missed opportunity to correct this problem since each of these groups failed to recognize that a single failure of the standby breakers could result in preventing the Emergency Power Switching Logic from performing its intended function.

This event was discovered by the Design Engineering Department during the Design Basis Documentation Analysis of the Emergency Power Switching Logic system. This is a project by which Design Engineering is reviewing the design bases of all Safety Related and Technical Specification related systems at Oconee and preparing a Design Basis Manual which will be issued as a controlled document at the end of the analysis. Duke Power is performing a Self Initiated Technical Audit of the Emergency Power Switching Logic system which will be completed in 1989. The Design Basis Manual will provide a means to ensure that all scenarios are reviewed prior to Technical Specifications being revised in the future and prevent the submittal of inadequate specifications. As a result of this incident, a Task Force was formed to review Technical Specification 3.7. This Task Force will consist of Design Engineering, General Office Licensing, General Office Maintenance and Station personnel.

The root cause of the incorrect operating procedure was due to defective procedure. Duke Power management revised operating procedure to allow manual sequencing of loads onto the Standby Buses when powered from Lee Steam Station. However they failed to realize that placing the transfer switches into manual prevented the EPSL system from performing its function. Due to these reasons, this secondary event is classified as a defective procedure resulting from erroneous information.

This event is not NPRDS reportable. A review of events within the last year revealed several similar events. This current discovery and the one documented in LER 269/89-06, concern the susceptibility of the Emergency Power Distribution System to single failures which would have prevented the system from providing automatic power in a LOCA or a LOCA concurrent with a loss of off-site power. According to Nuclear Safety Assurance guidelines, these events are considered similar, but not recurring because of different root causes. There were two other similar events which resulted from defective procedures. The first of these events was LER 269/89-05, "Emergency Steam Air Ejector Inoperable Due to Defective Procedure", which involved a violation of Technical Specifications due to inoperability of the emergency steam air ejector. However, the corrective actions as a result of that report would not have prevented this event since they addressed correcting mistakes in valve checklists. The second event is documented in LER 270/89-01, "Violation of Emergency Power Technical Specifications Due to Management Deficiency and Defective Procedure", which involved a technical specification violation when auxiliary power path testing was not performed. This event was a direct result of placing the Standby Bus Auto Manual transfer switches in the manual position. It is concluded that the corrective actions as a result of LER 270/89-01 were not effective. Because of previous similar events with the same root causes, this current event is considered to be recurring. This event is the latest in a series of events which was discovered as a result of added emphasis on the Emergency Power Switching Logic System. The Self Initiated Technical Audit and the Design Basis Documentation Analysis should resolve future problems and prevent reoccurrence of these problems. There were no radioactive material releases, personnel injuries, or radiation exposures as a result of this event, therefore the health and safety of the public was not affected by this event.

CORRECTIVE ACTIONS

Immediate

1. Operations included the requirement to maintain two operable Standby Buses on the shift turnover sheets.

2. Operations will place all Oconee units in a 72 hour limiting condition of operation if one Standby Bus becomes inoperable.

Subsequent

1. Operations reviewed operating procedures and past history for occurrences of one Standby Bus inoperability.

2. A Task Force was formed to review Technical Specification 3.7 and resolve problems.
3. Operating procedure deficiencies were identified and corrected.
4. Operations generated Training Package 89-21.

Planned

1. Compliance will pursue changing Technical Specification 3.7.1.b to require operability of two Standby Buses.
2. Compliance will pursue changing item 4 of Table 8.3-2 of the Final Safety Analysis Report as necessary.
3. Operations will generate procedures for the removal of the Standby Buses from service.
4. Operations will have Design Engineering review operating procedures which are used to remove buses from service.
5. Compliance will incorporate changes discovered as a result of the Task Force into Technical Specification 3.7.

SAFETY ANALYSIS

If the plant had been operating in the Technical Specification-allowed configuration of having one Standby Bus removed from service, then the plant's ability to mitigate a loss of coolant accident concurrent with a loss of off-site power would have been hampered by a single failure of the operable standby bus to main feeder bus (S) breaker (reference the attached drawing).

This hampered mitigation also pertains if the S breaker control switches had been in the manual position with the breakers open as directed by the "Loss of Power" procedure and the "100kV Power" procedure. Such positioning of these control switches places the units in a limiting condition for operation. These procedures were revised to provide such direction as a result of the discovery documented in LER 269/88-13, "Emergency Backup Power via Lee Gas Turbines Found to be Unacceptable in Certain Accident Scenarios Due to a Design Deficiency." These revisions were a temporary corrective action until a permanent modification could be installed.

In order to evaluate the above condition, various scenarios have been addressed.

1. Loss of coolant accident (LOCA)

If a unit had experienced a LOCA, electrical power would have been available and would have been unaffected by the postulated single failure of the S breakers to close or the placing of the S breaker control switches in "manual." The reason is that during a LOCA, the unit will trip and align itself to receive power through the Startup (CT) Transformer and E breakers. This alignment bypasses the Keowee hydroelectric generators, the Standby Buses and the S breakers which makes any failure of the S breakers or positioning of the S breaker control switches inconsequential.

2. Loss of off-site power (LOOP)

If the station had experienced a loss of off-site power due to isolation of the switchyard, the units would have automatically received power from the Keowee Hydro overhead path (an above ground line from one of the Keowee hydroelectric generators through the switchyard and the Startup Transformers). Power restoration was possible because on a switchyard isolation, the Keowee Hydro units would have automatically and immediately started. The Keowee Hydro units, as documented in the Final Safety Analysis Report (FSAR), reach full speed in 23 seconds; however, based on historic data, the units have started in the 12-16 second range. By design and simultaneous to the starting of the Keowee Hydro units, the Emergency Power Switching Logic (EPSL) would have waited 31 seconds before blocking the receipt of power through the Startup Transformer and looking for power on the Standby Buses. Within this time period, Keowee would have already powered the Startup Transformer. Accordingly, the EPSL would have sensed sufficient voltage on the Startup Transformers and initiated closure of the E breakers; thereby, restoring power to the main feeder buses. This alignment also bypasses the Standby Buses and the S breakers which makes any failure of the S breakers or positioning of the S breaker control switches inconsequential.

3. LOCA/LOOP

If a LOCA and a LOOP had occurred simultaneously, automatic power restoration would not have taken place and operator action would have been required. Because of the Engineered Safeguards (ES) signal generated by the LOCA, the Keowee Hydro units are started and that unit's EPSL would only wait 11 seconds before blocking the receipt of power through the Startup Transformer and looking for power on the Standby Buses. (The non-LOCA units' EPSL would still wait 31 seconds.)

After 11 seconds, it is not expected there would have been sufficient voltage from the Keowee overhead path on the Startup Transformer to supply the LOCA unit; therefore, the EPSL blocks the closing of the E breakers in anticipation of receiving power from the Keowee underground path (the path from the hydroelectric generators through the Standby Transformer (CT-4), the SK breakers, the Standby Buses and the S breakers to the main feeder buses).

Remembering that the plant configuration of concern was the removal of one of the Standby Buses from service, the LOCA unit could then only be supplied from one Standby Bus and its corresponding SK and S breakers. At this point, if a failure of the operable S breaker was pre-existing or had occurred then the underground path would have been ineffective in supplying power to the main feeder bus. In this situation, the Retransfer to Startup Logic portion of the EPSL would not detect that the underground path had become ineffective because it still sensed sufficient voltage on the operable Standby Bus. This sensing of voltage would have falsely indicated to the EPSL that the underground path was providing power to a main feeder bus. At this time, manual operator action would have been required. (This result also applies if the S breaker control switches were in "manual" because the breakers would not have automatically closed and the EPSL would still have sensed voltage on the Standby Buses - regardless if one or both buses were in service.)

The operator actions that would have been available are as follows:

a) Dispatch personnel to manually close the E breakers

This action would have been performed at the location of the breakers. Personnel could have overridden the block signal to the E breakers and closed the breakers. By taking this action, the energized Startup Transformer would have supplied the main feeder buses.

b) Restore the out of service Standby Bus (in case of the S breaker failure)

Restoring the out of service Standby Bus would reconnect a main feeder bus to the energized Standby Transformer. This action is contingent on if the Standby Bus were in a position to be quickly restored because the most probable reason for removing the bus is for maintenance purposes.

c) Trip the SK breaker connecting the operable Standby Bus to the Standby Transformer (in case of the S breaker Failure)

Tripping the SK breaker would de-energize the Standby Bus and, after a 10 second delay, the Retransfer to Startup Logic portion of the EPSL would have sensed the lack of Standby Bus voltage and the presence of Startup Transformer voltage. Hence, the closing of the E breakers would be unblocked and the E breakers would have closed to supply power to the main feeder buses. While this alternative was the only action possible in the Control Room for the scenario of the S breaker failure, the concept of removing power from a safety-related bus is outside the scope of operator training.

d) Close the S breakers from the Control Room or place at least one control switch in automatic (in case of the control switches being in "manual")

This action, as specified in Abnormal Procedure/1700/11 (Loss of power), would have connected the main feeder buses to the energized Standby Buses.

e) Trip the SL breakers (in case of the control switches being in "manual")

If the S breaker control switches were in "manual" then that means the Standby Buses were being energized from the Lee Gas Turbines via the SL breakers. Tripping the SL breakers would de-energize the Standby Bus and, after a 10 second delay, the Retransfer to Startup Logic portion of the EPSL would have sensed the lack of Standby Bus voltage and the presence of Startup Transformer voltage. Hence, the closing of the E breakers would be unblocked and the E breakers would have closed to supply power to the main feeder buses. Again, the concept of removing power from a safety-related bus is outside the scope of operator training; therefore, action d) would have been the most probable in the case of the S breaker control switches being in "manual".

The above alternatives describe only the required actions. The time for the operators to take these actions is unknown. Accident analyses require that emergency core coolant be delivered to the reactor vessel within 35 seconds after the ES signal (BAW-10103

Rev.3: ECCS Analysis of B&W's 177-FA Lowered Loop NSS). Only alternatives c), d) and e) had the possibility to satisfy the requirement of emergency core coolant flow in 35 seconds. While operator action may not have been in this time frame, it is expected that such response would have taken place quickly. After 11 seconds, automatic power would not have been restored and the operators would have then known that action was required on their part.

If power could not have been restored within a reasonable period of time, then emergency core coolant flow would have been delayed beyond what was assumed in accident analyses. Given this situation, fuel damage resulting in a radioactive release might have occurred. Fuel damage would have been bounded by FSAR Section 15.15 (Maximum Hypothetical Accident) which states the gross release of fission products from the core to the environment will be below the limits of 10CFR100.

Of the discussed scenarios, only the LOCA/LOOP resulted in the possibility of fuel damage. The probability of a LOCA, a LOOP, a Standby Bus being removed from service, and a failure of the operable S breaker occurring simultaneously is extremely low. The probability of a LOCA and a LOOP while operating with the S breaker control switches in manual is also extremely low. Since this scenario has never taken place, the health and safety of the public were not affected and corrective actions have been taken to ensure that such a condition will not exist.

Attachments

Oconee Power System

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Oconee Nuclear Station, Unit 1	0 5 0 0 0 2 6 9	8 9	— 0 0 9	— 0 1	1 2 OF 1 2

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

OCONEE NUCLEAR STATION
Power System