ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9203110116 DOC.DATE: 92/03/05 NOTARIZED: NO DOCKET #
FACIL:50-269 Oconee Nuclear Station, Unit 1, Duke Power Co. 05000269
AUTH.NAME AUTHOR AFFILIATION
BENESOLE,S.G. Duke Power Co.
HAMPTON,J.W. Duke Power Co.
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 92-002-00:from 920128-29,Keowee Hydro Station supply of emergency power to util interrupted.Caused by equipment failure & inappropriate actions.Personnel counselled & LER supplement to be issued.W/920305 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 10
TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD2-3 LA	1	1	PD2-3 PD	1	1
	WIENS,L	1	1			
INTERNAL:	ACNW	2	2	ACRS	2	2
	AEOD/DOA	1	1	AEOD/DSP/TPAB	1	1
	AEOD/ROAB/DSP	2	2	NRR/DET/EMEB 7E	1	1
	NRR/DLPQ/LHFB10	1	1	NRR/DLPQ/LPEB10	1	1
	NRR/DOEA/OEAB	1	1	NRR/DREP/PRPB11	2	2
	NRR/DST/SELB 8D	1	1	NRR/DST/SICB8H3	1	1
	NRR/DST/SPLB8D1	1	1	NRR/DST/SRXB 8E	1	1
	REG FILE 02	1	1	RES/DSIR/EIB	1	1
	RGN2 FILE 01	1	1			
EXTERNAL:	EG&G BRYCE,J.H	3	3	L ST LOBBY WARD	1	1
	NRC PDR	1	1	NSIC MURPHY,G.A	1	1
	NSIC POORE,W.	1	1	NUDOCS FULL TXT	1	1

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK, ROOM P1-37 (EXT. 20079) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

FULL TEXT CONVERSION REQUIRED
TOTAL NUMBER OF COPIES REQUIRED: LTTR 32 ENCL 32

Duke Power Company
Oconee Nuclear Station
P.O. Box 1439
Seneca, S.C. 29679

(803) 882-5363

DUKE POWER

March 5, 1992

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

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
LER 269/92-02

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report (LER) 269/92-02, concerning equipment failure in an emergency power system.

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. A Supplement Report with specific corrective action will be submitted after further investigation.

Very truly yours,

J. W. Hampton
Vice President

/ftr

Attachment

xc: Mr. S. D. Ebneter
Regional Administrator, Region II
U.S. Nuclear Regulatory Commission
101 Marietta St., NW, Suite 2900
Atlanta, Georgia 30323

Mr. L. A. Wiens
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Mr. P. E. Harmon
NRC Resident Inspector
Oconee Nuclear Station

INPO Records Center
Suite 1500
1100 Circle 75 Parkway
Atlanta, Georgia 30339

M&M Nuclear Consultants
1221 Avenue of the Americas
New York, NY 10020

IE22

bc: *P. M. Abraham
B. L. Walsh
*B. J. Dolan
*R. C. Henderson
*C. C. Jennings
*R. L. Dobson
*T. A. Ledford
*S. C. Adams
*R. O. Sharpe
*M. S. Sills
*G. B. Swindlehurst
H. B. Tucker
*T. C. Roberts
*R. L. Gill
*L. V. Wilkie
NSRB Support Staff
R. G. Hull
*R. C. Futrell
*M. E. Patrick

*Profs Distribution

NRC FORM 366 (6-89)

U.S. NUCLEAR REGULATORY COMMISSION

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

ESTIMATED BURDEN PER RESPONSE TO COMPLY WTH 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.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Oconee Nuclear Station, All Units	0 5 0 0 0 2 6 9	1 OF 0 8

TITLE (4) Equipment Failure In Emergency Power System and Inappropriate Action Result in Technical Specification Violation

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 1	2 9	9 2	9 2	0 0 2	0 0	0 3	0 5	9 2	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)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		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	TELEPHONE NUMBER
S. G. Benesole, Safety Review Group	AREA CODE 8 0 3 8 8 5 - 3 5 1 8

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

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	
F	E K	R L V	W 1 2 0	YES							

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
X YES (If yes, complete EXPECTED SUBMISSION DATE)	NO		0 9	1 0	9 2

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

Keowee Hydro Station supplies emergency power to the Oconee Nuclear Station. On January 29, 1992, Oconee Unit 1 was at 100% Full Power, Unit 2 was at cold shutdown and Unit 3 was at 99% Full Power. At 2104 hours, Keowee Hydro Unit 1 failed to start during a routine attempt to supply power to the grid. The operator shut Keowee Hydro Unit 1 down and started Keowee Hydro Unit 2 to supply power to the grid. There was a known problem with the breaker anti-pump "X" relays on the field and field flashing breakers so the operator inspected the relays associated with Keowee Hydro Unit 1. None of the relays were found to be out of the expected position. Keowee Hydro Unit 1 was determined to be inoperable from January 28, 1992, at 2149 hours, when the relays failed to reset after the last unit shutdown until January 29, 1992, at 2116 hours when the unit was successfully started. The root cause of this event is Equipment Failure. A second root cause is Inappropriate Action, no action taken when required because the need was not recognized. Keowee Hydro Unit 2 was not operability tested within 1 hour as required by Technical Specifications. Corrective action will include diagnosing the specific failure mode of the relay and submitting a supplement to this report which will outline the corrective actions to prevent a recurrence.

BACKGROUND

The Keowee Emergency Power System [EIIS:EK] consists of two hydroelectric generators which provide an emergency onsite power source for the Oconee Nuclear Station via two separate and independent paths, one of which is the underground feeder through transformer CT4 and the standby buses [EIIS:EB] and the second is the overhead path through the 230 KV switchyard [EIIS:FK]. See Attachment 1.

Each Keowee Unit is provided with its own automatic start equipment. Both units undergo a simultaneous automatic start and run in standby on a loss of the grid, an engineered safeguards actuation on any of the three Oconee Units, or an extended loss of voltage on any unit's main feeder breakers. On an emergency automatic startup, the unit connected to the underground feeder supplies that feeder while the other unit, remaining in standby, is available to supply the overhead transmission line. If there is a grid disturbance, this unit is automatically connected to the Oconee 230 KV switchyard yellow bus only after the yellow bus is automatically isolated from the grid. Therefore, in the event of a Loss of Coolant Accident and the simultaneous loss or degradation of the grid, emergency power is available from either Keowee Unit through the underground feeder and/or the overhead transmission line.

Technical Specification 3.7.2 allows one Keowee unit to be out of service for 72 hours provided the other unit is verified to be operable within one hour. This is verified by starting the Keowee Unit and energizing the standby power bus.

The field, supply, and flashing breakers are used to generate the field which will allow the generator to produce electricity. The "X" relays are the anti-pump relays used in Westinghouse type DB breakers. The anti-pump circuitry allows the breaker to receive only one close signal. This prevents the breaker from cycling back and forth between closed and tripped on a trip signal. The "X" relay is operated by a coil which is energized on the close signal. The coil stays energized after a shutdown signal until the hydro unit coasts down. A speed switch then trips the coil and allows gravity to reset the relay.

EVENT DESCRIPTION

On June 11, 1991, Keowee Unit 1 failed a performance test when the generator field breaker failed to close. This was documented on Problem Investigation Report 4-091-0063. It was determined that an "X" relay failed to reset, which prevented the generator field breaker from automatically closing, which in turn prevented a successful start of the unit. The relay was reset, successfully tested, and returned to service. The relays were subsequently removed and returned to Westinghouse for evaluation. These relays were commercial grade relays. No problems were noted with these specific relays; however, Westinghouse was aware of some

problems with their commercial grade relays. They were not aware of any problems with their safety related relays. Keowee was declared conditionally operational provided that all "X" type relays are visually inspected after each shutdown. This inspection was to continue until the commercial grade relays were replaced with safety-related qualified relays. This was completed on September 10, 1991 for Unit 1 and on October 2, 1991 for Unit 2. The "X" relay inspection was discontinued after the safety-related relays were installed. A review of the computer print-outs confirmed that between September 10, 1991, and January 28, 1992, Keowee Hydro Unit 1 was successfully started approximately 100 times.

On January 29, 1992, Oconee Unit 1 was at 100% Full Power, Oconee Unit 2 was at cold shutdown and defueled and Oconee Unit 3 was at 99% Full Power. At 2104 hours, Keowee Operator A tried to start Keowee Hydro Unit 1 per instructions from the system load dispatcher. The unit came up to speed but the field, supply, and flashing breakers failed to close. Keowee Operator A shutdown Keowee Hydro Unit 1 and started Keowee Hydro Unit 2. He then checked the relays associated with Keowee Hydro Unit 1 field, supply and field flashing breakers. No abnormalities were noted. At 2116 hours, Keowee Operator A successfully started Keowee Hydro Unit 1. The field and flashing breakers closed as required and the unit supplied power to the grid. The last successful start had been on January 28, 1992 and the unit had been shutdown at 2149 hours.

At 2117 hours, Keowee Operator A notified Reactor Operator A, at the Oconee Unit 2 Control Room, that Keowee Hydro Unit 1 had failed to start, but had later started and was not out of service. Reactor Operator A did not see this as a problem but said he would call Keowee Operator A back if it was determined to be a problem. Reactor Operator A did not think there was a problem so he did not communicate this with his supervisor.

At 2200 hours, Keowee Operator A called the Oconee Unit 2 Control Room to find out if Keowee's failure to start was a problem. At this time, he discussed the situation with another Reactor Operator, Reactor Operator B. At 2206 hours, Reactor Operator B notified Control Room Senior Reactor Operator A and Unit Supervisor A. At 2210 hours, Shift Supervisor A was notified of the problem with Keowee Unit 1. Shift Supervisor A declared Keowee Hydro Unit 1 out of service as of the time it failed to start at 2104 hours. He decided an operability test for Keowee Hydro Unit 2 was required and it was completed at 2215 hours. It was also decided to test the operability of Keowee Hydro Unit 1. This was completed at 2247 hours. Keowee Operator A verified that the relays had reset after the operability tests.

Temporary corrective measures were implemented to resume checking the relays after each shutdown. Since they were implemented, two other incidents have occurred:

At 2126 hours on February 13, 1992, the "X" relay failed to reset after Keowee Hydro Unit 1 was shutdown. The appropriate compensatory actions were taken and the unit was declared operable. The relay reset itself before any diagnostic evaluations could be done.

On the morning of February 20, 1992, the "X" relay failed to reset after Keowee Hydro Unit 1 was shutdown. The appropriate compensatory actions were taken and the unit was declared operable. Before the relay reset itself, the technicians were able to determine that no voltage was applied to the coil ("X" relay).

A subsequent evaluation by Design Engineering determined Keowee Hydro Unit 1 was inoperable between 2149 hours on January 28, 1992 and 2116 hours on January 29, 1992. Design Engineering also issued a conditional statement of operability requiring the relays to be inspected, at each shutdown, to assure that they have reset.

CONCLUSIONS

Keowee Hydro Unit 1 was inoperable for 23 hours and 33 minutes. The root cause of the Keowee inoperability is Equipment Failure. Preliminary evaluations have narrowed the cause to the "X" relay in the field breaker. The cause may either be mechanical or due to residual voltage in the coil. Planned corrective action will be to diagnose the specific failure mode and take the appropriate actions.

The root cause of failing to test Keowee Unit 2 within 1 hour is Inappropriate action, no action taken when required because the need was not recognized. Keowee Operator A started Keowee Hydro Unit 2 and restarted Keowee Hydro Unit 1 before calling the Oconee Control Room. The expected response was to immediately call the Oconee Control Room. Reactor Operator A did not recognize the significance of the Keowee Hydro Unit failing to start so he did not take the appropriate compensatory actions. Keowee Hydro Unit 2 was verified to be operable within a few minutes of the Shift Supervisor's operability evaluation. However, this was 1 hour and 11 minutes after the time that Keowee Hydro Unit 1 failed to start and should have been recognized as inoperable. This was not in accordance with Technical Specification requirements.

When Keowee Operator A called the Oconee Control Room the second time, the appropriate actions were taken by Reactor Operator B. A further review by Design Engineering determined Keowee Hydro Unit 1 was operable based on the successful start at 2116 hours.

The Keowee Hydro Units are considered conditionally operable based on a visual inspection of the relays every time the units are shutdown. Other breakers with a similar design, at Keowee, are also required to be inspected after each shutdown.

Problem Investigation Report 4-091-0063 was written because the generator field breakers failed to close during testing. Further investigation attributed this problem to the "X" relays and corrective action was to replace relays with safety related qualified relays. This did not correct the problem because failure of the same relay is the reason for this report. Since the Problem Investigation Report was written on the failure of the same relay, it is considered recurring.

The relays in question are part of Westinghouse DB breakers. They are Part Number 33A2746G32 and they are NPRDS reportable.

There were no releases, radiation exposures, or injuries associated with this event.

CORRECTIVE ACTIONS

Immediate

1. Keowee Hydro Units 2 and then Unit 1 were verified to be operable.

Subsequent

1. The Reactor Operator involved with the Inappropriate action has been counselled on the importance of effective communication and the importance of taking the appropriate actions anytime a safety-related component fails to start.

2. Keowee Operators have been counselled on this event and the appropriate actions to take anytime one of the Keowee units fails to start. The effect that Keowee has on the Oconee Nuclear Station will be given first priority. Whenever a Keowee unit fails to start, the Oconee Control Room will be notified immediately. Requests by the dispatcher will not be considered until the other unit is operability tested.

3. Keowee Operators have been instructed to visually inspect the "X" relays to assure that they have reset each time the units are shutdown. This is being documented in the Keowee Operator's Log.

Planned

1. The specific mode of the relay failure will be investigated. Then the appropriate actions will be taken to prevent a recurrence of the problem.

2. A supplement to this Licensee Event Report will be issued when the specific mode of equipment failure and the appropriate corrective action is determined.

3. This Licensee Event Report will be discussed with all licensed personnel emphasizing the importance of effective communication and taking appropriate action anytime a safety-related component fails to start.

SAFETY ANALYSIS

Oconee Unit 1 was operating at 100% Full Power and Unit 3 was operating at 99% Full Power. Unit 2 was at cold shutdown and defueled. Keowee Hydro Unit 1 was aligned to Oconee via the overhead path when it was declared inoperable. Power was available from Keowee Hydro Unit 2 through the underground power path.

A single failure of Keowee Hydro Unit 2 with Keowee Hydro Unit 1 remaining inoperable would result in the loss of all normal emergency power sources for Oconee Nuclear Station in a loss of offsite power (LOOP) event.

The Standby Shutdown Facility (SSF) is a separate seismically qualified building which houses the systems and components necessary to provide an alternate and independent means to achieve and maintain hot shutdown conditions for one or more of the three Oconee Units. The SSF was designed to resolve the safe shutdown requirement for fire protection, turbine building flooding, and physical security. The SSF has the capability of maintaining hot shutdown conditions on all three units for approximately three days following a loss of normal AC power.

An alternate power alignment for emergency offsite power is through the 100 KV transmission line from Lee Steam Station's gas turbines to the standby power buses. Power will be available from the Lee gas turbines within 60 minutes. An alternate power alignment is from the Central Switchyard. It is recognized that the Central Switchyard is not considered an acceptable emergency power source because of its lack of degraded grid protection. However, the use of the Central Switchyard is allowed by the station's abnormal procedures as a last resort for restoring power.

Final Safety Analysis Report (FSAR) 15.8.3 addresses a simultaneous LOOP event on all three units. This analysis shows that natural circulation of the reactor coolant system [EIIS:AB], turbine driven emergency feedwater system [EIIS:BA], condenser circulating water gravity induced flow, and

gravity insertion of the control rods [EIIS:ROD] are among the design features provided to ensure the removal of decay heat for the reactor coolant system without offsite power being available. Additionally, FSAR Section 15.8.3 states that "Each reactor can sustain a complete electrical power loss without emergency cooling for about 23 minutes before the steam volume in the pressurizer is filled with reactor coolant" and that "beyond this time reactor coolant will boil off, and an additional 83 minutes will elapse before the boil off will start to uncover the core." Therefore, the 106 minutes given in the FSAR for core uncovering is well beyond the 60 minutes required for establishing emergency power from the Lee gas turbines.

In the event that a Loss of Coolant Accident (LOCA) occurs simultaneously with a LOOP and power cannot be restored in a reasonable period of time, the emergency core coolant flow would have been delayed beyond what was assumed in the accident analysis. FSAR 15.14.3.3.6 assumes 48 seconds for the loss of Transformer CT4. If this happens, fuel damage could occur which will result in a radioactive release to the containment building. The FSAR states that without Reactor Building Spray [EIIS:BE] and Reactor Building Cooling Systems [EIIS:BK] the reactor building pressure would not exceed the design pressure for the containment following the LOCA. Given the 60 minute time frame to restore power, it is expected that the reactor building leak rate would not exceed the LOCA analysis rate, but dose rates may be higher due to a loss of filtered ventilation until power is restored. A design containment response evaluation has shown that equipment qualification conditions would not be exceeded in under two hours for the expected temperature and pressure resulting from this event. Therefore, reactor building equipment would be operable when unit power is restored.

The problems associated with the relays are known problems and actions to correct them could be taken in just a few minutes. Because of this and the fact that there is a low probability of each of the above scenarios occurring, the health and safety of the public was not affected.

ATTACHMENT 1