

# ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

## REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9006200011 DOC.DATE: 90/06/14 NOTARIZED: NO DOCKET #  
 FACIL:50-269 Oconee Nuclear Station, Unit 1, Duke Power Co. 05000269  
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SUBJECT: LER 90-007-00:on 900516,actuation of emergency safeguards  
 sys due to defective procedure.

W/9 ltr.

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INTERNAL:	ACNW		2	2		ACRS		2	2
	AEOD/DOA		1	1		AEOD/DSP/TPAB		1	1
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	NRR/DST/SELB 8D		1	1		NRR/DST/SICB 7E		1	1
	NRR/DST/SPLB8D1		1	1		NRR/DST/SRXB 8E		1	1
	<del>REG FILE 02</del>		1	1		RES/DSIR/EIB		1	1
	RGN2 FILE 01		1	1					
EXTERNAL:	EG&G STUART,V.A		4	4		L ST LOBBY WARD		1	1
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Duke Power Company  
Oconee Nuclear Station  
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**DUKE POWER**

June 14, 1990

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

Subject: Oconee Nuclear Station  
Docket Nos. 50-269, -270, -287  
LER 269/90-07

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report (LER) 269/90-07 concerning actuation of the Emergency Safeguards System due to defective procedure, lack of procedural precautions.

This report is being submitted in accordance with 10 CFR 50.73 (a)(2)(iv). 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  
Station Manager

RSM/ftr

Attachment

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## LICENSEE EVENT REPORT (LER)

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) Oconee Nuclear Station, Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 2 6 9 1				PAGE (3) OF 0 9						
TITLE (4) Actuation of Emergency Safeguards System Due to Defective Procedure, Lack of Procedural Precautions																				
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	5	1	6	9	0	9	0	0	0	7	0	0	0	6	1	4	9	0	N/A	0 5 0 0 0
OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §. (Check one or more of the following) (11)																		
N		20.402(b)				20.406(e)				X 50.73(a)(2)(iv)				73.71(b)						
POWER LEVEL (10)		- 1 0 -				20.406(a)(1)(i)				50.73(a)(2)(v)				73.71(c)						
		20.406(a)(1)(ii)				50.36(e)(2)				50.73(a)(2)(vi)				OTHER (Specify in Abstract below and in Text, NRC Form 366A)						
		20.406(a)(1)(iii)				50.73(a)(2)(i)				50.73(a)(2)(viii)(A)										
		20.406(a)(1)(iv)				50.73(a)(2)(ii)				50.73(a)(2)(vii)(B)										
		20.406(a)(1)(v)				50.73(a)(2)(iii)				50.73(a)(2)(ix)										
LICENSEE CONTACT FOR THIS LER (12)																				
NAME Henry R. Lowery, Chairman Oconee Safety Review Group										TELEPHONE NUMBER 8 1 0 3 8 1 8 5 1 - 1 3 1 0 3 1 4										
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																				
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs										
SUPPLEMENTAL REPORT EXPECTED (14)												EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR				
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)												<input checked="" type="checkbox"/> NO								

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

On May 16, 1990, at 1417 hours, with Unit 1 in a refueling outage the Engineered Safeguards (ES) System, Channels 1 through 6, actuated unexpected as a result of a pneumatic pressure test that was being performed during the implementation of a Nuclear Station Modification (NSM). The NSM required the replacement of Reactor Building (RB) pressure switches and the pressure test of their associated tubing. The pressure switches supply signals to ES Channels 7 & 8 when high RB pressure is sensed. The NSM procedure isolated the pressure switches from their ES Channels but did not isolate the pressure transmitters that also existed within the pressure boundary of the test. When the boundary was pressurized the pressure transmitters, which also monitor RB pressure, supplied a signal that actuated ES Channels 1 through 6. Due to the refueling outage some ES components were out of service, however, those components that were in service operated as expected. The Reactor Operators controlled the components and returned them to normal status. The corrective action revised the procedure to provide for pressure transmitter isolation prior to resuming the test. The root cause of this event was Defective Procedure, Lack of Procedural Precautions with a contributing cause of Inappropriate Action, Lack of Attention to Detail.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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

BACKGROUND

The Engineered Safeguards (ES) System [EIIS:JE] is designed to reduce the severity of a loss-of-coolant accident by maintaining structural integrity of the core, maintaining reactor building integrity and collecting and filtering reactor building penetration leakage. The ES System monitors reactor building pressure by the use of three narrow range pressure transmitters [EIIS:XT] and six pressure switches [EIIS:XIS]. The pressure transmitters and switches are installed in instrument tubing lines that originate in the reactor building, penetrate the containment and enter the auxiliary building penetration rooms where the instruments and isolation valves are located (see Attachment 1). Three of the six pressure switches have their own individual instrument lines. The other pressure switches share their individual instrument lines with three narrow range pressure transmitters. The pressure transmitters and switches provide input to three identical analog Channels A, B and C. The output of each analog channel feeds two or more of eight digital channels (see Attachment 2). The actuation of any particular safeguards action (trip any of eight digital channels) requires two of the three analog Channels A, B or C to provide input to it's respective digital channel.

EVENT DESCRIPTION

On January 22, 1990, Construction and Maintenance Department (CMD) Production Specialist I (PS-I) completed preparation of two procedures developed to control the implementation and verification of Nuclear Station Modification (NSM) ON-12682. The first procedure, TN/1/A/2682/00/AL1 "Disconnection/Termination of Reactor Building Pressure Switches" was written to control the electrical disconnection, connection and isolation of pressure switches. The second procedure, TN/1/A/2682/00/AK1 "Replacement of Reactor Building Pressure Switches" was written to control the removal, installation and testing of the pressure switches. During preparation of the procedures PS-I recognized that the pressure switches provided an actuation signal to the Reactor Protective System (RPS) [EIIS:JC] and the Engineered Safeguards (ES) System, therefore, he provided procedural provisions to isolate them from their RPS and ES System Channels during installation and pressure testing. During the evaluation of the pressure boundary for the pressure test on pressure switches 1BS PS0019, 21 and 23, PS-I recognized that pressure transmitters 1BS PT0004P, 5P and 6P were installed on the same instrument tubing as the pressure switches. PS-I understood that the transmitters only provided information to the computer, therefore no provision was included in the procedures to isolate the pressure transmitters from their ES Channels.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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

On February 7, 1990, the Accountable Engineer (AE) completed his review of the implementing procedures. The AE, while knowledgeable of these instruments, overlooked the transmitter's input to ES Channels 1 through 6 and the impact they would have during the pressure test.

On February 22, 1990, the Qualified Reviewer (QR) completed his review of the implementing procedures. The QR did not identify the omission of the procedural controls for the ES isolation of the pressure transmitters. After several other miscellaneous reviews and approvals, the procedures were approved for implementation on March 21, 1990.

On April 24, 1990, while Unit 1 was shutdown for refueling activities, CMD craft obtained clearance to begin work from Operations and proceeded to install the new pressure switches. The CMD craft completed the installation and prepared the switches for the pneumatic pressure test.

On the morning of May 16, 1990 Nuclear Production Department personnel from the Instrument and Electrical (I&E) section informed the Control Room Operators (ROs) that they would be working on analog Channel A of the ES System that day. This work was not associated with the work being performed on the NSM. The ROs stated that they acknowledged multiple alarms on Channel A during the day, as a result of the I&E work, however no further operator action was required because I&E reset the channels. The Alarm Typer recorded alarms on Channel A beginning at approximately 1036 hours and continuing until approximately 1107 hours.

On this same day, with the new pressure switches installed and electrically isolated, as required by the NSM procedure TN/1/A/2682/00/AK1, Performance Technicians proceeded to pressure test the switches and their associated tubing. At 1338 hours, the Performance Technicians pressurized switch 1BS PS0023 and pressure transmitter 1BS PT0006P causing the transmitter to send a signal through analog Channel C to digital ES Channels 1 through 6 and an alarm to the control room on analog Channel C. The Operators acknowledged the alarm but did not take action. The Operators stated that due to the alarms received on Channel A as a result of the I&E work and the close proximity of the alarm light locations on the panel for Channels A & C that they assumed that the alarm was caused, and would be reset, by I&E. At approximately 1418 hours, with ES analog Channel C tripped, the Performance Technicians pressurized switch 1BS PS0021 and pressure transmitter 1BS PT0005P causing the transmitter to send a signal through analog Channel B to digital ES Channels 1 through 6. This satisfied the two out of three trip logic and caused the unanticipated actuation of ES System Channels 1 through 6.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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

Unit 1 was in a refueling outage with fuel partially removed. Fuel movement, to reload the core, was in progress. The High Pressure Injection (HPI) (EIIS:BQ) pumps did not start because they were removed from service for the refueling outage. Keowee Hydro station, the onsite emergency power source, started but remained in standby status. The Reactor Building (RB) isolation initiated and isolated the radiation monitors (RIAs), however the remainder of the RB was already isolated due to the refueling operation that was in progress. The second Low Pressure Injection (LPI) (EIIS:BP) pump started as designed. The first LPI pump was already in operation providing cooling to the reactor. After an investigation it was identified that the ES actuation was caused by the pressure test being performed by NSM ON-12682. The pressure test and fuel movement were stopped near the beginning of the event. The ROs stopped Keowee Hydro and one LPI pump. They realigned the systems to their normal refueling configurations and restarted the RB RIAs. At approximately 1511 hours, the event was terminated and fuel movement restarted.

CONCLUSIONS

The root cause of the actuation of the Engineered Safeguards (ES) System is due to a Defective Procedure, Lack of Procedural Precautions. Production Specialist I (PS-I) had properly prepared many mechanical Nuclear Station Modification (NSM) procedures but had not prepared an instrumentation NSM procedures during his 2 1/2 year employment at Duke Power Company. However, PS-I had attended Oconee systems training and had instrumentation experience from previous employment. During the preparation of procedures TN/1/A/2682/00/AL1 "Disconnection/Termination of Reactor Building Pressure Switches" and TN/1/A/2682/00/AK1 "Replacement of Reactor Building Pressure Switches" PS-I appropriately evaluated the boundary for the pneumatic pressure test that was required as a result of the installation of new pressure switches. PS-I appropriately provided provisions to isolate the pressure switches from their ES channels. During the evaluation PS-I recognized that other components (pressure transmitters) existed within the boundary. PS-I believed, based on his previous experience, that pressure switches actuate devices while pressure transmitters provide information. Additionally, the design drawing for the pressure switches clearly stated that their outputs were to one of three inputs to ES analog Channels A, B or C while the same drawings simply stated for the transmitters that their outputs were to the "COMPUTER & ESG". This reinforced PS-I's belief that the transmitters just provided information to the computer, therefore, he failed to provide adequate procedural precautions to isolate the ES System during the pressure test.

LICENSEE EVENT REPORT (LER)  
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YEAR	SEQUENTIAL NUMBER	REVISION NUMBER							
90	007	00							

TEXT (If more space is required, use additional NRC Form 368A's) (17)

Additionally, the Accountable Engineer (AE) and the Qualified Reviewer (QR) reviewed the procedure for accuracy and failed to identify that a flaw existed in the procedure. The AE stated that he did not consider the pressure transmitters because he was focusing on the pressure switch inputs and their isolation. This contributed to the unanticipated actuation of the ES System Channels 1 through 6 due to the defective procedure.

The Control Room Operators (ROs) received the initial alarm on ES Channel C at 1338 hours and the ES System actuation occurred at 1418 hours. This gave the ROs 40 minutes to identify what had caused the initial alarm and avert the ES System actuation. The ROs did not pursue the cause of the Channel C alarm because, knowing that the alarm was not initiated by high Reactor Building or Reactor Coolant System [EIIS:AB] pressure due to the refueling outage, they assumed that it was a Channel A alarm caused by Instrument and Electrical (I&E). They failed to recognize that the alarm was on Channel C instead of Channel A. This is assigned as a contributing cause of Inappropriate Action, Lack of Attention to Detail.

There were no radiation exposures, injuries, or releases of radioactive material associated with this incident. There were no equipment failures, therefore, NPRDS reportability is not required.

A review of incidents occurring over the last two years revealed five Licensee Event Reports (LER) with a root cause of defective procedure. None of the LERs involved the unanticipated actuation of the ES System and only one (reference LER 287/88-04) involved the implementation of a NSM. LER 287/88-04 was a voluntary LER addressing Unit 3 load shed and the subsequent emergency start of Keowee Hydro units caused by work being performed on the non-safety related Main Feeder Bus Monitor Panel. A review of incidents occurring over the last two years with a cause of inappropriate action revealed three LERs (reference LER 269/89-01, LER 269/89-13, and LER 287/89-05) that caused the actuation of protective systems. Two of these events were the actuation of the Reactor Protective System (RPS) and the other event was the actuation of the ES System. The cause of the actuation of the ES System reported in LER 287/89-05 was the failure to follow the procedure where this LER reported that the ROs failed to recognize an alarm due to their lack of attention to detail. The corrective action for the previous events would not have been expected to prevent this event. Therefore, this incident is considered non-recurring. The procedures (TN/1/A/2682/00/AK1 and TN/1/A/2682/00/AL1) were revised to provide isolation of the pressure transmitters from their ES Channels which prevented this event from recurring during the completion of the NSM.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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

CORRECTIVE ACTIONSImmediate

- 1) The cause of the Emergency Safeguards (ES) System actuation was investigated by Operations personnel.
- 2) The refueling operation was stopped.
- 3) The pressure testing associated with the Nuclear Station Modification (NSM) was stopped.
- 4) ES equipment was adequately controlled and restored to normal operating configuration.

Subsequent

- 1) Procedures TN/1/A/2682/00/AK1 and TN/1/A/2682/00/AL1 were revised to include provisions to isolate the pressure transmitters during the testing.
- 2) The Production Specialist I, Accountable Engineer and Qualified Reviewer were cautioned to adequately review all aspects of a Nuclear Station Modification to insure that their procedures are correct.

Planned

- 1) All electrical and mechanical Projects and Construction and Maintenance Division Technical Support personnel shall be made aware of this event and the consequences for these inadequate procedural precautions.
- 2) The Reactor Operators involved in this incident will be cautioned to fully evaluate each system alarm.
- 3) All Reactor Operators shall review this event to ensure that they are cognizant of the necessity to fully evaluate each system alarm.

SAFETY ANALYSIS

At the time of this event Unit 1 was in a refueling shutdown with the core partially de-fueled. Fuel movement to reload the core was in progress. When the tubing was pressurized due to the test, the pressure transmitters responded as they were designed and initiated the actuation of Emergency Safeguard (ES) System Channels 1 through 6. The High Pressure Injection



LICENSEE EVENT REPORT (LER)  
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TEXT (If more space is required, use additional NRC Form 386A's) (17)

(HPI) pumps did not start because they were removed from service for the refueling outage. Keowee Hydro station started but remained in standby status because no emergency power was needed. The Reactor Building (RB) isolation initiated and isolated the radiation monitors (RIAs), however the remainder of the RB was already isolated due to the refueling operation that was in progress. The second Low Pressure Injection (LPI) (EIIIS:BP) pump started as designed and provided flow to the reactor. The first LPI pump was already in operation providing cooling to the reactor. The impact of the LPI pump operation was minimal because the Borated Water Storage Tank (one source of LPI suction) had been emptied to fill the refueling canal for the refueling operation and had been isolated. Additionally, the LPI system had been throttled for operation in the refueling mode resulting in a low recirculated flow without the addition of significant fluid volume. No unit, system or operation was adversely affected by the inadvertent actuation. No limits were exceeded by this event.

There were no releases of radioactive materials, radiation over-exposures, or personnel injuries as a result of this event.

This event is considered to be insignificance with respect nuclear safety. There was no impact to the health and safety of the public.

LICENSEE EVENT REPORT (LER)  
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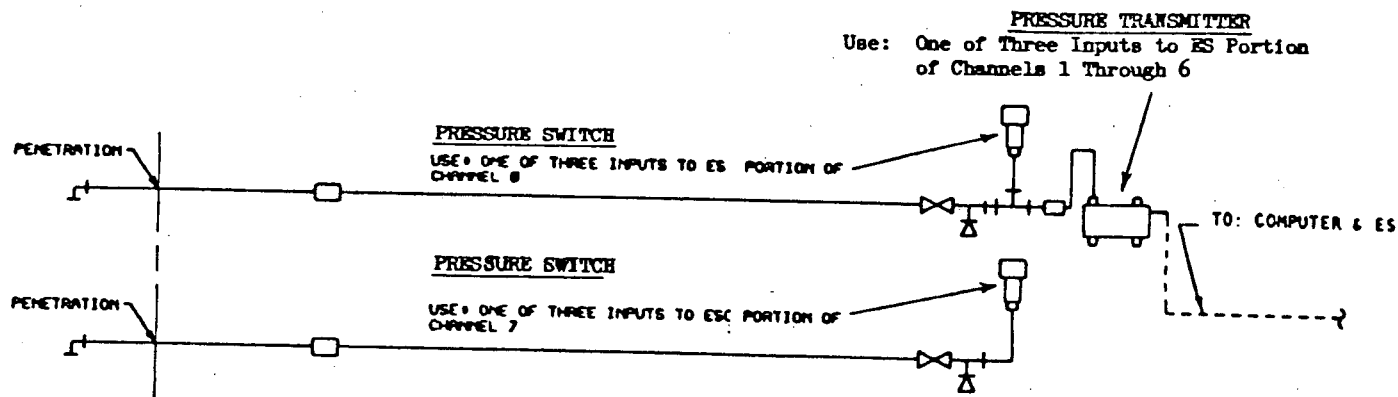
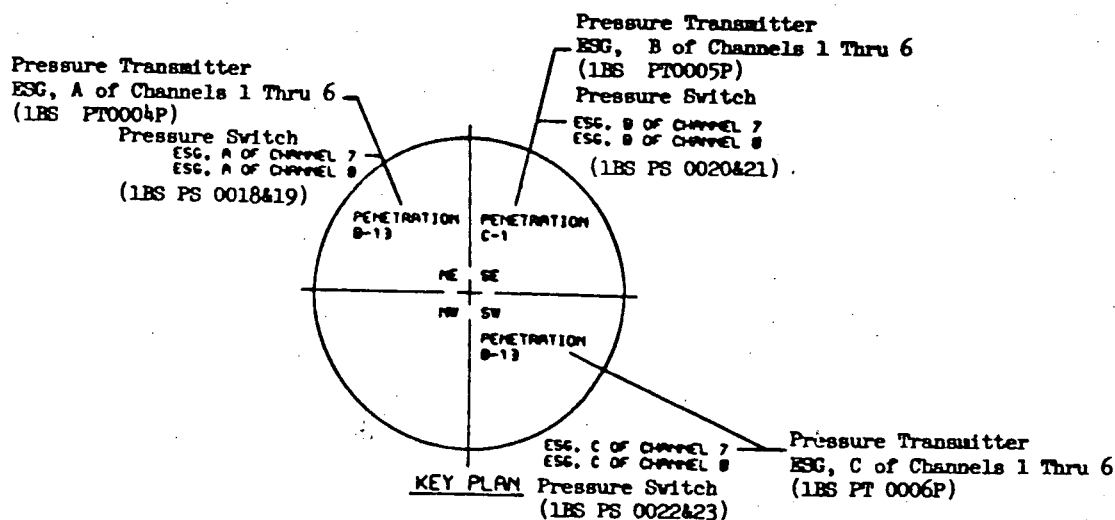
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TEXT (If more space is required, use additional NRC Form 388A's) (17)

## ATTACHMENT 1



TYPICAL INSTRUMENT INSTALLATION

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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-630), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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

## ATTACHMENT 2

