

# ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

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 FACIL:50-269 Oconee Nuclear Station, Unit 1, Duke Power Co.  
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DOCKET #  
05000269

SUBJECT: LER 89-008-00:on 890522,cable & equipment room fire  
 suppression sprinkler sys declared inoperable.

W/8 ltr.

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 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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Oconee Nuclear Station  
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(803) 882-5363



DUKE POWER

June 21, 1989

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

Subject: Oconee Nuclear Station  
Docket Nos. 50-269, -270, -287  
LER 269/89-08

Gentlemen:

Pursuant to 10CFR 50.73 Sections (a) (1) and (d), attached is Licensee Event Report (LER) 269/89-08 concerning inadequate supply pressure to cable and equipment room sprinklers.

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,

M. S. Tuckman  
Station Manager

SWB

Attachment

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## LICENSEE EVENT REPORT (LER)

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| FACILITY NAME (1)<br>Oconee Nuclear Station, Unit 1   |  |  |        |  |  |           |  |  |  | DOCKET NUMBER (2)<br>0 5 0 0 0 2 6 9 |  |                    |  |  |                 |  |  |                  |  | PAGE (3)<br>1 OF 0 6                                |           |  |  |              |  |  |                               |  |  |                |  |  |     |  |  |  |  |  |  |                  |  |  |                 |  |  |  |  |  |  |  |  |  |  |  |  |
| TITLE (4) Declared Cable and Equipment Rooms Fire Suppression Sprinkler Systems Inoperable<br>Due To A Design Deficiency, Deficient Communication |  |  |        |  |  |           |  |  |  |                                      |  |                    |  |  |                 |  |  |                  |  |   |           |  |  |              |  |  |                               |  |  |                |  |  |     |  |  |  |  |  |  |                  |  |  |                 |  |  |  |  |  |  |  |  |  |  |  |  |
| 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) |  |  |                 |  |  |  |  |  |  |  |  |  |  |  |  |
|   |  |  |        |  |  |           |  |  |  |                                      |  |                    |  |  |                 |  |  |                  |  |   |           |  |  |              |  |  | Oconee, Unit 2                |  |  |                |  |  |     |  |  |  |  |  |  | 0 5 0 0 0 2 7 0  |  |  |                 |  |  |  |  |  |  |  |  |  |  |  |  |
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| OPERATING MODE (9)<br>N   |  |  |        |  |  |           |  |  | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11) |                                      |  |                    |  |  |                 |  |  |                  |  |   |           |  |  |              |  |  |                               |  |  |                |  |  |     |  |  |  |  |  |  |                  |  |  |                 |  |  |  |  |  |  |  |  |  |  |  |  |
| POWER LEVEL (10)<br>1 0 0   |  |  |        |  |  |           |  |  | 20.402(b)  |                                      |  |                    |  |  |                 |  |  | 20.406(c)        |  |   |           |  |  |              |  |  | 50.73(a)(2)(iv)               |  |  |                |  |  |     |  |  | 73.71(b)   |  |  |  |                  |  |  |                 |  |  |  |  |  |  |  |  |  |  |  |  |
|   |  |  |        |  |  |           |  |  | 20.406(a)(1)(i)  |                                      |  |                    |  |  |                 |  |  | 50.38(c)(1)      |  |   |           |  |  |              |  |  | 50.73(a)(2)(v)                |  |  |                |  |  |     |  |  | 73.71(c)   |  |  |  |                  |  |  |                 |  |  |  |  |  |  |  |  |  |  |  |  |
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|   |  |  |        |  |  |           |  |  | 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)(iii) |  |   |           |  |  |              |  |  | 50.73(a)(2)(viii)(B)          |  |  |                |  |  |     |  |  |  |  |  |  |                  |  |  |                 |  |  |  |  |  |  |  |  |  |  |  |  |
| 20.406(a)(1)(v)   |  |  |        |  |  |           |  |  | 50.73(a)(2)(iii)   |                                      |  |                    |  |  |                 |  |  | 50.73(a)(2)(ix)  |  |   |           |  |  |              |  |  |                               |  |  |                |  |  |     |  |  |  |  |  |  |                  |  |  |                 |  |  |  |  |  |  |  |  |  |  |  |  |
| LICENSEE CONTACT FOR THIS LER (12)  |  |  |        |  |  |           |  |  |  |                                      |  |                    |  |  |                 |  |  |                  |  |   |           |  |  |              |  |  |                               |  |  |                |  |  |     |  |  |  |  |  |  |                  |  |  |                 |  |  |  |  |  |  |  |  |  |  |  |  |
| NAME<br>Henry R. Lowery, Oconee Safety Review Group   |  |  |        |  |  |           |  |  |  |                                      |  |                    |  |  |                 |  |  |                  |  | TELEPHONE NUMBER<br>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 NPDs |  |  | CAUSE           |  |  | SYSTEM           |  |   | COMPONENT |  |  | MANUFACTURER |  |  | REPORTABLE TO NPDs            |  |  |                |  |  |     |  |  |  |  |  |  |                  |  |  |                 |  |  |  |  |  |  |  |  |  |  |  |  |
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| 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 May 23, 1989, at approximately 1430 hours, with Unit 1 and 3 at 100% full power and Unit 2 in a refueling outage, Duke Power's Design Engineering Department identified that the sprinkler systems for the cable and equipment rooms of each unit were not adequately designed to operate in accordance with current operational guidance of the High Pressure Service Water (HPSW) System. This discovery was made during an engineering review of the HPSW system performed in conjunction with a Nuclear Station Modification. The root cause of this incident was determined to be Design Deficiency, Deficient Communication. The immediate corrective action was to revise operational guidance for the HPSW system to require the manual starting of an HPSW pump after valving in the sprinkler system in the event of a fire in the cable and equipment rooms.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES 8/31/85

|   |  |                |                      |                    |          |   |        |
|---|--|----------------|----------------------|--------------------|----------|---|--------|
| FACILITY NAME (1)<br><br>Oconee Nuclear Station, Unit 1 | DOCKET NUMBER (2)<br><br>0 5 0 0 0 2 6 9 8 9 - | LER NUMBER (8) |                      |                    | PAGE (3) |   |        |
|   |  | YEAR           | SEQUENTIAL<br>NUMBER | REVISION<br>NUMBER |          |   |        |
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

## BACKGROUND

The High Pressure Service Water System (HPSW) [EIIS:KQ] consists of two high pressure pumps [EIIS:P] and one jockey pump, an elevated water storage tank, and associated piping and valves. HPSW pump suction is taken from Units 1, 2, or 3 Condenser Circulating Water System (CCW) [EIIS:BS]. The HPSW system supplies water to the station fire protection system. Sprinkler Systems [EIIS:KP] are provided in the cable and equipment rooms for fire suppression with the capability of supplying a density of 0.10 gpm/sq. ft. These sprinkler systems are normally valved out of service and require manual action to be placed into service. In normal mode the HPSW system operates at 117 psig, this pressure being maintained by the jockey pump running continuously. The water level is maintained in the elevated water storage tank by means of an altitude valve [EIIS:V]. The operation of the system is as follows:

If pressure drops below normal, HPSW pumps A and B may be operated manually. If normal pressure is not restored and pressure at the altitude valve drops, the valve will open and release the supply from the tank. As tank water level drops, probes inside the tank will actuate a level alarm. When the water level drops to 70% of capacity, the first HPSW pump will automatically start (if not already in operation). If the tank level continues to drop, at 60% capacity the second HPSW pump will start automatically (if not already in operation).

In the event of a fire in the plant, water for fire protection is automatically supplied by the HPSW System Elevated Water Storage Tank with redundant HPSW pumps replenishing tank inventory. Either pump, if operated manually, can provide water for fire protection independent of the Elevated Water Storage Tank. In this mode, HPSW system pressure can be increased beyond that which is normally limited by the elevation of the tank. Operation of a pump manually has been an option rather than a procedural requirement.

Technical Specifications (TS) 3.17.2 requires the Fire Suppression Water System [EIIS:KP] to be operable. The system shall consist of 2 HPSW pumps with a capacity of 6000 gpm each and automatic initiation logic, to supply water to the sprinkler systems. TS 3.17.3 requires operability of the sprinkler systems in safety related areas.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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| Oconee Nuclear Station, Unit 1 | 0500026989        | —              | 008               | —               | 00       | 03 | OF 06 |

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

## EVENT DESCRIPTION

In June 1978, a commitment was made to the NRC to install sprinkler systems in the cable and equipment rooms of all three units. These systems were designed to be connected to the existing High Pressure Service Water (HPSW) System and were designed to supply a density of 0.10 gpm/sq.ft. During September and October of 1978, the systems design was reviewed and approved by Design Engineering. In September and October of 1980, the sprinkler systems were installed and placed in service as a part of Nuclear Station Modification (NSM) 819, which encompassed a number of enhancements to the station's fire protection and detection systems.

A design deficiency was identified on October 23, 1987, involving the operability of the HPSW System to supply loads that are required to protect safety related components as specified in Technical Specification 3.17 (examples: Cable Rooms, Equipment Rooms, and Cable Shaft Sprinkler Systems). Licensing Event Report (LER) 269/87-11 documented this design deficiency with a planned corrective action for Design Engineering to determine the flow and pressure requirements for each Technical Specification sprinkler system. Design Engineering performed calculations OSC-2661, -2758, and -2794 as required by the corrective actions.

In May 1989, Design Engineer 'A', while performing a design calculation review of the HPSW System involving a future NSM, acknowledged that the design calculations performed as a result of LER 269/87-11 required the operation of an HPSW pump to meet supply pressure requirements for sprinklers in the cable and equipment rooms. Design Engineer 'A', in further review, contacted ONS-Operations personnel to discuss and develop a clear understanding of system operations. This discussion revealed that normal operation of the system would not provide supply pressure requirements and that the operating considerations assumed in the design basis calculations were invalid. Specifically, the HPSW pump would not be in operation until the automatic initiation logic of the HPSW system started the pump.

A Problem Investigation Report was initiated on May 22, 1989, at 1430 hours, due to this finding. The immediate compensatory action resulted in ONS-Operations making an entry in the Senior Reactor Operators log and turnover sheets requiring the manual start of an HPSW pump in the event of a fire in the cable or equipment rooms. Subsequent actions included plans to add a warning statement in the ONS Pre-Fire Plans for the cable and equipment rooms.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

## CONCLUSION

The Sprinkler System demands in the cable and equipment rooms can not be met without the operation of a High Pressure Service Water (HPSW) pump. This fact has been confirmed by review of design engineering calculations OSC-2661, -2758, -2794. It is concluded that the cause of this incident was the failure to assure that the HPSW System would be operated in accordance with the design basis of the Sprinkler System. The sprinkler system was accepted by Duke Power's Design Engineering Department and installed in September and October of 1980. In May-October, 1987, a system demands study was performed by Design Engineering (DE) on the cable and equipment room sprinkler systems. The required operation of the HPSW pump to ensure proper operation of the sprinkler systems was not communicated to the station. It was stated during this investigation that Design Engineering, in 1987, was of the impression that the HPSW pump would be manually started after valving into service the sprinkler system for the cable and equipment rooms. This incident is considered a non-recurring event. This determination is based on the present guidelines for recurring events that two or more of the same events have occurred within the past twelve months. However, the scope of the corrective actions stated in LER 269/87-11 would have identified this problem if improper assumptions had not been used in performing the calculations.

The root cause of this incident is classified as a Design Deficiency, Deficient Communication, in that sufficient communication did not occur between Design Engineering and Station Engineering / Operating Personnel. Current established Design Engineering policies and programs such as "TOPFORM" will continue to require the design team to investigate in depth the effects of modifications. It was "TOPFORM" strategies that discovered this anomaly.

A program entitled Design Basis Documentation is currently being established within Duke Power Company. The purpose of this program is to review certain plant systems and to document the design basis for each of these systems in an easily retrievable manner. The HPSW system will be included in this program. This program will enhance engineering's ability to be more responsive and thorough in design work, operability evaluations, and other technical support.

This incident does not involve an actual component failure or malfunction and is therefore not reportable to NPRDS. There were no radioactive releases, radiation exposures, or personnel injuries resulting from this event.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

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| Oconee Nuclear Station, Unit 1 | 0500026989        | —              | 008               | —               | 00       | 05 | OF 06 |

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

## CORRECTIVE ACTIONS

## Immediate

1. Operational guidance of the HPSW System was changed to require the manual start of an HPSW pump in the event of a fire in the cable and equipment rooms.

## Subsequent

1. A warning statement was included in the appropriate ONS-Fire Plans to manually start an HPSW pump to ensure adequate water flow from the Sprinkler System.

## Planned

## Internal

1. Production Support Training Department will revise the appropriate lesson plans in the operator training program to include the HPSW pump requirement in the event of sprinkler system initiation.
2. This report will be reviewed by ONS Project engineers and Operations staff personnel with emphasis placed on the importance of open communications between design and station departments.

## External

1. Final Safety Analysis Report (FSAR), section 9.5, will be revised by Design Engineering to accurately describe the High Pressure Service Water (HPSW) System operation, in respect to design requirements, of the cable and equipment room sprinkler systems.
2. Design Engineering's calculations OSC-2661, OSC-2758, and OSC-2794 will be revised to evaluate sprinkler system operation by means of the elevated water storage tank.
3. This report will be reviewed by Design Engineering personnel with additional emphasis placed on the importance of open communications between design and station operations.
4. Design Engineering will include the HPSW System in the Design Basis Documentation program.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES 8/31/85

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| Oconee Nuclear Station, Unit 1 | 0 5 0 0 0 2 6 9 8 9 | —              | 0 0 8             | —               | 0 0      | 0 6 | OF 0 6 |

TEXT (If more space is required, use additional NRC Form 308A's) (17)

## SAFETY ANALYSIS

The sprinkler systems provided in the cable and equipment rooms are for fire suppression when the valves controlling the systems are manually opened. The sprinklers are supplied by the High Pressure Service Water (HPSW) system which is primarily designed for fire protection.

The operational guidance formerly provided for operation of the HPSW system would not have prevented sprinkler system operation, however, the stipulated 0.10 gpm/sq. ft. flow rate could not have been supplied. An evaluation performed by Design Engineering, in June 1989, indicated that operation according to the guidance formerly provided would have assured a flow rate of at least 0.081 gpm/sq. ft. at the worst case sprinkler location (Unit-3 Cable Room). This minimum flow would have been provided by the Elevated Water Storage Tank (EWST) until automatic start of an HPSW pump. The HPSW pump starts automatically at a level of 70,000 gallons in the EWST. Manual hose stations are located in the area of the cable rooms along with portable fire extinguishers. Ionization detectors are present in the cable rooms to provide quick notification of a possible fire.

Fire barriers separate the cable rooms from other plant areas and at least two remote and separate entrances are available for fire brigade access. Fire brigade personnel are on site continuously and are trained and staffed to be self-sufficient in combatting fires inside the protected area. In addition, the Standby Shutdown Facility is designed to provide a means to achieve and maintain a hot shutdown condition in case of fire with subsequent failure of plant systems including those in the cable rooms. Also, upon receiving a low pressure alarm on the HPSW header after actuation of the sprinkler system, a conscious operational decision could have been made to start an HPSW pump. Likewise, with the availability of other systems and the personnel trained to detect and control fires, little chance existed for a fire threatening plant safety. Therefore, this event is considered not to be significant with respect to the health and safety of the public. A fire has not occurred in the Cable or Equipment rooms nor has the sprinkler systems for these areas been operated. There were no releases of radioactive materials, radiation exposures, or personnel injuries involved with this incident.