

# ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

## REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:8907240220 DOC.DATE: 89/07/19 NOTARIZED: NO  
FACIL:50-270 Oconee Nuclear Station, Unit 2, Duke Power Co.

DOCKET #  
05000270

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RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 89-005-00, on 890605, Unit 2 reactor coolant sample  
isolation valves failed to meet EQ requirements.

W/8 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 11  
TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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**DUKE POWER**

July 19, 1989

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

Subject: Oconee Nuclear Station  
Docket Nos. 50-269, -270, -287  
LER 270/89-05

Gentlemen:

Pursuant to 10CFR 50.73 Sections (a) (1) and (d), attached is Licensee Event Report (LER) 270/89-05 concerning unmet Environmental Qualification requirements.

This report is being submitted on a voluntary basis. 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

Attachment

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July 19, 1989

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## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Oconee Nuclear Station, Unit 2										DOCKET NUMBER (2) 0 5 0 0 0 2 1 7 0 1										PAGE (3) 1 OF 0 1 9	
TITLE (4) Unit 2 Reactor Coolant Sample Isolation Valves Failed to Meet Environmental Qualification Requirements Due to Inappropriate Actions with a Contributing Cause of Management Deficiency																					
EVENT DATE (5)			LER NUMBER (6)				REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)											
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES					DOCKET NUMBER(S)							
0 6	0 5	8 9	8 9	0 0 5	0 0	0 7	1 9	8 9	Oconee, Unit 1					0 5 0 0 0 2 1 6 1 9							
									Oconee, Unit 3					0 5 0 0 0 2 1 8 1 7							
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(c)				50.73(a)(2)(iv)				73.71(b)							
POWER LEVEL (10)		20.406(a)(1)(i)				50.36(c)(1)				50.73(a)(2)(v)				73.71(c)							
0 0 0		20.406(a)(1)(ii)				50.36(c)(2)				50.73(a)(2)(vi)				X 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)				Voluntary							
		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										TELEPHONE NUMBER											
Henry R. Lowery, Oconee Safety Review Group										AREA CODE		8 1 0 3 8 8 5 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 NRC		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC											
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 5, 1989, with Unit 2 in a refueling outage (RFO) and Units 1 and 3 at 100% full power, a potential leak point was discovered during maintenance on 2RC-162 (Sample Isolation Valve) between the electrical entrance fitting of the valve and the point at which the cable was potted. Duke Power Design Engineering subsequently performed an operability evaluation and determined that the as-found method of cable entrance sealing was not leaktight. Additionally, 2RC-163, a valve in series with 2RC-162, was inspected and found similarly connected. These valves are required to meet Environmental Qualification (EQ) sealing requirements for submerged operation. The root cause of this event was determined to be Inappropriate Action, with a contributing cause of Management Deficiency. The electrical entrance sealing of both valves was corrected to comply with EQ requirements during the Unit 2 RFO.

## 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 2	050002710819	-	0015	-	01	02	OF 09

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

## BACKGROUND

The Reactor Coolant [EIIS:AB] Sample Isolation Valves [EIIS: V] are physically located below the flood line inside the reactor building containment and are required to be Environmental Qualified (EQ) for submerged operation. The sample isolation valves and associated piping provide one of several means for obtaining post accident information. The Post Accident Liquid Sampling (PALS) system [EIIS:IP] is a post-TMI requirement. This NRC requirement was issued as NUREG-0737, Section II.B.3. The PALS system is designed to allow for remote sampling of reactor coolant.

The one inch valves are solenoid operated with a dual-piloted disc, used to control the flow of liquids. Each valve consists of a disc and bonnet assembly surrounded by a solenoid assembly and mounted to a stainless steel body. The solenoid assembly consists of a coil and housing which is potted and sealed. Electrical power is removed from these valves during normal plant operations to prevent any spurious operation and loss of reactor coolant inventory. The valves are closed when de-energized.

These safety related valves do not perform an accident mitigating function, however, they are required to remain closed or be closed to maintain reactor coolant system boundary isolation and containment isolation.

Technical Specification 6.4.4 requires the station to have a program that ensures the capability to obtain and analyze reactor coolant under accident conditions. Technical Specification 6.7.1 requires all safety-related electrical equipment in the facility to be qualified in accordance with the provisions of Division of Operating Reactors "Guidelines for Evaluating Environmental Qualification of Class 1E Electrical Equipment in Operating Reactors" or NUREG-0588.

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TEXT (If more space is required, use additional NRC Form 306A's) (17)

## EVENT DESCRIPTION

Reactor Coolant Sample Isolation Valves 2RC-162 and 2RC-163 were installed under a Nuclear Station Modification which provided Unit 2 with a Post Accident Liquid Sampling (PALS) system. This modification provided improved sampling capability of the reactor coolant system following an accident in which there is core degradation.

Duke Power Company notified the NRC Staff on August 26, 1983, that two Post Accident Sample System valves from each unit, formerly considered Environmental Qualified (EQ), were found to be unqualified for submerged operation. The two valves referenced in the 1983 letter were RC-162 and RC-163. The NRC was also informed that a modification was underway to correct the EQ concerns with the submerged operation of the valves.

In March 1985, Nuclear Station Modification (NSM) ON-1396, Revision 2, Part A, was completed that modified 2RC-162 and 2RC-163. This revision was specifically performed to enable these valves to operate submerged in water. The old solenoids were removed and new solenoids, seals, and "O"-rings were installed. Limit switches were set and the valve operators were tested.

In the course of this incident investigation, it was found that the NSM implementation procedure (TN/2/A/1396/2A, Procedure to Modify Valves 2RC-162 and 2RC-163) directed the Instrument and Electrical (I&E) technicians to perform a vacuum test on the valves and to pot the electrical leads in accordance with a referenced approved procedure (IP/0/A/200/29A, Sealing Cable Entrance Fittings On Class 1E Devices).

Further investigation of NSM documentation revealed that NSM ON-1396, Rev. 2, Part A, implementation procedure was not performed correctly in 1985. Records on file indicated the vacuum test performed on 2RC-162 obtained satisfactory results. However, the vacuum test on 2RC-163 showed unsatisfactory results as stated in the procedure criteria. The criteria stated, "to accept the valve for use if the difference between the initial vacuum test and the final vacuum test was less than 0.1 inches of mercury". Test results indicated the difference on 2RC-163 was 0.2 inches of mercury. This vacuum test measured the solenoid enclosure seal.

The implementation procedure step which required the electrical cable sealing of both valves in accordance with the proper procedure (IP/0/A/200/29A) was marked N/A (Not Applicable). A discussion with the personnel involved in this work in 1985 indicated that the EQ seal was not

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

broken in the course of NSM implementation, therefore, they believed that any additional sealing was not required. Documentation was not found on file that explained the reason(s) for marking the procedure step N/A (Not Applicable), however, the step was initialled by an I&E supervisor which indicates that his approval was given. In addition, completed procedures were found on file that indicated several management reviews were performed on the completed documentation. Management signatures were found that confirmed this action.

On June 5, 1989, Station instrument and electrical personnel were electrically disconnecting 2RC-162 so that maintenance could be performed to correct a seating problem identified on work request # 14250C. The cable entrance of this valve was discovered sealed using a Crouse-Hinds UNY conduit union in conjunction with Scotchcast 9 potting. This arrangement was considered a preferred method of sealing cable entrances by Duke Power Company until 1983 when subsequent testing indicated that this method was not leaktight. 2RC-163 was also inspected and a similar connection was found.

A problem investigation report was initiated on June 6, 1989, at approximately 1200 hours, by the Instrument and Electrical Section upon confirming the sealing deficiency with Design Engineering. The subsequent corrective actions were to change the cable entrance arrangement, seal and retest both isolation sample valves on Unit 2 during the current outage. Sealing was done in accordance with a revised installation procedure to provide a qualified seal. Units 1 and 3 valves will be inspected and upgraded as required during the next outage of sufficient duration.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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## CONCLUSION

The root cause of this incident is classified as Inappropriate Action, lack of attention to detail with a contributing cause of Management Deficiency, deficient procedure review.

The Instrument and Electrical technicians and supervisors failure to comply with the procedure step to pot the electrical leads in accordance with the proper referenced procedure is classified as Inappropriate Action, lack of attention to detail. This inappropriate action, of marking a procedure step N/A (Not Applicable) when the step was required to obtain the proper cable entrance arrangements and Environmental Qualification requirements, rendered 2RC-162 and 163 unqualified for submerged operation. Also, their failure to recognize that the vacuum test results on 2RC-163 did not comply with the requirements of the implementation procedure is classified as Inappropriate Action, lack of attention to detail. Design Engineering contacted Target Rock Corporation, the valve supplier, to determine the significance of the higher than expected vacuum test results. Target Rock concluded that the additional leakage would be negligible in terms of water in-leakage into the valve and/or the operability of the valve. This contact was made during this investigation.

A contributing cause of this incident was a Management Deficiency, deficient procedure review. Station policies required a completed procedure review of the work performed under this modification by both management personnel in the Instrument and Electrical Section (superintendent and general supervisor) and the Projects Section (accountable engineer). The two implementation procedure violations listed above were not found or corrected as a result of the required procedure review by these individuals.

Oconee Nuclear Station Directive 2.2.1 (Station Procedures) has been changed since 1985 to provide more specific procedure use and adherence instructions. Specifically, step 9.8 defines the conditions in which a procedure step(s) may be declared "Not Applicable" (N/A). The procedure now includes the accountable engineer's initials and if the determination to N/A the step is not obvious, a notation must be included in the procedure to aid in reviewing the procedure. In addition, a Project Services Section Manual 4.6 has since been developed and contains detailed instructions on how to perform a completed package review. This document was originally developed on May 6, 1985. The above documents and their requirements should assist management in their responsibilities to accurately review completed procedures.

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Due to the cable entrance sealing method found on 2RC-162 and 2RC-163, it is reasonable to believe that the Unit 2 Post Accident Sampling (PALS) system would have been inoperable under flooded conditions at the valve locations. Likewise, it is possible that Unit 1 PALS system would also be inoperable given the same post accident submerged conditions. However, in October 1988, Nuclear Station Modification (NSM) 32614 (Installation of PALS II PLUS) was implemented on Unit 3 that provided two additional reactor coolant sample pathways. These alternate pathways would have allowed the system on Unit 3 to be operable. Similar modifications will be implemented on Units 1 and 2 under NSMs 12614 and 22614. Target dates for implementation are April 1, 1990 and August 1, 1990 respectively. The implementation of these NSMs will upgrade the station capabilities to obtain reactor coolant samples in the event an accident occurs that would warrant such sampling.

The subsequent corrective actions to upgrade the cable entrance arrangements, the environmental qualification (EQ) seals, and to retest the valve operators for Unit 2 RC-162 and RC-163 has now satisfied the EQ requirements for submerged operation. Since other sample means are available for assessing post accident conditions, no immediate action was required to inspect Units 1 and 3. A commitment has been made to inspect and correct, as needed, RC-162 and RC-163 on Units 1 and 3 at the next outage of sufficient duration.

This incident does not involve an actual component failure or malfunction and is not NPRDS reportable. There were no radioactive releases, radiation exposures, or personnel injuries resulting from this event. No accident has occurred that required the use of the Post Accident Sampling System. A review of events within the last year did not reveal any similar events, therefore this event is listed as nonrecurring.

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

## CORRECTIVE ACTIONS

## Immediate

1. Duke Power Company Design Engineering was requested to perform an Operability Evaluation as a result of the findings identified on Problem Investigation Report 2-089-0086.

## Subsequent

1. 2RC-162 and 2RC-163 were vacuum tested to ensure a proper seal on the solenoid enclosures.
2. Electrical cable entrances for 2RC-162 and 2RC-163 were properly sealed in accordance with Environmental Qualification requirements.

## Planned

## Internal

1. The Station Instrument and Electrical (I&E) Section Manager will prepare and distribute a letter to all appropriate I&E personnel addressing the importance of following procedure requirements. This written emphasis/instruction will be discussed in crew meetings.
2. The Station I&E Section Manager will address the necessity of proper procedure reviews to all I&E supervisors and general supervisors.
3. Inspection and upgrade of the cable entrance arrangements and the Environmental Qualification seals on RC-162 and RC-163 for Units 1 and 3 will be performed.
4. The Station Projects Section will provide training to all accountable engineers to ensure their full understanding of the requirements necessary to conduct a completed procedure review.

## External

None

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMS NO 3190-0104

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TEXT (If more space is required, use additional NRC Form 364A's) (17)

## SAFETY ANALYSIS

Duke Power Company Design Engineering (DE) during an Operability Evaluation of this event, evaluated other post accident submerged equipment. They determined that other equipment cable entrances had been appropriately sealed and that this situation was unique to these Oconee Target Rock solenoid valve applications.

Water intrusion into the solenoid housing of RC-162 and RC-163 could render the valves inoperable from the standpoint of opening. If this event did occur and the Post Accident Liquid Sampling (PALS) system was needed, alternate means of taking reactor coolant samples or assessing accident conditions would be required and initiated.

In the event a post accident reactor coolant sample was needed and the PALS pathway was not available due to submergence and subsequent inoperability of RC-162 and RC-163, the following alternate pathways would be considered and used appropriately.

via:

- Reactor Building emergency sump through the LPI recirculation system (Unit 3)
- Depending on the accident scenario-- Normal sampling pathway via the reactor coolant letdown (with expected increased exposures) (Units 1,2, and 3)
- PALS sampling via the reactor coolant letdown (Unit-3)

It should also be noted, the PALS system is utilized only to assist in assessing core damage during a Loss of Coolant Accident (LOCA) scenario. Core damage can also be estimated from containment air samples and rough estimates can be made from data obtained from radiation monitors in the containment building. Core damage estimates could also be based on hydrogen concentrations in the containment atmosphere.

These valves (RC-162 and RC-163), while performing no accident mitigating function, are required to maintain reactor coolant system boundary isolation and containment isolation. With regards to the isolation requirements of RC-162 and RC-163, it should be realized that the valves are normally closed with the power removed.

Futhermore, a DE review of the valve control circuits and wiring termination layouts indicate that it is highly unlikely that multiple electrical shorts could occur due to water intrusion such that any of the

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valves would open. Additionally, the sample line has two outside containment isolation valves in series with RC-162 and RC-163, i.e., RC-164 and RC-165. These valves are also normally closed and de-energized. Power is supplied to RC-162 and RC-163 from separate/redundant 120VAC Vital Power buses and the associated valve feeder breakers are acceptably coordinated, such that electrical faults at these RC valves would be isolated without adverse impact on other shutdown loads.

The DE Operability Evaluation concluded that with the existing (as-found on Unit 2) cable entrance sealing method, RC-162 and RC-163 are considered operable to perform their isolation requirements and inoperable to meet the post accident liquid sampling requirement.

This event is not considered significant with respect to the health and safety of the public. There were no releases of radioactive materials, radiation exposures, or personnel injuries involved with this incident.