

Omaha Public Power District
444 South 16th Street Mall
Omaha, Nebraska 68102-2247
402/636-2000

November 8, 1991
LIC-91-275L

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, DC 20555

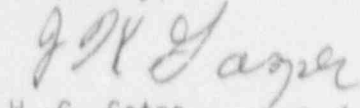
Reference: Docket No. 50-285

Gentlemen:

Subject: Licensee Event Report 91-022 for the Fort Calhoun Station

Please find attached Licensee Event Report 91-022 dated November 8, 1991. This report is being submitted pursuant to 10 CFR 50.73(a)(2)(ii). If you should have any questions, please contact me.

Sincerely,



W. G. Gates
Division Manager
Nuclear Operations

WGC/rkj

Attachment

c: R. D. Martin, NRC Regional Administrator
D. L. Wigginton, NRC Project Manager
R. P. Mullikin, NRC Senior Resident Inspector
INPO Records Center

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Employment with Equal Opportunity
Male/Female

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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-533), 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)
Fort Calhoun Station Unit No. 1DOCKET NUMBER (2)
0 5 0 0 0 2 8 5 1 OF 0 4TITLE (4)
Nuclear Instrumentation Channels B & D Outside Design Basis

EVENT DATE (6)			LER NUMBER (8)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (9)											
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME(S)	DOCKET NUMBER(S)										
1	0	0	9	9	1	9	1	0	2	2	0	0	1	1	0	8	9	1	N	0 5 0 0 0 0 1 1

OPERATING MODE (3)	POWER LEVEL (10)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 50.73 (Check one or more of the following) (11)			
1	0 9 4	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.405(c)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)
		<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 50.95(c)(1)	<input type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 73.71(c)
		<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 50.95(c)(2)	<input type="checkbox"/> 50.73(a)(2)(vi)	OTHER (Specify in Abstract below and in Text, NRC Form 308A)
		<input type="checkbox"/> 20.405(a)(1)(iii)	<input type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(vii)(A)	
		<input type="checkbox"/> 20.405(a)(1)(iv)	<input checked="" type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(vii)(B)	
		<input type="checkbox"/> 20.405(a)(1)(v)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(viii)	

LICENSEE CONTACT FOR THIS LER (12)
NAME: Robert F. Mehaffey, Principal Engineer - Electrical/I&C
TELEPHONE NUMBER: 4 0 2 6 1 3 6 1 - 1 3 4 7 1 1

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)
☐ YES (If yes, complete EXPECTED SUBMISSION DATE) ☒ NO

EXPECTED SUBMISSION DATE (15)
MONTH DAY YEAR

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

Omaha Public Power District (OPPD) initiated an evaluation of the potential failure to meet the Regulatory Guide 1.97, Revision 2 (RG 1.97) design basis requirements for neutron flux indication. This review was in response to neutron flux channel concerns that occurred during shutdown for the Fort Calhoun Station (FCS) September 12, 1991 battery outage. OPPD concluded that the neutron flux monitoring channels selected to meet RG 1.97 (NE-002 and NE-004) do not meet the RG 1.97 single failure criteria. Failure of DC Bus No. 2 in a Design Basis Accident (DBA)/Post DBA (i.e., Loss of Coolant Accident or Main Steam Line Break in containment) could result in the loss of both NE-002 and NE-004. This condition is outside the FCS design basis and was reported to the NRC pursuant to 10 CFR 50.72(b)(1)(ii)(B) at 1651 hours on October 9, 1991.

This event is not safety significant as reactor safe shutdown could be achieved without this wide range neutron flux indication.

The root cause is the failure to follow procedure PED-QP-5. Contributing causes are lack of guidance and failure to understand the procedural requirements with regard to updating analyses/studies.

A Nonconformance Report was issued to evaluate and correct the environmental qualification problem with the neutron flux channels, and to track final resolution of this condition which is outside the design basis of FCS.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.6 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-830), 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)	DOCKET NUMBER (2)	LER NUMBER (3)			PAGE (5)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
Fort Calhoun Station Unit No. 1	0 5 0 0 0 2 8 5	9 1	- 0 2 2	- 0 0	0 2	OF 0 4

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

The Fort Calhoun Station (FCS) Emergency Operating Procedures require that the Control Room Operators and Shift Technical Advisor verify, in the event of a transient involving a reactor trip, that reactor power is less than 10^{-5} percent and is a constant or decreasing reading. This is accomplished via the Reactor Protective System Wide Range Log Reactor Power Channels (NE-001, NE-002, NE-003, NE-004) which measure neutron flux. NE-001 and NE-003 are powered from station battery No. 1 via DC Bus No. 1 to 120 VAC vital power inverters "A" and "C" respectively, or by associated 480/120 VAC bypass transformers either from emergency diesel generator (DG) No. 1 or offsite power, if available. NE-002 and NE-004 are powered from station battery No. 2 via DC Bus No. 2 to 120 VAC vital power inverters "B" and "D" respectively, or by associated 480/120 VAC inverter bypass transformers either from DG-2 or offsite power, if available. These power indication channels measure reactor power by measuring neutron flux leakage from the reactor vessel. The fission chamber detectors are mounted at intervals of approximately 90 degrees around the outside of the reactor vessel. Two detectors and their signal cables in containment must be environmentally qualified to provide neutron flux indication in the event of a Loss of Coolant Accident (LOCA) or Main Steam Line Break (MSLB) in containment, which would expose the detectors and cabling to a harsh environment.

Regulatory Guide (RG) 1.97, Revision 2 "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident", requires wide range neutron flux indication be provided to confirm that reactivity control is being accomplished in the event of a Design Basis Accident (DBA)/Post DBA. As part of this requirement, the neutron flux monitoring must be a Category 1 variable which requires the instrumentation to be qualified for a harsh environment, be redundant, and meet the single failure criteria.

Omaha Public Power District's (OPPD) compliance with the DBA/Post DBA monitoring of neutron flux requirement, was defined in Engineering Study 84-07, Revision 0, "Regulatory Guide 1.97, Rev. 2 Response" transmitted to the NRC on April 1, 1985. In this submittal, OPPD stated that all four channels of neutron flux indication (NE-001, NE-002, NE-003 and NE-004) were environmentally qualified. This position was not changed through Revision 2 of ES-84-07 dated June 30, 1987.

On May 10, 1988, a 10 CFR Part 21 "Reporting Defects and Noncompliance" report was submitted to the NRC by the neutron flux detector/cable vendor, notifying the NRC and the nuclear industry that manufacturing defects in the cable assembly could allow moisture leakage, thus causing a failure of the channel. Therefore, during the 1988 Refueling Outage, OPPD performed leak testing on channels NE-001, NE-002 and NE-004, and the results indicated signs of leakage. NE-003 was not tested due to its location in a high radiation area, and conservatively, was also considered not to be qualified. On November 25, 1988, Safety Analysis for Operability (SAO) 88-01, "Unqualified Source Range Neutron Flux Monitoring System" was issued to verify that safe plant operation could continue until cable repairs could be made during the 1990 Refueling Outage.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COL. 1.00. 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) Fort Calhoun Station Unit No. 1	DOCKET NUMBER (2) 0 5 0 0 1 2 8 5 3 1 — 0 2 2 — 0 0 0 3 OF 0 4	LER NUMBER (3)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			

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

On November 30, 1989, the decision was made to repair only NE-002 and NE-004 based on selecting cable replacement only versus cable and detector replacement. The repairs to NE-002 and NE-004 were completed during the 1990 outage and OPPD's compliance with RG 1.97 was revised. The applicable pages of ES-84-07, Revision 2, were marked up and forwarded to the NRC on February 9, 1990. This letter updated OPPD's compliance with RG 1.97 neutron flux monitoring to include only NE-002 and NE-004. This change to ES-84-07, Revision 2, was not completed in compliance with procedure PED-QP-5, Revision 0, "Engineering Analysis Preparation, Review, and Approval", including the review and independent review.

Single failure implications were not investigated when this update was made. With only NE-002 and NE-004 environmentally qualified, a single failure of DC Bus No. 2 could result in the loss of inverters "B" and "D", as well as DG-2. The inverters' loss, coupled with the loss of DG-2 and the required loss of offsite power assumption, would deenergize NE-002 and NE-004. No credit could be taken for NE-001 and NE-003 due to potential environment-induced failure, resulting in the assumed total loss of neutron flux indication.

On October 2, 1991, OPPD initiated an evaluation of the potential failure to meet RG 1.97 design basis requirements for neutron flux monitoring. This review was in response to neutron flux channel concerns during shutdown for the FCS September 12, 1991 battery outage. This review confirmed the failure to meet RG 1.97, Category 1, single failure criteria. Failure of DC Bus No. 2 in a DBA/Post DBA (i.e., LOCA or MSLS in containment) could result in the loss of both NE-002 and NE-004. This condition was determined to be outside the FCS design basis on October 9, 1991. Thus, notification was made to the NRC at 1651 hours on October 9, 1991 pursuant to 10 CFR 50.72(b)(1)(ii)(B).

The potential loss of wide range neutron flux indication in a DBA/Post DBA is not considered safety significant, as reactor safe shutdown could be achieved without this indication. The loss of this indication would not result in the loss of any automatic function nor would it result in manual termination of negative reactivity insertion (i.e., safety injection, automatic RCS boration). This would ensure that the reactor remained subcritical.

The root cause of this event is the failure to follow procedure PED-QP-5, which is intended to ensure that design documents of this type are properly updated, including reviews for technical accuracy. Failure to follow this procedure led to the single failure criteria being overlooked. Contributing causes are lack of guidance and failure to understand the requirements of PED-QP-5 with regard to updating analyses/studies which predate the August 7, 1989 issuance of PED-QP-5, Revision 0.

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-520), 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) Fort Calhoun Station Unit No. 1	DOCKET NUMBER (2) 0 5 0 0 0 2 8 5 9 1 - 0 2 2 - 0 0 0 4 OF 0 4	LER NUMBER (3) <table border="1"><tr><td data-bbox="1011 257 1103 385">YEAR</td><td data-bbox="1103 257 1301 385">SEQUENTIAL NUMBER</td><td data-bbox="1301 257 1389 385">REVISION NUMBER</td></tr><tr><td></td><td></td><td></td></tr></table>	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER				PAGE (3) 0 4 OF 0 4
YEAR	SEQUENTIAL NUMBER	REVISION NUMBER							

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

The following corrective actions have been or will be implemented to prevent recurrence:

1. Nonconformance Report NCR 91-096 has been issued to evaluate, correct and track the environmental qualification problem with one neutron flux channel associated with Battery No. 1 (NE-001 or NE-003). This will be completed during the 1992 or 1993 Refueling Outage, depending on parts availability.
2. The failure to understand and follow procedure PED-QP-5, and lack of proper guidance will be addressed in a memorandum to Production Engineering Division personnel, regarding the applicability of PED-QP-5 to analysis/studies predating the August 7, 1989 issuance of PED-QP-5, Revision 0. This memorandum will be issued by December 6, 1991.

Other LERs that have been submitted addressing design deficiencies include: 91-18, 91-10, 91-07, 91-04, 91-03, 90-25, 90-23, 90-20, 90-16, 90-09, 90-07, 90-05, 90-03, 89-24, 89-15, 89-14, 89-09, 88-33, 88-32, 88-20, 88-19 and 88-09.