NRC Form 366 (9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Fort Calhoun Station Unit No. 1	0 5 0 0 0 2 8 5	1 OF 0 4

TITLE (4)
Potential for Loss of Two Pressurizer Press. Transmitters Upon Pressurizer Spray Line Break

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 3	0 9	8 8	8 8	— 0 0 5	—	0 4	0 8	8 8	N	0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9): 0

POWER LEVEL (10): 0 7 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)

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)	50.73(a)(2)(i)	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 (AREA CODE)
Mark W. Hollingsed, Shift Technical Advisor	4 0 2 4 2 6 - 4 0 1 1

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
X YES (If yes, complete EXPECTED SUBMISSION DATE)	NO		0 6	0 8	8 8

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

At 1600 hours on March 9, 1988, with reactor power at 70 percent, Omaha Public Power District (OPPD) discovered a condition by which a specific Loss of Coolant Accident (LOCA) could incapacitate instrumentation feeding a protective function. This is outside the design basis as detailed in Updated Safety Analysis Report section 7.2.9. Analysis performed indicates that a LOCA where the break occurs at specific pressurizer spray line locations could possibly render two channels of pressurizer pressure inoperable, leaving only two channels operable. With one of the unaffected channels initially out of service, sufficient instrumentation would not exist to complete the required 2-out-of-4 logic for reactor trip and safeguards initiation from the decreasing pressurizer pressure.

OPPD determined that this condition presents no significant safety consequences, but was reportable under 10 CFR 50.72 (b)(1)(ii)(B). The NRC was notified at 1647 hours on March 9, 1988. Licensed operations personnel have been alerted to this problem, the possible consequences, and recommended operator actions.

OPPD has analyzed this situation and concluded that safe operation may be continued due to: (1) availability of alternate leak detection methods (in the event of a pressurizer spray line break), (2) operator awareness of the potential consequences of a spray line break, and (3) the low probability of a catastrophic spray line break.

Further evaluation of other segments of this high energy line is being pursued. Results of this evaluation will be provided in a supplement to this LER.

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At 1600 hours on March 9, 1988, with reactor power at 70 percent, Omaha Public Power District (OPPD) discovered a condition by which a specific Loss of Coolant Accident (LOCA) could incapacitate instrumentation feeding a protective function. This is outside the design basis as detailed in Updated Safety Analysis Report section 7.2.9. It was determined that this condition presented no significant safety consequences, but was reportable under 10 CFR 50.72 (b)(1)(ii)(B). The NRC was notified at 1647 hours on March 9, 1988.

This potential condition was discovered during a review of high energy line concerns resulting from a modification to the pressurizer level transmitters. The review indicated that a pressurizer spray line break at specific locations could possibly render two channels of pressurizer pressure inoperable, leaving only two channels operable. Pressurizer pressure is used as an input to the thermal margin/low pressure (TM/LP) and high pressurizer pressure trips of the Reactor Protective System
(RPS), and also feeds the pressurizer pressure low signal (PPLS) in the Engineered Safety Features (ESF) logic. Both the RPS and ESF function through a 2-out-of-4 logic system for actuation.

USAR section 7.2.9 states that the plant is protected against common-mode failures by the selection of instrumentation sensor locations and lines which provides physical separation of the channels. With one of the operable pressurizer pressure channels (i.e., not subjected to steam impingement from the break) out for maintenance or already inoperable (as allowed by Technical Specifications), the plant would be placed in a condition outside the design basis of USAR section 7.2.9 after a pressurizer spray line break.

Using the criteria for break postulation of NRC Branch Technical Position MEB 3-1, Revision 2, analysis has concluded that a catastrophic pressurizer spray line break is unlikely. It is expected that any failure of the line will be of the leak-before-break mode, with a crack developing into a leak, eventually resulting in a break. Both catastrophic failure and leak-before-break were considered and are discussed in the following paragraphs.

If the line failure starts as a leak, the leak will be detectable through various means. The leak will show up in the daily performance of ST-RLT-3, "Reactor Coolant System Leak Rate Test", as a noticeable jump or increasing trend. The maximum unknown leakage allowed by ST-RLT-3 before corrective action is required is 0.3 gallons per minute (gpm); the Technical Specification limit is 1.0 gpm. Depending on the size of the leak and the length of time it exists, abnormal trends may also be observed in the containment sump level, containment dewpoint, and on containment radiation monitors RM-050 and RM-051. A LOCA-qualified ambient temperature detector, normally available on Emergency Response Facilities computer as point T888, is located in the vicinity of the pressurizer pressure transmitters and can be used to detect local heating from a leak. Upon discovery of a leak, a controlled shutdown could be initiated.

If a catastrophic break were to occur, three failure modes of the transmitters (Foxboro Model N-E11GM-HIE2-ADL) are possible: low, high, and as-is.

If the transmitters fail low, they will fulfill their design function by tripping the reactor on TM/LP, with the two operable channels acting as backups as the reactor coolant system (RCS) pressure falls below the TM/LP setpoint. ESF will also be actuated, as designed, by the PPLS signals generated by both the failed and operable transmitters. Failure toward low pressure is the most probable failure mode, based on information from the transmitter manufacturer.

If the transmitters were to fail high, they would cause a simultaneous reactor trip and opening of the Power Operated Relief Valves (PORV's) due to the perceived high pressurizer pressure. The PORV's or their block valves must be manually closed by a control room operator to minimize the pressure loss in the RCS. ESF is not actuated by high pressurizer pressure, so until containment pressure reaches the setpoint for the Containment Pressure High Signal (CPHS), there will be no containment spray or safety injection. The CPHS will initiate safety injection, containment isolation, and steam generator isolation, but due to the ESF logic, containment spray will not be initiated without a PPLS along with the CPHS. The containment isolation signal will, however, open the component cooling water valves to the containment air cooling units, and therefore assist in controlling containment pressure. At approximately the same time, each of the two unaffected pressurizer pressure transmitters will see the RCS pressure fall and send a PPLS to the ESF circuitry to initiate ESF functions. If one of the unaffected pressure channels is initially out of service, containment spray must be actuated manually by a control room operator if required to control containment pressure. With high failure of the transmitters, manual actuation of ESF may be required if CPHS is not received early enough in the transient or if one of the unaffected pressure channels is out of service. Manual actions may include closing the PORV's or their block valves, actuation of containment spray, and actuation of the entire ESF system.

In the case of the transmitters failing as-is, or anywhere within the setpoints of TM/LP on the low side and high pressurizer pressure on the high side, the two remaining pressure channels will trip the reactor on TM/LP. If one of the unaffected pressure channels is initially out of service, the reactor will trip on CPHS, due to the pressurization of the containment building. As in the case of high failure, CPHS will initiate safety injection, containment isolation, and steam generator isolation, but manual actuation of containment spray will be necessary if required to control containment pressure.

It must be noted for the high and as-is failure modes, that a reactor trip on CPHS and associated ESF actuations will not occur as early as from TM/LP and PPLS, respectively, following a pressurizer spray line break.

Licensed operations personnel have been alerted to this problem, the possible consequences, and recommended operator actions by means of a training hotline. The hotline must be signed and dated by each operator to verify notification. The actions recommended in the event of a spray line break (ensuring reactor has tripped and ESF has actuated) are already part of the Emergency Operating Procedures (EOP's) for reactor trip and LOCA; thus, the EOP's already provide guidance for this scenario.

The plant can continue to be safely operated in light of this design deficiency due to the following factors:

(1) A catastrophic pressurizer spray line break is considered improbable; failure of the line is more likely to start as a crack, propagate into a leak, and ultimately break if no corrective actions are taken. A leak could be detected by the previously discussed indications and a plant shutdown could be initiated.

(2) If the line does break, the expected failure mode of the transmitters is toward low pressure, thereby allowing the transmitters to fulfill their design function.

(3) If the transmitters fail high or as-is, operator awareness of the potential problems associated with a pressurizer spray line break, and proper utilization of the EOP's, will assist in ensuring appropriate actions are taken.

Omaha Public Power District
1623 Harney Omaha, Nebraska 68102-2247
402/536-4000

April 8, 1988
LIC-88-216

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

Reference: Docket No. 50-285

Gentlemen:

SUBJECT: Licensee Event Report for the Fort Calhoun Station

Please find attached Licensee Event Report 88-005 dated April 8, 1988. This report is being submitted per requirements of 10 CFR 50.73.

Sincerely,

R. L. Jaworski for
R. L. Andrews
Division Manager
Nuclear Production

RLA/me

Attachment

c: R. D. Martin, NRC Regional Administrator
A. Bournia, NRC Project Manager
P. H. Harrell, NRC Senior Resident Inspector
INPO Records Center
American Nuclear Insurers

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