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U. S. Nuclear Regulatory Commission
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SUBJECT: Arkansas Nuclear One - Unit 1
Docket No. 50-313
License No. DPR-51
Licensee Event Report No. 50-313/90-001-01

Gentlemen:

In accordance with 10CFR50.73(a)(2)(i)(A), attached is a supplement to the subject report concerning a plant shutdown as required by Technical Specifications due to a loss of Reactor Building integrity involving leakage through a Reactor Building cooling coil and associated Reactor Building isolation valve.

This supplement is being submitted to revise the completion dates for certain corrective actions contained in this report.

Very truly yours,

James J. Fisicaro

J. J. Fisicaro
Manager, Licensing

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(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)
Arkansas Nuclear One, Unit One	0 5 0 0 0 3 1 3	1 OF 0 5

TITLE (4) Plant Shutdown As Required By Technical Specifications Due To a Loss of Reactor Building Integrity Involving Leakage Through a Reactor Building Cooling Coil and Associated Reactor Building Isolation Valve

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 2	2 8	9 0	9 0	-- 0 0 1	-- 0 1	1 2	1 7	9 0		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)							
POWER LEVEL (10)	0 8 0	__ 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
		__ 20.405(a)(1)(iii)	X 50.73(a)(2)(i)	__ 50.73(a)(2)(viii)(A)	Abstract below and
		__ 20.405(a)(1)(iv)	__ 50.73(a)(2)(ii)	__ 50.73(a)(2)(viii)(B)	in Text, NRC Form
		__ 20.405(a)(1)(v)	__ 50.73(a)(2)(iii)	__ 50.73(a)(2)(x)	366A)

LICENSEE CONTACT FOR THIS LER (12)

Name	Telephone Number: Area Code
Richard Scheide, Nuclear Safety and Licensing Specialist	5 0 1 9 6 4 - 3 1 0 0

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
X	B K	C C L		N						

SUPPLEMENT 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 February 28, 1990 at 2015 a plant shutdown was initiated as required by Technical Specification 3.6.1 due to a loss of Reactor Building (RB) integrity. Loss of RB integrity had occurred due to a combined effect of a service water cooling coil leak on 'D' RB cooler (VCC-2D) and leakage past the cooling coil isolation valve which also serves as a RB isolation valve. These conditions existing simultaneously constituted a degraded ability of the RB structure to perform its design function of limiting a radioactive release during an accident condition. To prevent leakage through the cooling coil boundary, blind flanges were installed in the inlet and outlet piping for the leaking coil within VCC-2D. In addition, the isolation valve was replaced and leak tested satisfactorily during refueling outage 1R9. This particular event has had minimal safety significance considering that no accident condition existed within the RB structure during this time. This event is reportable pursuant to 10CFR50.73(a)(2)(i)(A) as the completion of a plant shutdown required by Technical Specifications.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		Year	Sequential Number	Revision Number	
Arkansas Nuclear One, Unit One	0 5 0 0 0 3 1 3	9 0	-- 0 0 1	-- 0 1	0 2 OF 0 5

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

A. Plant Status

At the time this condition was discovered, Arkansas Nuclear One, Unit 1 (ANO-1) was in power operations at 80 percent. Reactor Coolant System (RCS)[AB] temperature was 579 degrees Fahrenheit and Reactor Coolant System pressure was approximately 2155 psig.

B. Event Description

On February 28, 1990, at 2015 a plant shutdown was initiated as required by Technical Specification 3.6.1 due to a loss of Reactor Building (RB) [NH] integrity. Loss of Reactor Building integrity had occurred due to a combined effect of a service water cooling coil leak on 'D' Reactor Building cooler (VCC-2D) and leakage past the seat of CV-3815 which serves with CV-3813 as isolation valves for VCC-2D and VCC-2C. The inlet isolation valve for VCC-2D (CV-3813) is a motor operated gate type valve; whereas, the outlet isolation valve for VCC-2D (CV-3815) is a pneumatically operated butterfly valve manufactured by Contramatic. RB cooling units such as VCC-2D consist of eight separate coils which are flanged together.

On February 20, 1990, while performing a monthly RB cooling unit test it was discovered that the outlet valve (CV-3814) on 'A' and 'B' RB cooling units (VCC-2A and VCC-2B) would not stroke open on the initial attempt. This condition was caused by elevated pressure against the valve seating surface resulting from a hydraulic lock being created between the normally closed Reactor Building cooler inlet and outlet valves. In this case, the hydraulic lock was the product of thermal volumetric expansion and occurred when service water between the inlet and outlet valves on the Reactor Building cooling coils at lake temperature was heated to Reactor Building ambient temperature. This resulted in CV-3814 being declared inoperable. To alleviate the pressure on CV-3814, the inlet valve (CV-3812) was opened which depressurized the line between CV-3814 and CV-3812 allowing CV-3814 to open within its normal time limit. Further investigation during this time revealed the pressure between CV-3812 and CV-3814, while the line was pressurized, was 259 psig. The redundant Reactor Building coiling coil units (VCC-2C and VCC-2D) were verified operable along with the associated inlet and outlet valves (CV-3813 and CV-3815).

After implementing a procedure revision which changed the normal position of the inlet isolation valves from closed to open, an observation was made by the Control Room Operator that the RB sump fill rate had increased. During this time the sump fill rate increased from 0.13 gpm to 0.25 gpm with a subsequent chemical analysis identifying the water in the sump as originating from the service water system. Individual RB cooler groups were systematically isolated during the investigation to determine which cooler group was leaking. This investigation indicated leakage was coming from either VCC-2C or VCC-2D.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		Year	Sequential Number	Revision Number	
Arkansas Nuclear One, Unit One	0 5 0 0 0 3 1 3	9 0	0 0 1	0 1	0 3 OF 0 5

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

Following a RB entry for the purpose of cooler inspection, it was determined that VCC-2D contained a coil leak. This condition along with concurrent leakage past either the inlet or outlet isolation valve constitute a loss of Reactor Building integrity which requires a plant shutdown (Technical Specification 3.6.1) and the declaration of an Emergency Class (Notification of an Unusual Event) based on current criteria. In this case, leakage past the inlet or outlet isolation valve was evidenced by continued coil leakage when the isolation valves were closed. A power reduction was initiated on February 28, 1990 at 2015 with hot shutdown conditions obtained on March 1, 1990 at 0100.

C. Root Cause

The cause for the loss of RB integrity was the service water leak on VCC-2D. An engineering evaluation was conducted and it was concluded that the tube leak in VCC-2D was the result of a localized corrosion pitting mechanism rather than overpressurization due to the volumetric expansion of confined service water within the cooling coil.

D. Corrective Actions

In accordance with Technical Specification 3.6.1, a plant shutdown was initiated on February 28, 1990 at 2015 in response to a loss of Reactor Building integrity. A Reactor Building cooling coil leak in conjunction with a leaking cooling coil isolation valve, which also serves as a containment isolation valve, resulted in the loss of containment integrity and subsequent plant shutdown. Several corrective actions, in addition to the plant shutdown, have been or will be implemented to prevent this situation from recurring.

As an interim measure, to prevent additional leakage through the cooling coil boundary, blind flanges were installed in the inlet and outlet connections for the leaking coil within VCC-2D. This modification has not significantly affected the cooling capacity of the RB coolers, according to an evaluation conducted by Arkansas Power & Light, and has effectively isolated the leaking cooling coil until the cooling coil can be replaced. Additionally, the RCS leak detection procedure was revised to require a RB sump sample analysis, if the RB sump fill rate increases above the 5 day average by more than 0.1 gpm. If the RB sump sample results indicate the source of the increased fill rate is from service water, steps will be initiated to perform a RB entry to inspect accessible areas. These activities address corrective actions in regards to leakage through the boundary created by the cooling coil.

During refueling outage 1R9, the Service Water System was chemically cleaned. Subsequent to this cleaning, additional leaking cooling coils were identified in coolers VCC-2C and VCC-2D. Due to the unavailability of spare parts, all of the leaking coils could not be replaced during the outage and some were required to be left blanked off. Details regarding the temporary repairs made to VCC-2C and 2D are discussed in ANO's letter to NRC dated December 14, 1990 (1CAN129011.) The blanked off coils will be repaired at the next outage of sufficient duration following receipt of additional replacement coils.

In addition to addressing leakage through the cooling coil, corrective actions also were implemented to monitor and minimize leakage through the cooling coil isolation valves. A review of 10 CFR 50, Appendix J requirements concluded that isolation valves serving as a second, redundant isolation barrier in systems designed in accordance with General Design Criteria 57 (closed systems) should be incorporated into the Appendix J leak testing program. Specifically CV-3814 and CV-3815 were added as Type C tested components. As-found Type C tests were performed during the 1R9 outage and it was determined that the isolation valves leaked excessively. CV-3814 and CV-3815 were cut out and replaced with new valves, leak tested satisfactorily, and returned to service.

E. Safety Significance

This incident has potential safety significance considering that a RCS leak in the Reactor Building could result in a radiological release to the outside environment if Reactor Building pressure were to exceed service water pressure at the cooling coil. This condition, existing simultaneously with a leaking isolation valve, would constitute an inability of the containment structure to perform its design function of preventing a radioactive release during an accident condition. If a radioactive release was present during this time, in the service water system, it would have been detected by a service water process radiation monitor (RE-3815) or the discharge flume process monitor (RE-3618). This particular event, in actuality, has had minimum safety significance considering that no accident or elevated pressure condition existed within the containment structure during this time.

F. Basis for Reportability

This event is reportable pursuant to 10CFR50.73(a)(2)(i)(A) which involves the completion of a plant shutdown as required by Technical Specifications. A one hour notification was made at 2040 on February 28, 1990, pursuant to 10CFR50.72(a)(1)(i) and 10CFR50.72(b)(1)(i)(a) which involves the declaration of an emergency classification and initiation of a shutdown required by TS.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		Year	Sequential Number	Revision Number	
Arkansas Nuclear One, Unit One	0 5 0 0 0 3 1 3	9 0	-- 0 0 1	-- 0 1	0 5 OF 0 5

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

G. Additional Information

There have been no previous similar events at ANO related to a Technical Specification required plant shutdown due to loss of containment integrity involving failed components.

Reference Correspondence submitted on March 2, 1990, addressing the evaluation of RB coolers service water isolation valve (1CANØ39ØØ6 with accompanying engineering report 90R-1006-01).

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].