

NRC Form 366
(9-83)

U.S. Nuclear Regulatory Commission
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L I C E N S E E E V E N T R E P O R T (L E R)

FACILITY NAME (1) Arkansas Nuclear One, Unit Two | DOCKET NUMBER (2) | PAGE (3)
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TITLE (4) Leak in the Common Reference Leg for Safety Injection Tank "D" Water Level Transmitters
Following System Modification Results in a Violation of Technical Specifications

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)																				
Month	Day	Year	Sequential Number	Revision Number	Month	Day	Year	Facility Names	Docket Number(s)																				
0	5	2	5	8	8	8	8	--	0	1	0	--	0	0	0	6	2	9	8	8	N/A	0	5	0	0	0			
									N/A	N/A			0	5	0	0	0												

OPERATING MODE (9) 1: THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)

POWER LEVEL (10)	20.402(b)	20.405(a)(1)(i)	20.405(a)(1)(ii)	20.405(a)(1)(iii)	20.405(a)(1)(iv)	20.405(a)(1)(v)	20.405(c)	50.36(c)(1)	50.36(c)(2)	50.73(a)(2)(i)	50.73(a)(2)(ii)	50.73(a)(2)(iii)	50.73(a)(2)(iv)	50.73(a)(2)(v)	50.73(a)(2)(vii)	50.73(a)(2)(viii)(A)	50.73(a)(2)(viii)(B)	50.73(a)(2)(x)	73.71(b)	73.71(c)	Other (Specify in Abstract below and in Text, NRC Form 366A)	

LICENSEE CONTACT FOR THIS LER (12)
Name: Larry A. Taylor, Nuclear Safety and Licensing Specialist | Telephone Number: 51011964-1311010
Area: | Code: |

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

SUPPLEMENT REPORT EXPECTED (14) | EXPECTED SUBMISSION DATE (15) | Month | Day | Year

Yes (If yes, complete Expected Submission Date) | | No

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

On May 25, 1988 from 0417 hours until May 26 at 0356 hours, safety injection tank (SIT) "D" was inoperable due to a water level less than that required by Technical Specifications (TS). This was discovered following the identification and repair of a leak on the common reference leg for the narrow range (NR) water level instruments for the "D" SIT. The leak caused an erroneous water level indication and resulted in the control room operators inadvertently decreasing the tank level below TS requirements. The cause of the leak was a lack of detail in the plant's modification process related to proper methods for connecting and leak testing fittings associated with water level transmitters and tubing. Procedures are being revised to include additional instructions for connecting instrument and tubing fittings and leak testing. The total volume of borated water available in the SITs was not decreased below the value assumed in the safety analysis during this event. There were no adverse safety consequences as a result of this event.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)									
		Year	Sequential Number	Revision Number										
Arkansas Nuclear One, Unit Two	051010131618	8	8	--	0	1	0	--	0	0	0	2	0	5

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

I. Description of Event

A. Plant Status

At the time of this event on May 25, 1988, Unit 2 of Arkansas Nuclear One (ANO-2) was in Operational Mode 1 (Power Operation) with reactor power at approximately 5 percent. The sixth refueling outage of the unit had been recently completed and Operational Mode 3 (Hot Standby) had been entered on May 17.

B. Component Identification

This event involves the discovery of erroneous control room indication of the narrow range water level in the "D" Safety Injection Tank (SIT). Control room indication of "D" SIT water level is provided by three water level transmitters [LT] which are located in the ANO-2 containment building. Two of the transmitters (2LT-5068 and 2LT-5069) provide narrow range (NR) tank water level indications and one transmitter (2LT-5070) provides a wide range (WR) tank water level indication.

C. Sequence of Events

On May 25, 1988, control room operators noted a gradual increase in the indicated pressure and NR water level for "D" SIT. Due to the indications, the control room operators suspected that back leakage from the Reactor Coolant System (RCS) into "D" SIT was occurring. In order to maintain the SIT water level within Technical Specification (TS) limits of 80.1 to 87.9 percent indicated level, the operators lowered the water level, as indicated by the NR water level transmitters, from approximately 85.6 to 82.9 percent at 0417 hours. The WR water level indication at this time decreased from approximately 81 to 77 percent. Monitoring of the SIT indicated pressure and water level was continued to further evaluate the problem. The SIT pressure eventually stabilized, however, control room operators observed that the NR indicated water level continued to increase at a slow rate. The WR indicated water level at this time was observed to be stable at approximately 77 percent. Based on these indications, it was suspected that a leak might exist on the common reference leg for the NR level transmitters. A containment entry was made and an inspection of the level transmitters was completed at 2245 hours. Personnel performing these inspections did not identify any leaks nor any abnormal conditions (i.e., damaged transmitters, lines, etc.).

Although no leaks were identified, it was suspected that the NR water level indication might not be indicative of actual water level in the tank (i.e., indicated level higher than actual level) and at 0356 hours on May 26 the "D" SIT was filled to a level of approximately 87 percent on the NR water level indicators. The WR water level indication at this time increased to approximately 81 percent. At 0605 hours, plant Instrument and Controls (I&C) personnel entered containment to perform another inspection of the level indication system. During this inspection a small leak from an instrument tubing connection on the reference leg for the NR water level transmitters was discovered. The connection was tightened to stop the leak, and the reference leg for the NR water level transmitters was refilled. As a result of refilling the reference leg, the NR water level indications for the "D" SIT decreased to 80.5 percent, reflecting actual tank water level. Control room operators then filled "D" SIT to 82.2 percent water level on the NR water level indicators at 0625 hours. At 0630 hours, operations personnel identified that the TS minimum level for the "D" SIT could have been violated on May 25.

Observation of the "D" SIT water level indications were continued in order to verify the problem had been corrected. On May 27 at 2200 hours, control room operators again observed a small increasing trend of the NR water level indicators while the WR level indication remained steady. Another containment entry was made by I&C personnel and a pinhole weld leak was located on the instrument manifold block for 2LT-5068. The leaking manifold block was isolated and removed for repair. The reference leg was refilled, returning 2LT-5069 to service. On May 29, 2LT-5068 was returned to service after being repaired.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

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

II. Event Cause

A. Event Analysis

ANO-2 is designed with 4 SITs which are part of the safety injection system. Each SIT is provided with three water level measuring systems which provide indication in the control room. Two of the water level transmitters used in the systems provide indication of water level over a narrow range (72 - 90 percent) with respect to total tank volume. The remaining transmitter is used to indicate the SIT water level over a range of 0 to 100 percent (i.e., wide range). The water level transmitters are differential pressure cells and are connected by instrument tubing to upper and lower taps on the tank. The NR water level transmitters share a common set of tank taps and therefore, a common reference leg is used for both transmitters. All three water level indicators for each SIT are monitored by control room operators and the readings are recorded once per shift. The WR water level indication is not as accurate as the NR water level indication since it provides indication over a greater range of tank water volume, therefore, the NR water level readings are used to verify compliance with TS limits on SIT water volume for assurance of SIT operability.

Since both NR water level transmitters share a common reference leg, a loss of water volume in this reference leg will result in an erroneous increase in the indicated level from both NR level transmitters if the actual tank water level remains constant. Additionally, the existing common reference leg consists of relatively small inside diameter instrumentation tubing which limits the total volume of water available in the reference leg. This creates a condition such that even an extremely small leak which might not be detected by a rigorous visual examination could cause a significant loss of total reference leg volume over time. The difficulty of identifying such a leak is exemplified by this event. A total of three containment entries for inspection were required to locate both leaks identified in this event.

As a result of the visual inspections performed on the SIT transmitters and associated instrumentation tubing, two leaks were identified which caused a loss of water from the reference leg for the NR water level transmitters. The first leak identified was caused by a loose connection in the instrument tubing from the SIT to the water level transmitters. The second leak identified was a pinhole weld leak on the instrument block manifold for transmitter 2LT-5068. During the recently completed refueling outage the NR water level transmitters for the "D" SIT and their associated instrument block manifolds were replaced by a Design Change Package (DCP). The replacement of the transmitters and instrument block manifolds required that the instrument tubing be disconnected and reconnected. An in-service leak test (ILST) of the system was performed as part of the DCP and no leakage had been identified.

During this event, the initial increase in "D" SIT level (as indicated by the NR water level transmitters) and pressure were initially believed to be caused by back leakage from the RCS into the "D" SIT. Later evaluations attributed the SIT pressure increased to tank heatup as ambient containment temperature increased during the plant heatup and startup. When the "D" SIT level was drained from 85.6 to 82.9 percent as indicated by the NR water level transmitters, the WR water level transmitter indication decreased from approximately 81 to 77 percent. Although the WR water level indication is not as accurate as the NR water level indication, it is believed that the actual level decreased below the minimum TS required water level (80.1 percent) at this time. As further evaluation of the conditions indicated leakage from the NR water level transmitters reference leg, the "D" SIT was filled until the NR water level indication was slightly below the TS maximum level of 87.9 percent. This was accomplished at 0356 hours on May 26 and restored the actual water level in the tank to within TS limits. After the first leak was identified and repaired, and the reference leg was refilled, the "D" SIT NR water level indication was observed to be 80.5 percent providing additional positive indication that the TS minimum level had been reestablished at 0356 hours on May 26 and that the minimum tank water level had not been maintained for approximately 24 hours.

B. Root Cause

The cause of this event was determined to be a lack of detail in the DCP installation process related to proper methods of connecting and leak testing fittings associated with water level transmitters and tubing.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		Sequential	Revision		
		Year	Number	Number	
Arkansas Nuclear One, Unit Two					
TEXT (If more space is required, use additional NRC Form 366A's) (17)		0 5 0 0 0 3 6 8	8 8 --	0 1 0 --	0 0 4 0 5

C. Safety Significance

The four safety injection tanks contain borated water pressurized by a nitrogen gas cover constituting a passive injection system. Each tank is connected directly to one reactor coolant cold leg. Two check valves located on the tank discharge piping are used to isolate each tank from the RCS during normal operation. When the RCS pressure falls below the tank pressure, as could occur during a loss of coolant accident (LOCA), the check valves open allowing the contents of the tanks to discharge into the system. Adequate borated water is supplied to rapidly reflood the core with one tank assumed to be discharging through a postulated break.

Due to the difficulty in diagnosing and locating a small leak on the reference leg for the NR water level transmitters, the TS required minimum level for the "D" SIT was not maintained for approximately 24 hours. However, due to the careful evaluation of the information available, the control room operators attempted to compensate for the reference leg leak prior to locating the actual leak. Additionally, this continued evaluation led to the prompt discovery of the second reference leg leak.

An evaluation of the total available borated water volume in the three SITs with the lowest water levels during this event was conducted. Although the water level for the "D" SIT was allowed to decrease to less than the minimum TS requirement, the total volume of available borated water in the safety injection tanks remained greater than the value used in the accident analysis for LOCAs.

Due to the prompt operator action which limited the amount of time the "D" SIT water level was below the TS required minimum level and the total volume of borated water available in the SITs during this event, this event is considered to be of minor safety significance.

D. Basis for Reportability

TS 3.5.1 requires that each SIT be operable with a contained borated water volume level of between 81 and 87.9 percent. With one SIT inoperable, the inoperable tank must be restored to an operable condition within one hour or the reactor must be placed in Hot Shutdown within the next 12 hours. As a result of evaluating the details of this event, it was concluded that the "D" SIT was inoperable for a time period of approximately 24 hours without the required TS actions being performed. Therefore, this event is reportable under the provisions of 10CFR50.73(a)(2)(i)(B), Operation Prohibited by Technical Specifications.

III. Corrective Actions

A. Immediate

Upon discovery of each reference leg leak, the leak was repaired, the reference leg was refilled, and the level for the "D" SIT was verified to be within TS requirements.

B. Subsequent

The corrective actions discussed in LER 50-368/88-008 related to procedure changes being made in the DCP installation process to provide additional guidance for fitting installation and ISLTs should minimize the recurrence of an event of this nature. Since this event, no additional leaks in the water level transmitters for the SITs have been identified.

C. Future

None.

IV. Additional Information

A. Similar Events

During the recently completed refueling outage, several water level transmitters in different plant systems (including 2LT-5068 and 2LT-5069) had been replaced with new transmitters. A

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		Year	Sequential Number	Revision Number	
Arkansas Nuclear One, Unit Two	01501010368	88	01	0	01510105

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

recently submitted Licensee Event Report (LER), 50-368/88-008, documented the discovery of a leak from a threaded fitting on a volume control tank (VCT) water level transmitter which had been replaced during the refueling outage. In that event, a leak developed at a threaded fitting where the instrument tubing for the reference leg connects to the water level transmitter. The leak had not been detected due to lack of an ILST being required by the DCP. As the result of that event, maintenance personnel and plant modifications personnel performed a walkdown inspection of all new instrumentation transmitters and tubing fittings (includes 2LT-5068 and 2LT-5069) which had been installed during the refueling outage. No additional leaks were identified during the inspections. However, as a precautionary measure the instrument tubing to transmitter threaded fittings which had been installed during the outage without the use of a thread sealant were disconnected and reconnected using a sealant as a precautionary measure against leakage.

The DCP used to replace the new NR water level transmitters for the "D" SIT was not the same DCP used to install the water level transmitter discussed in LER 50-368/88-008. Additionally, an ISLT had been performed as part of the SIT transmitter replacement. Also, it should be noted that the leaks identified on the SIT NR water level transmitters reference leg did not occur at the instrument tubing to transmitter threaded fittings.

B. Supplemental Information

None.

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



ARKANSAS POWER & LIGHT COMPANY

June 29, 1988

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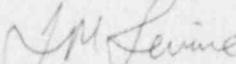
U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

SUBJECT: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
Licensee Event Report 50-368/88-010-00

Gentlemen:

In accordance with 10CFR50.73(a)(2)(i), attached is the subject report concerning a leak in the common reference leg for safety injection tank "D" water level transmitters following a system modification resulting in a violation of Technical Specifications.

Very truly yours,


J. M. Levine
Executive Director,
Nuclear Operations

JML:LAT:dm
attachment

cc w/att: Regional Administrator
Region IV
U. S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 1000
Arlington, TX 76011

INPO Records Center
Suite 1500
1100 Circle, 75 Parkway
Atlanta, GA 30039

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11