

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 One DOCKET NUMBER (2) PAGE (3)
0500101 31 11 3110F014

TITLE (4) Plant Instrumentation Found Not Seismically Qualified Due to Improperly Sized Anchor Bolts for Mounting Rack

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)		
1	0	2	2	8	7	8	8	N/A	0500101		
1	0	2	2	8	7	8	8	N/A	0500101		

OPERATING MODE (9) THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:

MODE (9)	N	(Check one or more of the following) (11)
POWER LEVEL (10)	101010	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)(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: Patrick C. Rogers, Nuclear Safety and Licensing Specialist
Telephone Number: 50119614-1311010

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

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

On 10/22/87, while performing a plant modification during a mid-cycle maintenance/inspection outage, expansion-type anchor bolts used for securing an instrumentation rack to a wall inside the reactor building were observed to be degraded, i.e., the bolts were found to be loose and pulling out of the wall. Further inspections revealed the bolts lack proper embed depth for this application. The deficiencies were corrected by removing the existing bolts and drilling the bolt holes to a proper embed depth in accordance with engineering specifications. New anchor bolts were installed and torqued to specified values. Additional instrumentation racks were inspected and found acceptable. The cause was determined to be insufficient guidance to field personnel on the use of expansion anchors during initial plant construction. The rack is used for mounting safety-related pressure transmitters which provide inputs to the Reactor Protection System. A conservative engineering evaluation of the rack in the as-found condition concluded the rack might have failed during a seismic event resulting in failure of the associated transmitters. The occurrence was considered reportable per 10CFR50.73.(a)(2)(vii).

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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		Year	Sequential Number	Revision Number		
Arkansas Nuclear One, Unit One	U 5 0 0 0 3 1 3	8 8 --	0 0 2 --	0	0 0 2 0 4	

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

I. Description of Events

A. Unit Status

At the time of the discovery of the event, Arkansas Nuclear One, Unit One (ANO-1) was in cold shutdown.

B. Component Identification

Instrumentation rack R-02 is located inside the ANO-1 reactor building and supports various instruments, i.e., pressure transmitters and flow transmitters, which provide input to the Reactor Protection System (RPS) as well as various non-safety related instruments. The rack is anchored by three lower base plates attached to the floor and three upper base plates attached to a wall. The three lower base plates are secured by welding the base plates to the steel floor structure. The three upper base plates use two expansion-type anchor bolts in each base plate to secure the rack to the wall. The EIIS identifiers for this rack are JC-SPT and JE-SPT. R-02 was installed during original construction by Bechtel Corporation (B130).

C. Sequence of Events

During a mid-cycle maintenance/inspection outage in October 1987, two flow transmitters were added to instrument rack R-02. On 10/22/87 during installation of the new transmitters, the anchor bolts for the upper north base plate of R-02 were observed to be degraded, i.e., the bolts were found to be loose and pulling out of the wall. Plant Engineering was contacted to determine appropriate corrective action and repairs were made to this base plate as specified. Subsequent to the repairs, additional inspections revealed that one of the anchor bolts for the upper center base plate had become loose and pulled out of the wall during the repair. A torque test was performed for the anchor bolts for the upper center base plate. This test revealed that both anchor bolts for the upper center base plate were degraded. A torque test was also performed for the anchor bolts on upper south base plate. One of these two anchor bolts did not pass the torque test. The anchor bolts which failed the torque tests were replaced with new bolts. The embed depth of the new bolts was increased. All repairs were completed on 10/31/87 prior to startup. An evaluation was initiated to determine the cause of the anchor bolt failures and the as-found seismic qualification of the instrument rack.

II. Event Cause

A. Event Analysis

On 10/22/87 during installation of two new non-safety related flow transmitters, the anchor bolts for the upper north base plate of R-02 were found to be loose and pulling out of the wall. These anchors were examined and found to be 1/2 inch diameter WEJ-IT anchors with an overall length of 2 inches. With full thread engagement of the anchor bolt nut and the 1/2 inch base plate thickness, only 1 inch of anchor bolt embedment existed. A repair method was specified by engineering personnel which required drilling the existing anchor bolt holes to greater embed depth and installing new anchors. However, while attempting to make repairs, interferences due to reinforcing steel (rebar) prevented drilling of the holes to specified depth. Therefore, another repair method was provided by engineering personnel which, in part, provided for alternate bolt locations.

Subsequent to the repair of the upper north base plate, an inspection was performed by engineering personnel and it was observed that one of the two anchor bolts for the upper center base plate had also become loose and pulled out of the wall. No degradation to this plate had been observed when previously inspected prior to repair of the upper north base plate. As a result of this finding, a torque test was performed on the remaining anchor bolts for R-02. A torque test consists of applying a predetermined torque to the anchor bolts. If the anchor breaks or the anchor turns, the test is failed. The two anchors for the upper center base plate and one of two anchors for the upper south base plate failed the torque test. The anchors that failed were also 1/2 inch diameter WEJ-IT anchors with an overall length of 2 inches. The anchor that passed was a 1/2 inch diameter Phillips wedge anchor (PWA) with an overall length of 5-1/2 inches. Since this one anchor was different than other anchors, a review of plant records was performed but did not reveal when the PWA anchor was installed, i.e., during or subsequent to initial construction.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
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Arkansas Nuclear One, Unit One	015101013113	88	002	0	010310F104

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

During construction of ANO-1, there was not a specification to provide specific guidance for installation of expansion-type anchors. Instrument racks were installed in accordance with a typical details drawing which specified use of 1/2 inch by 5-1/2 inch KWIK-BOLTS or equal. Apparently, the use of anchors with a length of 2 inches was determined to be acceptable for mounting R-02 during plant construction. The cause of loosening of the anchor bolts for the upper north base plate could not be conclusively determined. Additionally, since no problems were noted with the other two base plates until after repair of the upper north plate, it is speculated that this repair may have induced loosening of the anchor bolts securing these plates.

The safety significance of this event is related to the affect of a seismic event on the instrument components supported by instrument rack R-02. An engineering evaluation was performed to determine the affect of a seismic event on the instrument rack. The engineering evaluation conservatively assumed that all 6 anchors in the three wall base plates were deficient and no support was provided. No credit was taken for the PWA type anchor or the 3 WEJ-IT anchors which were not loose at the time of initial discovery of the degraded upper north base plate anchors. This evaluation concluded that the instrument rack would have failed during a seismic event.

Assuming failure of the instrument rack, the affect of the unavailability of the components supported by the rack was determined. The following components are supported by the rack:

1. PDS-6214: Chilled water flow to reactor building cooling coil VCC-1C.
2. PDIS-6218: Chilled water flow to reactor building cooling coil VCC-1D.
3. PT-1010: Low range reactor coolant system (RCS) pressure.
4. PT-1021: Loop A RCS pressure for reactor protection system (RPS) channel 1.
5. PT-1023: Loop A RCS pressure for RPS channel 2.
6. PDT-1029: Loop A RCS flow for RPS channel 2.
7. PDT-1030: Loop A RCS flow for RPS channel 3.

Of the above components, PDIS-6214, PDIS-6218 and PT-1010 provide indication only and are not required to shut the plant down or maintain the plant in a safe condition. The chilled water flow indicators PDIS-6214 and PDIS-6218 provide indication when chilled water flow to VCC-1C or VCC-1D is below 120 gpm. RCS low range pressure indication PT-1010 provides RCS pressure indication from 0 to 500 psig. This indicator was originally used in conjunction with computer indication during plant startups and cooldowns. Currently, other instrumentation is primarily used. These instruments provide no safety function related to mitigation of consequences or prevention of accidents.

PT-1021, PT-1023, PDT-1029 and PDT-1030 provide signals to the RPS for Reactor trip function generation. PT-1021 and PDT-1029 also provide control room indication for normal operations. The exact failure mode of these components as a result of the rack failing during a seismic event is indeterminate. However, the most probable type of failure i.e., loss of power to transmitters or pressure sensing line failures, would not have prevented protective functions required of the components. Redundant instrumentation would have been available for monitoring functions provided by the affected instruments.

For events due to natural phenomena such as earthquakes, the safety considerations relate to the capability to shut the plant down and maintain the plant in a safe shutdown condition. Based on this consideration, the most probable affect of instrumentation rack R-02 failure, and the significant amount of conservatism used to conclude the rack would have failed during a seismic event, the safety significance of this event was considered to be minimal.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)				PAGE (3)
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Arkansas Nuclear One, Unit One	015101013113	01	01	2	01	0141014

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

B. Root Cause

The root cause of the event is believed to be insufficient or inappropriate guidance to original construction field personnel on the use of expansion anchors during initial construction of the plant.

C. Basis for Reportability

The installation of the anchors occurred during initial construction of ANO-1 but the exact date could not be determined. Therefore, the event date for this report was chosen to be 10/22/87, the date the discrepancy was discovered. An engineering evaluation performed to determine the affect of a seismic event on the rack in the as-found condition was completed on 11/4/87 and concluded that the instrument rack might have failed during a seismic event. Further review was conducted to determine the instrumentation supported by the rack and the affects on the instrumentation in order to make a reportability determination. The operability of instruments, which provide signals to multiple channels of RPS, could not be assured following a seismic event. Since a single cause might have affected components that provide signals to multiple channels of RPS, this discrepancy is reportable under the provisions of 10CFR50.73(a)(2)(vii). This determination was made on 1/27/88. Preparation and submittal of the report was delayed due to activities related to containment integrity issues reported in LER 50-313/88-001 and LER 50-327/88-001.

III. Corrective Actions

A. Immediate

The existing baseplate and anchor bolts for the upper north instrument rack support were removed. The anchor bolt holes were filled and new holes were drilled. A new baseplate was installed and two new PWA anchors were installed with proper embed depth. The anchor bolts were torqued and found acceptable. The anchors which failed the torque test on the upper center and upper south supports were removed. The existing holes were drilled to proper embed depth and new PWA anchors were installed. The anchor bolts were torqued and found acceptable.

B. Subsequent

Six similarly secured instruments racks were inspected, including racks supporting other RPS instrumentation as well as other safety-related instrumentation. The anchor bolts used to support these racks were PWA type and the racks were found to be acceptable in the as-found condition. An evaluation of the seismic qualification of the instrument rack in the as-found condition and a subsequent evaluation of the potential affects on the instruments supported by the rack were performed.

C. Future

Sufficient instructions for installation of expansion anchors are provided in the current plant procedures and specifications. The current engineering specifications for expansion-type anchor installation specify acceptable manufacturers, minimum embed depth, and torquing requirements. Specific field installation instructions are controlled by department administrative procedures and provide embed depth requirements, bolt verticality, spacing and abandonment criteria, torquing requirements and inspection requirements.

No future actions are necessary.

IV. Additional Information

A. Similar Events

Previous LERs have not identified events regarding inadequate anchor bolt installation.

B. Supplemental Report

No supplemental report is planned.



ARKANSAS POWER & LIGHT COMPANY

March 9, 1988

1CAN038803

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

SUBJECT: Arkansas Nuclear One - Unit 1
Docket No. 50-313
License No. DPR-51
Licensee Event Report No. 313/88-002-00

Gentlemen:

In accordance with 10CFR50.73(a)(2)(vii), attached is the subject report concerning plant instrumentation found not seismically qualified due to improperly sized mounting rack anchor bolts.

Very truly yours,

J. M. Levine /smc

J. M. Levine
Executive Director,
Nuclear Operations

JML:DJM:dm
attachment

cc w/att: ANO Prompt Distribution

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