



January 10, 1991

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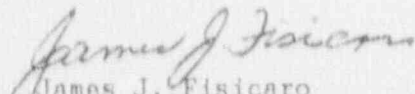
U. S. Nuclear Regulatory Commission  
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SUBJECT: Arkansas Nuclear One - Unit 1  
Docket No. 50-313  
License No. DPR-51  
Licensee Event Report 50-313/90-020-00

Gentlemen:

In accordance with 10CFR50.73(a)(2)(ii)(A) attached is the subject report concerning a design deficiency which resulted in the potential for structural damage or failure of the containment polar crane during a design basis accident.

Very truly yours,

  
James J. Fisicaro  
Manager, Licensing

JJF/LAT/mmg  
Attachment  
cc:

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Arkansas Nuclear One, Unit One DOCKET NUMBER (2) 050003131 OF 04  
 PAGE (3) 31

TITLE (4) Design Deficiency Results in Potential for Structural Damage or Failure of Containment Polar Crane During Design Basis Accident Conditions

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	3	0	9	0	9	0	--	0	2	0	--	0	0	0	0	0	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	0	0	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)	
														X											

LICENSEE CONTACT FOR THIS LER (12)

Name	Telephone Number
Larry A. Taylor, Nuclear Safety and Licensing Specialist	501964-5000

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

Cause	System	Component	Manufacturer	Reportable to NRCDS	Cause	System	Component	Manufacturer	Reportable to NRCDS

SUPPLEMENT REPORT EXPECTED (14)

<input type="checkbox"/> Yes (If yes, complete Expected Submission Date)	<input checked="" type="checkbox"/> No	EXPECTED SUBMISSION DATE (15)	Month	Day	Year

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

On October 30, 1990 during a refueling outage, Design Engineering personnel determined that an analysis had never been performed to ensure that certain structural components of the ANO-1 containment building polar crane could withstand the effects of a rapid increase in containment pressure during a loss of coolant accident without sustaining structural damage. The potential concern was that inadequate venting could result in a large differential pressure across the crane's girders which might cause the girders to yield or collapse allowing the crane or a part of the crane structure to fall from its stored position. Further investigations determined that the ANO-2 polar crane, which is similarly designed, had been modified during the construction phase of the unit to address the same concern. The ANO-1 polar crane vendor was consulted and an analysis was performed which indicated that modifications were necessary to ensure the crane components were adequately vented. The crane was modified by cutting vent holes in the bridge girders, trolley sides and end trucks. The root cause was determined to be an oversight by the ANO-1 architect engineer during the construction phase of ANO-1.

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

A. Plant Status

At the time of discovery of this condition, Arkansas Nuclear One, Unit One (ANO-1) was in a refueling shutdown. Refueling outage 1R9 was in progress.

B. Event Description

On October 30, 1990 Design Engineering personnel determined that an analysis had never been performed to ensure that certain structural components of the ANO-1 containment building polar crane [CRN] e.g., bridge girders, trolley sides and end trucks, could withstand the effects of a rapid increase in containment pressure without sustaining structural damage. The primary concern was that the crane's main box girders and support girders, which are enclosed compartments, might not be adequately vented resulting in a condition where a large increase in containment pressure over a short period of time could cause a high differential pressure ( $\Delta P$ ) to exist across the girders. A large  $\Delta P$  might cause yielding or collapse of the girders allowing the crane or a part of the crane structure to fall from its stored position in containment. A rapid increase in containment pressure, i.e., 0 to approximately 54 psig in approximately 20 seconds, is postulated to occur as the result of the Design Basis Accident (DBA) for the containment building which is a Loss of Coolant Accident (LOCA).

ANO-1 was in a refueling shutdown condition with the reactor coolant system (RCS) [AB] depressurized and vented at the time of discovery of this condition. Therefore, no immediate actions were necessary to address the potential concern with respect to the effect on current plant operation.

However, since ANO-2 was operating at full power and it was known that the ANO-2 polar crane was similarly designed and was manufactured by the same vendor, investigations were initiated to determine the applicability of the potential concern to ANO-2. The results of this investigation revealed that the potential problem had been previously identified and resolved in 1977 during the construction phase of ANO-2. Reviews of plant records indicated that the ANO-2 polar crane was modified by cutting vent holes in the bridge girders, end trucks and trolley sides prior to initial plant operation. Based on this information it was concluded that no additional actions were necessary on ANO-2.

During the ANO-1 refueling outage, Design Engineering personnel contacted the polar crane vendor and requested an analysis and evaluation of the ANO-1 crane components considering occurrence of a rapid pressurization of containment. The analysis was performed assuming a rapid increase in containment pressure from 0 psig to 59 psig over a 20 second time period. The results of the analysis were evaluated and it was determined that the crane components would have to be modified by adding vent holes to allow rapid pressure equalization across the components in order to assure the structural integrity of the components under the postulated conditions.

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

C. Root Cause

Following discovery of this potential problem a review of plant records was conducted and correspondence between the architect engineer for ANO-1, (Bechtel Power Corporation), and the polar crane manufacturer, (Harnishfeger) was located which indicated the concern of possible structural damage to polar crane components due to a rapid pressure change in the containment building was discussed between these organizations in 1973 during the construction phase of ANO-1. However, no documentation could be located to indicate the issue was ever resolved or dispositioned prior to operation of ANO-1. It was noted in the correspondence however, that the purchase specification for the crane provided to Harnishfeger by Bechtel did not specify a rate of pressure change that the crane components should be able to withstand. Based on this information it was concluded that the root cause of the event was an oversight by the ANO-1 architect engineer to require, as part of the purchase specification for the polar crane, that the components be capable of withstanding the projected containment DBA atmospheric conditions without damage.

D. Corrective Actions

During the 1R9 refueling outage, Design Engineering personnel coordinated with the polar crane vendor and a modification was developed to add vent holes to the crane bridge girders, trolley sides and end trucks. The modification was implemented prior to plant heatup following the outage.

ANO is implementing a Design Configuration Documentation (DCD) program as addressed in ANO Business Plan Item D.6.a. It is expected that this DCD program would improve the quality, completeness and retrievability of the documentation which describes aspects of the design of ANO.

E. Safety Significance

Following initial identification of this potential safety concern, an engineering evaluation of the design of the ANO-1 polar crane and structural components was performed. The crane structural drawings and installation were reviewed. Based on several factors such as existing openings in the components which would minimize the  $\Delta P$  across the structural members and the low stresses in the girders under dead load conditions with the crane in a stored position, it was judged that although some damage might occur as the result of a rapid increase in containment pressure the crane would most likely remain in place and not fall during a DBA. However, because this judgment could not be supported analytically and due to the difficulty in predicting the various effects on plant equipment and capability to respond to an accident should the crane or part of the crane structure collapse and fall from its stored position, this condition was determined to be potentially significant.

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

F. Basis for Reportability

Following completion of the analysis of the condition by the crane vendor, these findings were considered to constitute previous operation of the plant in an unanalyzed condition and is reportable per 10CFR50.73(a)(2)(ii)A). The NRC Operations Center was notified of this condition pursuant to 10CFR50.72 (b)(2)(i) at 1300 hours on December 9, 1990.

G. Additional Information

There have been no previous similar events reported at ANO.

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