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October 16, 2000

2CAN100002

U. S. Nuclear Regulatory Commission  
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Washington, DC 20555

Subject: Arkansas Nuclear One - Unit - 2  
Docket No. 50-368  
License No. NPF-6  
Licensee Event Report 50-368/2000-002-00

Gentlemen:

In accordance with 10CFR50.73(a)(2)(i)(B), enclosed is the subject report concerning Main Steam Safety Valves.

Very truly yours,

A handwritten signature in cursive script, appearing to read "Jimmy D. Vandergrift".

Jimmy D. Vandergrift  
Director, Nuclear Safety

JDV/tfs

enclosure

IE22

U. S. NRC

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cc: Mr. Ellis W. Merschoff  
Regional Administrator  
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**LICENSEE EVENT REPORT (LER)**

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)  
Arkansas Nuclear One - Unit 2

DOCKET NUMBER (2)  
05000368

PAGE (3)  
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TITLE (4) As-Found Lift Settings Of Three Main Steam Safety Valves Were Below Technical Specifications Requirements Due To Different Methods For As-found And As-left Tests, As-left Setpoint Bias, And Setpoint Drift

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 NAME	DOCKET NUMBER
09	14	2000	2000	002	00	10	16	2000	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	POWER LEVEL (10)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (Check one or more) (11)							
1	085	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.405(c)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)	<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 50.36(c)(1)	<input type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 73.71(c)
		<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> OTHER	<input type="checkbox"/> 20.405(a)(1)(iii)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	Specify in Abstract Below and in Text
		<input type="checkbox"/> 20.405(a)(1)(iv)	<input type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)		<input type="checkbox"/> 20.405(a)(1)(v)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)	

LICENSEE CONTACT FOR THIS LER (12)

NAME  
Thomas F. Scott, Nuclear Safety and Licensing Specialist

TELEPHONE NUMBER (Include Area Code)  
501-858-4623

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	SB	RV	C710	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	X				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

Prior to a scheduled refueling outage, in situ testing revealed that as-found lift settings of three of the ten Main Steam Safety Valves (MSSVs) were more than three percent below their setpoints. The testing was conducted with a Crosby Set Pressure Verification Device (SPVD). MSSVs that were not within one percent of their setpoint were adjusted and re-tested until repeatable lifts were within tolerance. During the previous refueling outage, as-left setpoint verification was conducted using steam at a vendor's facility. Lift points were left in the low part of the allowable tolerance band based on experience that their as-found values were more often high at the end of the operating cycle. A potential failure mode analysis determined that the most probable causes were a difference in results from using the two test methods, the setpoint bias from the previous as-left tests, and setpoint drift. Collection and evaluation of information to improve MSSV performance will continue during future operating cycles.

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TEXT CONTINUATION

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

## A. Plant Status

At the time this condition was discovered, Arkansas Nuclear One Unit 2 (ANO-2) was operating in steady state conditions at approximately 85 percent power, Mode 1. Main Steam (MS) [SB] header pressure was approximately 800 psig.

## B. Event Description

As found lift settings of three Main Steam Safety Valves (MSSVs) [SB] were below the requirements of Technical Specifications (TS).

ANO-2 has five MSSVs per header. During Modes 1, 2, and 3, TS 3.7.1.1 requires the valves to have lift settings within plus or minus three percent of the specified setpoints. Additionally, if lift settings are found outside a plus or minus one percent tolerance band, they are required by TS to be reset to within that tolerance. On September 14 and 15, 2000, all of the valves were tested in situ using the Crosby Set Pressure Verification Device (SPVD) just prior to the start of a scheduled refueling outage. Three were found with initial lift settings more than three percent below the lift setting specified by TS. Results of the initial as-found tests are provided below. All pressures are in psig.

<u>Tag Number</u>	<u>Setpoint</u>	<u>As-Found</u>	<u>Percent Deviation</u>
2PSV-1002	1078	1041.0	-3.4
2PSV-1003	1105	1094.9	-0.9
2PSV-1004	1105	1080.7	-2.2
2PSV-1005	1132	1118.2	-1.2
2PSV-1006	1132	1118.7	-1.2
2PSV-1052	1078	1044.3	-3.1
2PSV-1053	1105	1090.5	-1.3
2PSV-1054	1105	1072.1	-3.0
2PSV-1055	1132	1124.9	-0.6
2PSV-1056	1132	1086.5	-4.0

MSSVs that were not within one percent of their setpoint were adjusted and re-tested until repeatable lifts were within tolerance.

## C. Root Cause

During the previous refueling outage, a flexidisc modification was installed in the MSSVs. Following that outage, ANO was not able to perform setpoint verification using the SPVD because the vendor had not completed SPVD qualification for the flexidisc design. Setpoint verification was conducted using steam at a vendor's facility. The as-left lift values were set in the low part of the allowable tolerance band based on experience that their as-found values were more often high at the end of the operating cycle.

NRC FORM 366A (5-92)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB NO. 3150-0104 EXPIRES 5/31/95	
<b>LICENSEE EVENT REPORT (LER) TEXT CONTINUATION</b>				ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 MRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.	
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A team of site personnel was assembled to perform failure mode analysis. Sufficient operating history and physical evidence to determine a root cause for this condition was not available; however, after evaluating approximately 40 potential failure modes, three factors were identified as probable contributors.

The first factor involves a difference in test results that can be obtained when certifying valves by lifting with steam compared to results obtained when using the SPVD lift assist device. This effect has been noted in industry experience as a potential source of measured setpoints.

The second factor involves the previous outage lift values being left in the lower part of the allowable tolerance band (0 to -1 percent of setpoint) due to past experience with as-found lift points at the end of an operating cycle.

The third factor involves the anticipated setpoint deviation (drift) around a mean value. Several items affect the repeatability of the MSSV lift point including the length of time the valves are installed on the header, the number of lifts, and the disc design (flat or flexidisc). Industry experience indicates that large safety valves have a history of setpoint drift that can be expected occasionally to challenge the Technical Specifications tolerance limits.

The combination of an as-left low setpoint bias, in conjunction with a potential difference introduced by the different test methodologies and setpoint drift during the first cycle of operation of the valves, resulted in the 3 MSSVs being found low out of tolerance. No physical degradation or degradation mechanisms are believed to exist with the MSSVs.

#### D. Corrective Actions

The as-left setpoints of the MSSVs were established between plus or minus one percent with SPVD.

The valve lifts for the current outage were consistent and repeatable, although generally low. The test data indicated that previous modifications and other improvements were successful in eliminating the high lift values and seat leakage following testing. Based on these considerations, ANO decided not to remove the valves for maintenance or offsite setpoint testing.

The collection and evaluation of information to evaluate and improve MSSV performance will be a continuing process over the next few cycles of operation.

#### E. Safety Significance

Accidents and Abnormal Operating Occurrences (AOOs) in the Safety Analysis Report (SAR) related to MSSV lift setting tolerances were reviewed. The lower negative tolerance has the effect of lifting the MSSVs earlier and closing them later than the analyzed limits. This has the potential of releasing more

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steam and thus increasing the calculated offsite dose. It may also result in a reduction in the Steam Generator (SG) inventory and potentially losing the heat sink. Since the MSSVs were lifting at a lower pressure, they were providing adequate over pressure protection as intended.

There are six events analyzed in SAR Chapter 15 for which the MSSVs open. These are Loss of Coolant Flow with Loss of Offsite Power, Loss of Load, Loss of Feedwater (LOFW), Loss of AC power, Feed Water Line Break (FWLB), and Steam Generator Tube Rupture (SGTR) with loss of AC Power. For Loss of Coolant Accident (LOCA) events, the maximum set pressure is more adverse and this analysis is not affected by the low as-found lift point condition.

For the Loss of Coolant Flow with Loss of Offsite Power, Loss of Load, and Loss of AC Power, the offsite dose is calculated based on the steam release necessary through the Atmospheric Dump Valves (ADVs) to bring the plant to shutdown cooling entry conditions in a specific period of time. The amount of steam released through the MSSVs may increase due to the lower negative as-found values, but the total amount of steam released would remain the same. Thus, there would be no increased dose consequence. The radiological consequences of the FWLB event is bounded by the Loss of AC Power event since the water would remain in the containment.

For SGTR with Loss of AC, the offsite doses could be higher with a lower negative lift point since more steam from the ruptured SG is released through the MSSVs. A conservative estimate shows that the as-found limiting lift point could increase the steam release and thus the dose consequence by less than an additional 2 percent over the previously analyzed results. The total offsite dose from this condition would remain far below the 10CFR100 limits, the licensing basis for this event at ANO-2.

The LOFW event analysis identifies that the event is not limiting with respect to Departure from Nucleate Boiling Ratio (DNBR), Linear Heat Rate, or dose consequences. The criterion to be satisfied is that the SG heat removal capability is maintained. The analysis with the MSSVs lifting at -3 percent results, for the worst case, in the MSSVs being open for less than 20 seconds. The as-found limiting lift point is conservatively estimated to keep the MSSVs open for an additional 10 seconds. For the worst case, the additional inventory loss would result in the SG inventory being well above the required amount needed to avoid dry-out. This result is conservative considering the fact that the Steam Dump and Bypass Control System [SB] could be in operation with a steam release rate higher than the MSSV release rate. There would be no loss of SG heat sink resulting from the lower negative as-found MSSV lift values.

The potential impact of this condition on events analyzed in the SAR is negligible. Any increase in dose for the SGTR event would have been small and well within the ANO-2 licensing basis. The SGs would have provided an adequate heat sink in the case of the LOFW event. The MSSVs would have adequately performed their required safety functions during the previous operating cycle. For these reasons, this condition is considered to have had minimal actual safety significance.

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**F. Basis for Reportability**

The guidance provided in Example (5) of Section 3.2.2 of NUREG-1022 Revision 1, "Event Reporting Guidelines - 10CFR50.72 and 50.73," states that multiple safety valves found to lift with setpoints outside the TS limits is an indication that the discrepancies arose over a period of time and constitutes an event reportable under 10CFR50.73(a)(2)(i)(B) as operation prohibited by Technical Specifications.

**G. Additional Information**

The ANO-2 MSSVs are model HA-65-FN, size 8T10x10, manufactured by Crosby Valve and Gage Company (Manufacturer Code C710).

There have been no previous Licensee Event Reports (LERs) submitted by ANO regarding MSSVs with as-found lift points below TS limits.

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