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U. S. Nuclear Regulatory Commission  
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Subject: Arkansas Nuclear One - Unit 2  
Docket No. 50-368  
License No. NPF-6  
Licensee Event Report 50-368/95-005-00

Gentlemen:

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

Very truly yours,

Dwight C. Mims  
Director, Nuclear Safety

DCM/tfs

enclosure

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cc: Mr. Leonard J. Callan  
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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.

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TITLE (4) MAIN STEAM SAFETY VALVE SETPOINTS NOT WITHIN TECHNICAL SPECIFICATION TOLERANCE DURING OPERATION DUE TO A FAILURE TO ADEQUATELY SPECIFY ENVIRONMENTAL CONDITIONS FOR USE IN VENDOR PROCEDURES FOR TESTING AND SETPOINT ADJUSTMENT

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
10	04	95	95	005	00	11	02	95	FACILITY NAME	DOCKET NUMBER
OPERATING MODE (9)		6	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (Check one or more) (11)							
POWER LEVEL (10)		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	
			20.405(a)(1)(iii)		X 50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		Specify in	
			20.405(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)		Abstract Below	
			20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)		and in Text	

## 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 NRPDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRPDS

## SUPPLEMENTAL REPORT EXPECTED (14)

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

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

During testing of Main Steam Safety Valve (MSSV) setpoints prior to a scheduled refueling outage, some of the valves were discovered to have setpoints that were unusually high. After cooldown, all MSSVs were removed and sent to Wyle Laboratories for testing and evaluation. Previous testing at Wyle was found to have been performed using default environmental conditions that were not representative of the service environment for these valves. Since at least one of the MSSVs was determined to have had a setpoint in excess of the operability requirement specified in the unit Technical Specifications (TS) during the previous operating cycle without the required actions having been taken, this condition constituted operation prohibited by TS. The as-found setpoints were used in an evaluation that concluded there would have been no adverse effects upon analyzed accidents during the past operating cycle. The root cause of this condition was attributed to a failure to adequately specify environmental conditions under which vendor testing and setpoint adjustment were performed. Setpoints for all MSSVs were adjusted to within tolerance after the vendor procedure was changed and before re-installation. This condition did not affect ANO-1 MSSVs because they are of a different design, measured spring temperature conditions are consistent with those used in the Wyle test procedure, and good repeatability exists between ANO and Wyle test results.

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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 determined to be reportable, Arkansas Nuclear One Unit 2 (ANO-2) was in Mode 6 refueling conditions with fuel being off-loaded from the core.

## B. Event Description

Some Main Steam Safety Valve (MSSV) [SB] setpoints were found to have been outside the tolerance required by Technical Specifications (TS) during previous periods of operation.

ANO-2 has ten MSSVs, five per header, with setpoints as indicated. The setpoints are required to correspond to ambient conditions of the valve at nominal operating temperature and pressure.

Valve Tag NumberRequired Lift Setting (+1/-3 percent)

<u>Header No. 1</u>	<u>Header No. 2</u>
2PSV-1002	2PSV-1052
2PSV-1003	2PSV-1053
2PSV-1004	2PSV-1054
2PSV-1005	2PSV-1055
2PSV-1006	2PSV-1056

1078 psig  
1105 psig  
1105 psig  
1132 psig  
1132 psig

Setpoint testing of the MSSVs began on September 22, 1995, with reactor power at approximately 83 percent in a coast-down prior to a scheduled refueling outage. To comply with the action requirement of TS 3.7.1.1, the Linear Power Level - High trip setpoint was reduced to less than 91 percent on all channels of the Plant Protection System (PPS) [JC] prior to the start of testing. The first valve tested, 2PSV-1052, failed to lift with a simulated header pressure of 1143.6 psig. Testing was curtailed at that point to assess test conditions and test equipment performance. The plant shutdown continued to Mode 3 (hot standby). In preparation for the next valve test, PPS linear power level trip setpoints were reduced to less than 45 percent. At 0205 on September 23, the next valve tested, 2PSV-1002, lifted at 1124 psig and was declared inoperable due to exceeding its maximum allowable lift pressure. It was retested several times as its setpoint was being adjusted. At 0505, testing of 2PSV-1002 confirmed that it had been returned to an operable status with an as-left lift point of 1078 psig. At 0536, 2PSV-1006 was tested to a simulated header pressure of approximately 1199 psig and it did not lift. The valve was declared to be inoperable and further in-place MSSV testing was suspended. Because of the unusual results from these tests, following completion of cooldown all ANO-2 MSSVs were removed and shipped to Wyle Laboratories for testing and evaluation.

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At Wyle, 2PSV-1006 was tested in accordance with the Wyle test procedure. This required thermal stabilization at 90 percent of set pressure in an ambient environment of 140F. Thermal stability is defined as a temperature change of no more than 5F in 30 minutes and inlet neck temperature within 200F of steam temperature. Under these conditions, the valve lifted at 1143 psig, an acceptable as-found value. After comparison of the location at which the valve body temperature was measured at ANO and Wyle, it was determined that a significant difference existed. Temperature conditions of actual valve service were established on the test bench by adding an additional thermocouple and maintaining the valve temperature as measured at ANO. When tested under these conditions, the valve lifted at 1196 psig.

Valve 2PSV-1002 was then tested with the lower temperature controls, maintaining temperature by lowering steam pressure before and after lifts. It lifted at 1062, 1070, and 1053 psig on successive tests. In order to more closely approximate plant conditions, the Wyle procedure was changed to allow thermal stabilization at 80 percent, reduce ambient temperature from 140F to 110F, and remove insulating blankets from the valves. (There are no insulating blankets on the valves at ANO.) Under these test conditions, the valve lifted at 1057 psig, an acceptable as-found lift point. This valve had its setpoint adjusted at ANO on September 23, 1995.

Valve 2PSV-1053 had last been tested at ANO in March of 1994 with an as-found setpoint of 1109 psig and as-left of approximately 1103 psig. Using the revised test method at Wyle, the as-found setpoint of 1086 psig was within the acceptable tolerance.

On the basis of the testing described above, on October 4, 1995, ANO concluded that sufficient evidence existed to conclude that some deviations from desired setpoints were not the result of routine drift over the operating cycle. Since at least one MSSV had a setpoint in excess of TS limits during the previous operating cycle without required actions having been taken, this condition was determined to be reportable as operation prohibited by TS.

Testing continued at Wyle using revised environmental conditions with the following results:

<u>Valve Tag Number</u>	<u>Required Setpoint</u>	<u>As-Found Setpoint</u>
2PSV-1003	1105 psig	1172 psig - out of spec high
2PSV-1005	1132 psig	1135 psig - acceptable
2PSV-1055	1132 psig	1103 psig - acceptable
2PSV-1004	1105 psig	1103 psig - acceptable
2PSV-1056	1132 psig	1167 psig - out of spec high
2PSV-1054	1105 psig	1075 psig - acceptable
2PSV-1052	1078 psig	1153 psig - out of spec high



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**C. Root Cause**

The root cause of this condition is attributed to failure of ANO personnel to adequately specify to Wyle the environmental conditions under which the MSSVs were to be tested. Both the ANO-2 Technical Specifications and ASME Standard OM-1 (1987), "Requirements for In-service Performance Testing of Nuclear Power Plant Pressure Relief Devices," specify that the ambient temperature of the operating environment is to be simulated during the test of the pressure setpoint. Since ANO did not specify environmental conditions, the vendor used a generic procedure for steam safety valve testing. Vendor procedures called for use of this default set of conditions unless otherwise specified by the customer.

A review of records was performed to evaluate previous deviations of the MSSV setpoints from the desired value. Prior to 1992, off-site testing and refurbishment of the ANO-2 valves were accomplished at the valve vendor (Crosby) facility. Since 1992, these activities have been accomplished at Wyle Laboratories with Crosby support for refurbishment. Based on a review of the maintenance history, it was concluded that sufficient information was available to have identified this condition prior to the time of discovery. Contributing to the condition not having been discovered were setting of the valves at different locations under differing environments, a belief by those involved that setpoint drift was a characteristic of large safety valves as well as an industry problem, and other contributors to setpoint deviation that were identified and corrected. These factors also affected recognition of the relation of this condition to previously identified problems with relief valve lift point variation through evaluation of internal and external industry experience information.

**D. Corrective Actions**

Wyle Laboratories was notified by letter to change the procedure for testing and setting ANO-2 MSSVs to more accurately reflect in service environmental conditions.

The generic implications for testing other ANO safety valves were evaluated. Pressurizer code safety valve test procedures specify normal plant environmental conditions when tested at Wyle. Current testing practices for other ASME code valves were reviewed and appear to be appropriate. The condition does not affect ANO-1 MSSVs because they are of a different design and measured spring temperature conditions are consistent with those used in the Wyle test procedure. There has been good repeatability between ANO-1 and Wyle test results.

All ANO-2 MSSVs had setpoints established and verified under proper environmental conditions prior to their being re-installed in the plant.

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**E. Safety Significance**

An Engineering evaluation of the as-found setpoints of the MSSVs was performed. The limiting analysis for the identified condition is the Loss of Condenser Vacuum (LOCV) event. The evaluation was performed at 103 percent power. The effects of a slightly reduced core power would have a small effect on the results in a conservative direction.

For the maximum primary pressure LOCV case, the analysis takes credit for the lower set of valves and also credits the next bank of MSSVs for relief capacity; therefore, six valves are required to ensure adequate relief capacity for this event. The analysis confirmed that adequate relief capacity was available based on the as-found test results, there was no impact on the LOCV event analysis, and the primary pressure limit of 110 percent of RCS design pressure would not have been exceeded. For the peak secondary pressure case, almost all of the valves are required to mitigate the secondary pressure rise to prevent exceeding 110 percent of the secondary design pressure. Using the as-found setpoints, the analysis concluded that the secondary design pressure would not have been exceeded.

Since the evaluation of the limiting event affected by MSSV lift setpoints demonstrated sufficient relief capacity to ensure that primary and secondary design limits would not have been exceeded, this particular condition is judged to have had minimal safety significance.

**F. Basis for Reportability**

ANO-2 TS 3.7.1.1 requires MSSVs to have lift settings as specified in Table 3.7-5 during Mode 1, 2, or 3. With one or more of the valves inoperable, Action "a" of that specification requires that within four hours either the valve be restored to an operable status or the Linear Power Level - High trip setpoint be reduced. Unit shutdown is required if neither of these actions is completed. On October 4, 1995, sufficient testing had been performed at Wyle to allow a conclusion that at least one MSSV had been inoperable for longer than the allowable outage time without the required actions having been completed; therefore, operation prohibited by Technical Specifications occurred. This condition is reportable in accordance with 10CFR50.73(a)(2)(i)(B).

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## G. Additional Information

At ANO-2, the MSSVs are model HA-65-FN manufactured by Crosby Valve and Gauge Company (Manufacturer Code C710).

There have been no previous similar events reported by ANO as Licensee Event Reports.

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