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Christopher J. Schwarz
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10CFR 50.73

1CAN041203

April 12, 2012

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: Licensee Event Report 50-313/2012-002-00
Condition Prohibited by Technical Specifications Due to Inoperable Main Feedwater Startup and Low Load Valves
Arkansas Nuclear One – Unit 1
Docket No. 50-313
License No. DPR-51

Dear Sir or Madam:

Pursuant to the requirements of 10CFR 50.73(a)(2)(i)(B), attached is the subject Licensee Event Report concerning a condition prohibited by Technical Specifications due to the discovery of an inoperable Main Feedwater Startup Valve and Low Load Valve.

There are no new commitments contained in this submittal. Should you have any questions concerning this issue, please contact Stephenie Pyle, Licensing Manager, at 479-858-4704.

Sincerely,

Original Signed by Christopher J. Schwarz

CJS/slc

Attachment: Licensee Event Report 50-313/2012-002-00

cc: Mr. Elmo Collins
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
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Arlington, TX 76011-4511

NRC Senior Resident Inspector
Arkansas Nuclear One
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NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
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4. TITLE Inoperable Main Feedwater Startup Valve and Low Load Valve Controllers Due to a Degraded Resistor in an Integrated Control System Auxiliary Relay Results in a Condition Prohibited by Technical Specification

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
02	15	2012	2012	- 002 -	00	04	12	2012	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE

1

10. POWER LEVEL

100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☒ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER *(Include Area Code)*
Stephenie L. Pyle, Licensing Manager	479-858-4704

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	JA	RLY	B040	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR
N/A	N/A	N/A

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

On 2/15/2012 at 0300 (CST), Arkansas Nuclear One - Unit 1 Control Room Operators discovered that the CV-2673 Feedwater Train "B" Start-Up Valve Hand/Auto (H/A) station and the CV-2672 Feedwater Train "B" Low Load Valve H/A station on Control Room panel C03 had no light indications for the "auto" or "hand" mode. Appropriate Technical Specifications (TS) were entered at the time of discovery, with TS 3.7.3 Condition E (two feedwater control valves in the same flow path inoperable) requiring flowpath isolation within 8 hours; otherwise TS 3.7.3 Condition F requires the unit to be in Mode 3 within 6 hours and Mode 4 within 12 hours. TS 3.7.3 Condition E completion time expired at 1100 on 02/15/2012, at which time the Operations staff began preparations for shutdown. After corrective maintenance, both subject H/A stations were returned to auto, and applicable TS were exited at 1323 on 02/15/2012. Plant computer points indicated that both H/A stations had previously transferred from auto to hand with no operator action at 1924 on 2/14/2012, resulting in the subject valves being inoperable for a total of 18 hours, a condition prohibited by TS. Subsequent investigation revealed that a degraded carbon resistor on an Integrated Control System (ICS) 24 vDC auxiliary relay module resulted in a blown fuse in an ICS transfer relay module, causing both of the subject H/A stations to transfer from auto to hand. The apparent cause was determined to be a latent design change error from 1990 that resulted in the 24 vDC auxiliary relay module being utilized in a 48 vDC service application.

NARRATIVE

A. Plant Status

At the time of the event, ANO-1 was at approximately 100% power.

B. Event Description

On 2/15/2012 at 0300 (CST), Arkansas Nuclear One - Unit 1 (ANO-1) Control Room Operators discovered that the CV-2673 B Start Up Valve controller Hand/Auto (H/A) station ICC-0004 [JA][XIK], and CV-2672 B Low Load Valve controller H/A station, ICC-0006 [JA][XIK], on Control Room panel C03 [PL] had no light indication for the “auto” or “hand” mode. The light bulbs were replaced for the auto and hand indication, but the modules still had no auto or hand mode indication.

Normal operation of the startup and low load control valves is dependent upon the plant power level. At low power operation with the loop feedwater demand less than 50 percent, feedwater flow is controlled by modulation of the startup and low load control valves with the main feedwater block valve closed and the feedwater pumps operating to maintain 70 psid across the block valves. The valve positioning is sequenced so that when the startup control valve is approximately 90 percent open, the low load control valve will begin to open. When the loop feedwater demand reaches approximately 50 percent, the main block valves open and the startup and low load control valves have no effect on feedwater flow. In the event of a main feedwater line or main steam line break, the start up valves and low load valves are designed to provide automatic steam generator isolation capability that is redundant to Main Feedwater Isolation Valve (MFIV) isolation. This feature was added by Design Change Package 91-1008, “Integrated Control System (ICS) Backup to Main Feedwater (MFW) Isolation” to address a postulated failure of MFIV CV-2630 [SJ][ISV] or CV-2680 [SJ][ISV].

The Control Room staff implemented applicable Technical Specification (TS) requirements at the time of discovery (2/15/2012 at 0300) as follows:

TS 3.7.3: Main Feedwater Isolation Valves (MFIVs), Main Feedwater Block Valves, Low Load Feedwater Control Valves and Startup Feedwater Control Valves:

- Condition C was satisfied with the inoperable Low Load Feedwater Control Valve closed.
- Condition D was satisfied with the inoperable Startup Feedwater Control Valve closed.
- Condition E (two feedwater control valves in the same flow path inoperable) requires feedwater flow to the affected steam generator be isolated within 8 hours; otherwise, Condition F must be entered.
- Condition F requires the unit to be in Mode 3 within 6 hours AND Mode 4 within 12 hours.

B. Event Description - *continued*

TS 3.7.3 Condition E completion time expired at 1100 on 02/15/2012, at which time the Operations staff entered TS 3.7.3 Condition F and began preparations for shutdown. After corrective maintenance, both subject H/A stations were returned to auto, and applicable TSs were exited at 1323 on 02/15/2012. Plant computer points indicated that both H/A stations had previously transferred from auto to hand with no operator action at 1924 on 2/14/2012, resulting in the subject valves being inoperable for a total of 18 hours, a Condition Prohibited by TSs.

C. Event Cause

The apparent cause was determined to be a latent design change error that resulted in the 24 vDC auxiliary relay C46 5310 [JA][RLY] being utilized in a 48 vDC service application. Historical research revealed that 24 vDC auxiliary relay module C46 5310 and similar relay C46 533 [JA][RLY] were installed in 1990 in accordance with Design Change Package 88-1096, "OTSG Level Setpoints & ICS Known Safe States." The misapplication of the relay at this higher voltage resulted in overheating of a dropping resistor which resulted in its value reduction, and subsequently the opening of a fuse in the 24 vDC feed for ICS transfer relay module C46 5311 [JA][RLY]. This subject resistor is in series with the relay indicating lamp, which is illuminated when the relay is energized.

D. Corrective Actions

The subject resistor was eliminated from the affected circuit by removing the relay position indicating light, and the as left condition of relay modules C46 5310 and C46 533 were verified to be within allowable operating conditions. The proposed future corrective action will develop an engineering modification package and install ICS 48 vDC Auxiliary relays in C46 5310 and C46 533 locations, and is being tracked under the ANO Corrective Action Process.

E. Safety Significance Evaluation

In original plant design, the MFIVs provide the automatic isolation of main feedwater to the steam generators in the event of a main steam line or main feedwater line break. The main feedwater startup valves and low load valves were subsequently modified to provide automatic steam generator isolation capability that is redundant to MFIV isolation. This feature was added by Design Change Package 91-1008, "ICS Backup to MFW Isolation" to address a postulated failure of MFIV CV-2630 or CV-2680. The resistor and relay failure described in this report impacted the ability of the startup and low load valves to provide automatic isolation redundancy of the "B" feedwater train in the event of a main steam line or MFW line break; however, the MFW safety related function was maintained with the "B" Train MFIV being fully capable of MFW automatic isolation. Additionally, Operators maintained the ability to manually close the startup and low load flow paths from the Control Room during the subject time period. Based on these facts, this event is considered to have no significant safety implications.

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F. Basis For Reportability

This event is reported as a condition prohibited by TSs pursuant to 10 CFR 50.73(a)(2)(i)(B).

G. Additional Information

No similar events have been reported in the last three years.

Energy Industry Identification System (EIIS) codes and component codes are identified in the text of this report as [XX].