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OCAN041302

10CFR 50.73

April 04, 2013

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

Subject: Licensee Event Report 50-368/2013-002-00
Emergency Control Room Chiller Inoperability
Arkansas Nuclear One – Unit 1 and Unit 2
Docket Numbers 50-313 and 50-368
License Numbers DPR-51 and NPF-6

Dear Sir or Madam:

Pursuant to the reporting requirements of 10CFR 50.73, attached is the subject Licensee Event Report concerning an inoperable Emergency Control Room Chiller.

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,

Signature on file with original

JGB/slc

Attachment: Licensee Event Report 50-368/2013-002-00

cc: Mr. Arthur T. Howell
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
1600 East Lamar Boulevard
Arlington, TX 76011-4511

NRC Senior Resident Inspector
Arkansas Nuclear One
P.O. Box 310
London, AR 72847

Institute of Nuclear Power Operations
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LEREvents@inpo.org

NRC FORM 366 (10-2010)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013											
LICENSEE EVENT REPORT (LER) (See reverse for required number of digits/characters for each block)				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.											
1. FACILITY NAME Arkansas Nuclear One – Unit 2			2. DOCKET NUMBER 05000368		3. PAGE 1 of 5										
4. TITLE An Inoperable Emergency Control Room Chiller Due to Maintenance Error Results in a Prevented Safety Function.															
5. EVENT DATE MONTH DAY YEAR 02 04 2013		6. LER NUMBER YEAR SEQUENTIAL NUMBER REV NO. 2013 - 002 - 00		7. REPORT DATE MONTH DAY YEAR 04 04 2013											
8. OTHER FACILITIES INVOLVED <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:60%; border-bottom: 1px solid black;">FACILITY NAME Arkansas Nuclear One-Unit 1</td> <td style="width:40%; border-bottom: 1px solid black;">DOCKET NUMBER 05000313</td> </tr> <tr> <td style="border-bottom: 1px solid black;">FACILITY NAME</td> <td style="border-bottom: 1px solid black;">DOCKET NUMBER</td> </tr> </table>						FACILITY NAME Arkansas Nuclear One-Unit 1	DOCKET NUMBER 05000313	FACILITY NAME	DOCKET NUMBER						
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9. OPERATING MODE <div style="text-align: center; font-size: 1.2em;">1</div>		11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:25%; vertical-align: top;"> <input type="checkbox"/> 20.2201(b) <input type="checkbox"/> 20.2201(d) <input type="checkbox"/> 20.2203(a)(1) <input type="checkbox"/> 20.2203(a)(2)(i) <input type="checkbox"/> 20.2203(a)(2)(ii) <input type="checkbox"/> 20.2203(a)(2)(iii) <input type="checkbox"/> 20.2203(a)(2)(iv) <input type="checkbox"/> 20.2203(a)(2)(v) <input type="checkbox"/> 20.2203(a)(2)(vi) </td> <td style="width:25%; vertical-align: top;"> <input type="checkbox"/> 20.2203(a)(3)(i) <input type="checkbox"/> 20.2203(a)(3)(ii) <input type="checkbox"/> 20.2203(a)(4) <input type="checkbox"/> 50.36(c)(1)(i)(A) <input type="checkbox"/> 50.36(c)(1)(ii)(A) <input type="checkbox"/> 50.36(c)(2) <input type="checkbox"/> 50.46(a)(3)(ii) <input type="checkbox"/> 50.73(a)(2)(i)(A) <input checked="" type="checkbox"/> 50.73(a)(2)(i)(B) </td> <td style="width:25%; vertical-align: top;"> <input type="checkbox"/> 50.73(a)(2)(i)(C) <input type="checkbox"/> 50.73(a)(2)(ii)(A) <input type="checkbox"/> 50.73(a)(2)(ii)(B) <input type="checkbox"/> 50.73(a)(2)(iii) <input type="checkbox"/> 50.73(a)(2)(iv)(A) <input type="checkbox"/> 50.73(a)(2)(v)(A) <input type="checkbox"/> 50.73(a)(2)(v)(B) <input type="checkbox"/> 50.73(a)(2)(v)(C) <input checked="" type="checkbox"/> 50.73(a)(2)(v)(D) </td> <td style="width:25%; vertical-align: top;"> <input type="checkbox"/> 50.73(a)(2)(vii) <input type="checkbox"/> 50.73(a)(2)(viii)(A) <input type="checkbox"/> 50.73(a)(2)(viii)(B) <input type="checkbox"/> 50.73(a)(2)(ix)(A) <input type="checkbox"/> 50.73(a)(2)(x) <input type="checkbox"/> 73.71(a)(4) <input type="checkbox"/> 73.71(a)(5) <input type="checkbox"/> OTHER Specify in Abstract below or in NRC Form 366A </td> </tr> </table>				<input type="checkbox"/> 20.2201(b) <input type="checkbox"/> 20.2201(d) <input type="checkbox"/> 20.2203(a)(1) <input type="checkbox"/> 20.2203(a)(2)(i) <input type="checkbox"/> 20.2203(a)(2)(ii) <input type="checkbox"/> 20.2203(a)(2)(iii) <input type="checkbox"/> 20.2203(a)(2)(iv) <input type="checkbox"/> 20.2203(a)(2)(v) <input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 20.2203(a)(3)(i) <input type="checkbox"/> 20.2203(a)(3)(ii) <input type="checkbox"/> 20.2203(a)(4) <input type="checkbox"/> 50.36(c)(1)(i)(A) <input type="checkbox"/> 50.36(c)(1)(ii)(A) <input type="checkbox"/> 50.36(c)(2) <input type="checkbox"/> 50.46(a)(3)(ii) <input type="checkbox"/> 50.73(a)(2)(i)(A) <input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(i)(C) <input type="checkbox"/> 50.73(a)(2)(ii)(A) <input type="checkbox"/> 50.73(a)(2)(ii)(B) <input type="checkbox"/> 50.73(a)(2)(iii) <input type="checkbox"/> 50.73(a)(2)(iv)(A) <input type="checkbox"/> 50.73(a)(2)(v)(A) <input type="checkbox"/> 50.73(a)(2)(v)(B) <input type="checkbox"/> 50.73(a)(2)(v)(C) <input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 50.73(a)(2)(vii) <input type="checkbox"/> 50.73(a)(2)(viii)(A) <input type="checkbox"/> 50.73(a)(2)(viii)(B) <input type="checkbox"/> 50.73(a)(2)(ix)(A) <input type="checkbox"/> 50.73(a)(2)(x) <input type="checkbox"/> 73.71(a)(4) <input type="checkbox"/> 73.71(a)(5) <input type="checkbox"/> OTHER Specify in Abstract below or in NRC Form 366A						
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10. POWER LEVEL <div style="text-align: center; font-size: 1.2em;">100</div>															
12. LICENSEE CONTACT FOR THIS LER															
FACILITY NAME Stephenie L. Pyle, Licensing Manager				TELEPHONE NUMBER (Include Area Code) 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						
A	EC	2B-52D5	S125	Y											
14. SUPPLEMENTAL REPORT EXPECTED <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO						15. EXPECTED SUBMISSION DATE <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:33%; text-align: center;">MONTH</td> <td style="width:33%; text-align: center;">DAY</td> <td style="width:33%; text-align: center;">YEAR</td> </tr> <tr> <td style="text-align: center;">N/A</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">N/A</td> </tr> </table>				MONTH	DAY	YEAR	N/A	N/A	N/A
MONTH	DAY	YEAR													
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) <p>On February 4, 2013, at 1255 CST, Control Room Emergency Chiller 2VE-1A breaker tripped shortly after the chiller was started. 2VE-1A is one of two control room emergency chillers common to both Arkansas Nuclear One (ANO) Unit-1 and ANO Unit-2. The 2VE-1A breaker (2B-52D5) is a Siemens 480 volt, 100 amp molded case circuit breaker. An Apparent Cause Evaluation determined that the the "C" phase load side wire lug was not properly connected when the breaker was installed on November 15, 2012, resulting in a loose connection between the lug and the breaker stab. The condition was corrected and 2VE-1A was declared operable on February 6, 2013. The apparent causes of the condition were determined to be a human performance error during breaker replacement due to the inadequate use of human performance tools and an inadequate molded case circuit breaker testing procedure which did not provide a step to perform a visual inspection of the wire grip style lug after installation. Initial corrective actions included a human performance error review and a requirement for visual verification of the wire lugs for remaining breaker replacement work orders. The Apparent Cause Evaluation provided firm evidence that the condition existed since the breaker was incorrectly installed on November 15, 2012, resulting in the inoperability of 2VE-1A. The redundant 2VE-1B Chiller was considered inoperable from November 26, 2012 to December 3, 2012, resulting in the potential inoperability of both control room emergency chillers and a condition that could have prevented the fulfillment of a safety function.</p>															

LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Arkansas Nuclear One – Unit 2	05000368	YEAR	SEQUENTIAL NUMBER	REV. NO.	2 OF 5
		2013	- 002	- 00	

NARRATIVE

A. Plant Status

At the time that the Control Room Emergency Chiller 2VE-1A breaker tripped, Arkansas Nuclear One (ANO) Unit-1 and ANO Unit-2 were both at approximately 100% power. The redundant Control Room Emergency Chiller 2VE-1B was available and operable.

B. Event Description

On February 4, 2013, at approximately 1255 CST, Control Room Emergency Chiller [VI][CDU] 2VE-1A breaker tripped shortly after being started. 2VE-1A is one of two emergency chillers normally powered from the ANO Unit-2 electrical distribution system, and designed to maintain the common control room environment during accident conditions for both ANO Unit-1 and ANO Unit-2. The subject 2VE-1A breaker (2B-52D5)[EC][BKR], is a Siemens 480 volt, 100 amp molded case circuit breaker that was installed by contract electricians on November 15, 2012. After breaker installation, the 2VE-1A chiller was started for post maintenance testing (PMT) which included the monthly Technical Specification (TS) surveillance (the TS surveillance acceptance criterion requires that the chiller must be run for greater than one hour). The chiller monthly TS surveillance was subsequently performed in December 2012 and January 2013, with satisfactory results. The 2VE-1A breaker then tripped after being started for TS surveillance testing on February 4, 2013.

An Apparent Cause Evaluation determined that on November 15, 2012, the compression style lug or "wire grip" that tightens the "C" phase load side wire to the breaker stab had been incorrectly installed in front of the breaker stab instead of over the stab, resulting in a loose connection between the lug and the breaker stab. Although three successful starts and surveillance runs were achieved over the course of three months with the incorrect configuration, the electrical connection degraded to the point that the breaker tripped on February 4, 2013, when starting 2VE-1A.

C. Event Cause

The apparent causes of the condition were determined to be a human performance error due to the inadequate use of human performance tools, and an inadequate molded case circuit breaker testing procedure, which did not provide a step to perform a visual inspection of the wire grip style lug after installation.

Interviews with the electricians identified that it is not uncommon for the wire grips to come out of the breaker during transportation or installation, and it is a common practice to check the lugs for proper installation after installing a new breaker.

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Arkansas Nuclear One – Unit 2	05000368	YEAR	SEQUENTIAL NUMBER	REV. NO.	3 OF 5
		2013	- 002 -	00	

Event Cause - continued

During the Human Performance Error Review (HPER), both electricians stated that they were aware of the ability to improperly install the lugs, but they thought that by pulling on the wire after installation, they could verify that the lugs were installed properly. Both electricians and a supervisor pulled on the wire to verify installation. The Apparent Cause Evaluation stated that pulling the wire in this case would not have identified the deficiency and that only a visual inspection could have identified the incorrect lug installation. Previous training was provided to the contract electricians on the replacement of the circuit breakers and the ability to incorrectly install the wire grip style lug was discussed during the training. Since both individuals attended the training and were aware of the possibility of incorrectly installing the lug, neither lack of knowledge nor insufficient training is considered a cause that contributed to this event. The HPER stated that the physical location of the breaker required the electricians to lay down on the floor to see the load side breaker lugs after the breaker was installed, potentially contributing to the error. The HPER did not identify any time or situational pressures associated with this work activity.

D. Corrective Actions

After repairs to the 2VE-1A breaker, a surveillance was satisfactorily completed on February 6, 2013. Other initial corrective actions included a human performance error review, and an additional requirement for visual verification of the wire grip style lugs was added to the remaining breaker replacement work orders. A work request was generated to inspect previously replaced breakers identified in the Apparent Cause Evaluation extent of condition. Other actions being tracked in the corrective action process are to revise the molded case circuit breaker testing procedure to include a step to visually verify the lugs are installed correctly, and to review the results of the Apparent Cause Evaluation with electricians.

E. Safety Significance Evaluation

2VE-1A and 2VE-1B are part of the the Control Room Emergency Air Conditioning System (CREACS) that provides temperature control for the common ANO Unit-1 and ANO Unit-2 control room when the control room is isolated. The emergency chiller units are manually started from the ANO Unit-2 Control Room. The design basis of the CREACS is to maintain control room temperature for 30 days of continuous occupancy. The CREACS components are arranged in redundant, safety related trains.

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

U.S. NUCLEAR REGULATORY COMMISSION

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Arkansas Nuclear One – Unit 2	05000368	YEAR	SEQUENTIAL NUMBER	REV. NO.	4 OF 5
		2013	- 002 -	00	

Safety Significance Evaluation - continued

The CREACS is capable of removing sensible and latent heat loads from the control room, including consideration of equipment heat loads and personnel occupancy requirements, to ensure a habitable environment and equipment operability. The operability of the control room emergency ventilation and air conditioning system ensures that the ambient air temperature does not exceed the allowable temperature for continuous duty rating for the equipment and instrumentation cooled by this system, and that the control room will remain habitable during and following all credible accident conditions.

Probabilistic Risk Assessment (PRA): Engineering confirmed through a review of the ANO Unit-2 fault tree logic that the CREACS is not included in the ANO Unit-2 PRA model. The CREACS is not included in the ANO Unit-1 PRA Model based on documented industry recommendations (Reference WCAP-16679-P November 2006 Accident Sequence Phenomena Considerations). The reference states that control room heatup analyses are typically not available to predict the control room transient environment for all events. Typical industry heatup calculations for control rooms show that temperatures do not approach the limiting conditions for equipment operation (120 degrees F) in the first 12 to 16 hours after the loss of control room cooling. Analyses also show that simply opening doors and allowing air circulation into and out of the control room can significantly reduce these temperatures. The reference states that most of the manual operator actions modeled in industry PRA for the applicable accident sequences are taken within the first 6 to 8 hours of the event. Therefore it is concluded that these temperatures should not impact control room habitability or human reliability for manual operator actions modeled in the PRA.

During the time that 2VE-1A is being considered inoperable from November 15, 2012 to February 6, 2013, the redundant chiller 2VE-1B was considered inoperable during a period from November 26, 2012, to December 3, 2012 (approximately 7 days), due to its emergency power supply (Emergency Diesel Generator 2K-4B) [EK] being out of service for overhaul. During this time, the Alternate AC Diesel Generator (Station Blackout Diesel Generator) [EK] was available to power the 2VE-1B if it had been required for control room temperature control concurrent with a loss of normal offsite power event. Additionally, during this seven day period, the normal power supply was available for the redundant 2VE-1B except for a brief period on November 29, 2012 (approximately 2.2 hours), while the 2VE-1B chiller unit was out of service planned maintenance. During the time period from November 15, 2012, to February 6, 2013, the emergency control room chillers were not required to be in service for accident mitigation, therefore, there was no actual nuclear or radiological consequence as a result of the event described in this report.

LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Arkansas Nuclear One – Unit 2	05000368	YEAR	SEQUENTIAL NUMBER	REV. NO.	5 OF 5
		2013	- 002 -	00	

F. Basis For Reportability

This event is reported pursuant to the following criteria:

10CFR 50.73(a)(2)(i)(B): Any operation or condition which was prohibited by the plant's Technical Specifications.

2VE-1A is being considered inoperable at the time the breaker was replaced on November 15, 2012. The Apparent Cause Evaluation establishes firm evidence (as discussed in NUREG-1022 Reporting Guidance) that the inappropriate breaker configuration was introduced at that time. Although the 2VE-1A Chiller surveillance was performed three times during the subsequent three months after the breaker replacement, the incorrect breaker configuration introduced uncertainty regarding the ability of 2VE-1A being able to run for a 30 day mission time as required in accident conditions.

10CFR 50.73(a)(2)(v): Any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to:

(D) Mitigate the consequences of an accident

During the time that 2VE-1A is being considered inoperable, the redundant chiller 2VE-1B was also inoperable for a period of time, which constitutes a potential prevented safety function for both ANO Unit-1 and ANO Unit-2.

G. Additional Information

10CFR 50.73(b)(5) states that this report shall contain reference to "any previous similar events at the same plant that are known to the licensee." NUREG-1022 reporting guidance states that term "previous occurrences" should include previous events or conditions that involved the same underlying concern or reason as this event, such as the same root cause, failure, or sequence of events.

A review of the ANO corrective action program and Licensee Event Reports for the previous three years revealed no relevant similar events.

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