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January 16, 1995

ICAN019501

U. S. Nuclear Regulatory Commission  
Document Control Desk  
Mail Station P1-137  
Washington, DC 20555

Subject: Arkansas Nuclear One - Unit 1  
Docket No. 50-313  
License No. DPR-51  
Licensee Event Report 50-313/94-003-01

Gentlemen:

In accordance with 10CFR50.73(a)(2)(i)(B), enclosed is a supplemental report concerning surveillance testing of Engineered Safeguards systems.

Very truly yours,

A handwritten signature in cursive script, appearing to read "Dwight C. Mims".

Dwight C. Mims  
Director, Licensing

DCM/kjm

enclosure

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cc: Mr. Leonard J. Callan  
Regional Administrator  
U. S. Nuclear Regulatory Commission  
Region IV  
611 Ryan Plaza Drive, Suite 400  
Arlington, TX 76011-8064

Institute of Nuclear Power Operations  
700 Galleria Parkway  
Atlanta, GA 30339-5957

## 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 One

DOCKET NUMBER (2)

05000313

PAGE (3)

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TITLE (4) Surveillance Testing of Some Engineered Safeguards Components Did Not Verify Operability as Required by Technical Specifications Due to Procedural Deficiencies Resulting from Inadequate Definition of Testing Requirements

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	08	94	94	-- 003 --	01	01	16	95	ANO-2	50-368
									FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (Check one or more) (11)						
POWER LEVEL (10)	100	20.402(b)		20.405(c)		50.73(a)(2)(iv)		70.71(b)
		20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		70.71(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

Kimberly J. Miller, Nuclear Safety and Licensing Specialist

TELEPHONE NUMBER (Include Area Code)

501-858-5000

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

## 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)

On October 8, 1994, during a review of Engineered Safeguards Actuation System testing methodology which was initiated as a result of concerns identified regarding ANO-2 engineered safety features surveillance procedures, ANO-1 personnel identified two concerns with the testing of High Pressure Injection (HPI) pumps actuation circuitry. It was identified that the Engineered Safeguards (ES) Integrated Test, which is performed every 18 months during a refueling outage, did not include complete functional verification of the circuit breaker position interlocks used in the HPI pump auto-start circuitry. It was also identified that the Integrated ES Test does not verify that the swing HPI pump would start utilizing the logic path containing the normal feeder circuit breaker contact. The direct cause of this condition was inadequate procedural guidance. The root cause was determined to be inadequate definition of testing requirements for control circuitry in ES systems. The feeder breakers for P36-B were racked down and removed from the switchgear rooms, ensuring that the P-36A and C circuitry remained in a previously tested configuration. Functional testing of the previously untested HPI pump circuitry was completed and P-36B was returned to an operable status at 1622 on October 9, 1994. A task force established rules and guidelines for determining ES testing requirements which were used to evaluate the existing test program and identify any necessary ES testing procedure changes. One additional instance, the autostart function of the HPI Auxiliary Lube Oil Pumps, required additional testing to fully meet Technical Specification surveillance requirements. Necessary procedure changes will be implemented by March 16, 1995.

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)</b> TEXT CONTINUATION				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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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-1 (ANO-1) was operating at approximately 100 percent power.

#### B. Event Description

On October 8, 1994, during a review of Engineered Safeguards Actuation System (ESAS) [JE] testing methodology which was initiated as a result of concerns identified regarding ANO-2 Engineered Safety Features surveillance procedures, ANO-1 personnel identified two concerns with the testing of High Pressure Injection (HPI) pump actuation circuitry.

The HPI system [BQ] is an integral part of the Makeup and Purification system [CB] and uses two of the three makeup pumps (P-36A, B and C) to inject coolant into the Reactor Coolant System [AB] from the Borated Water Storage Tank following a Loss of Coolant Accident (LOCA). The HPI system is used collectively with the Low Pressure Injection [BP] and Core Flood systems [BP] to ensure that adequate core cooling is maintained. P-36B is the 'swing pump' that can be powered from either Engineered Safeguards (ES) bus.

It was identified that the Integrated ES Test does not include complete functional verification of the circuit breaker position interlocks used in the HPI pump auto-start circuitry. Specifically, each HPI pump auto-start circuit contains parallel contacts from another HPI pump circuit breaker that provide interlocks which either permit or inhibit breaker closure. One of these, a 'cell switch' contact, closes and permits auto-start when the interlocking breaker is racked down. The other, a "b" contact, closes and permits auto-start when the interlocking breaker is open, or opens and inhibits auto-start when the interlocking breaker is closed. The HPI pump circuit breakers are racked down during performance of the Integrated ES test; therefore, the functionality of the "b" contact is not proven since the associated cell switch provides an auto-start permissive regardless of "b" contact state. Since the HPI pump circuit breakers are normally racked up during power operation, the "b" contact interlock, which is not tested, must be functional for proper pump auto-start operation.

The second HPI pump testing concern involved swing pump P-36B. The auto-start circuitry for this pump contains parallel circuit breaker contacts, either of which can allow pump start in the event of an ESAS actuation. It was identified that the ES Integrated Test, which is performed every 18 months during a refueling outage, did not verify that the pump would start utilizing the logic path containing the offsite feeder breaker contact.

Service Water pump and header isolation circuitry, which also contains 'swing' equipment logic, was also reviewed. This review identified that the automatic restart logic for the Service water pumps is not verified for the condition when power is supplied from the off-site feeder breaker.

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

At 0010 on October 8, 1994, when these conditions were discovered, the provisions of Technical Specification 4.0.3 were implemented, allowing 24 hours to complete adequate surveillance testing of the HPI pumps. At 0036, the feeder breakers for P-36B were racked down and at 0230, they were removed from the switchgear rooms, ensuring that the P-36A and C circuitry remained in a previously tested configuration. Technical Specification 4.0.3 was exited at that time. Functional testing of the previously untested HPI pump circuitry was completed and P-36B was returned to an operable status at 1622 on October 9, 1994.

A subsequent evaluation of existing ES testing requirements was performed as a corrective action for the subject event. This evaluation identified one additional instance where current ES testing methods did not meet Technical Specification surveillance requirements. The provisions of Technical Specification 4.0.3 were implemented at 1100 hours on December 15, 1994, due to an inadequate surveillance test of the ES autostart function of the HPI Auxiliary Lube Oil Pumps (P64A/B/C) which provide pre-start lubrication for the HPI pumps. A supplemental ES test was satisfactorily completed on the P64 pumps at 1904 hours on December 15, 1994.

#### C. Root Cause

The direct cause of this condition was inadequate procedural guidance. The root cause was determined to be inadequate definition of testing requirements for control circuitry in ES systems. Previous interpretations of guidance regarding ES testing have resulted in the development of surveillance tests geared toward literal compliance with Technical Specifications surveillance requirements. As a matter of prudence, ANO has historically chosen to test more circuitry than this definition would imply. However, this additional testing has been viewed as discretionary rather than required.

#### D. Corrective Actions

At 0036 on October 8, the feeder breakers for P36-B were racked down and at 0230, they were removed from the switchgear rooms, ensuring that the P-36A and C circuitry remained in a previously tested configuration. Functional testing of the previously untested HPI pump circuitry was completed and P-36B was returned to an operable status at 1622 on October 9, 1994.

Proper operation of the Service Water pump logic was verified on October, 9, 1994.



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A task force was established to develop rules and guidelines for determining ES testing requirements by November 12, 1994. The task force provided recommendations for testing of ES components based on consideration of present test requirements, evolving industry sensitivity to improved testing methods, and other verifications determined to be prudent by the site staff. This action was completed on November 11, 1994. These recommendations were used to evaluate the existing test program and identify any necessary procedure changes. The verification of the autostart function of the HPI Auxiliary Lube Oil Pumps is the only instance identified during this evaluation where additional testing was required to meet Technical Specifications surveillance requirements. This testing was completed on December 15, 1994. Necessary procedure changes will be implemented in permanent plant procedures by March 16, 1995, which is before their next scheduled use.

#### E. Safety Significance

Each function and contact of concern was tested and verified to be operable. Therefore, this condition involved only the potential for these contacts to impact component operability. Several additional factors minimize the significance of this condition. Testing of ES systems and components has historically involved more than the minimum literal Technical Specifications requirements. There is a low probability of hidden failure of these components. Control circuitry interlocks involve components such as relays or breaker position switches with several contact outputs. Most failures of devices of this type have the effect of all outputs not achieving the desired condition. Such failures will often be indicated by control board status lights for the affected component or malfunction of other tested equipment. As a result of an Electrical Drawing Upgrade Program, the configuration of safety related control circuitry has recently been validated. Electrical schemes were carefully reviewed, walked down, and as-built as part of this project. For these reasons, the actual safety significance of this condition is considered minimal.

#### F. Basis for Reportability

The failure to test the "b" circuit breaker contact of the swing HPI pump feeder breakers which permit the HPI pumps to start and the failure to verify the autostart function of the HPI Auxiliary Lube Oil Pumps were determined to constitute an inadequate surveillance for verification of ES component operability and are reportable pursuant to 10CFR50.73(a)(2)(i)(B) as an operation prohibited by Technical Specifications.

#### G. Additional Information

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

A similar condition was reported in Licensee Event Report (LER) 50-368/94-004-00.

Although there have been previous ANO LERs dealing with missed or inadequate surveillance tests due to inadequate procedures, none of them were the result of the same root cause.