



ENTERGY

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November 4, 1994

2CAN119401

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 50-368/94-004-00

Gentlemen:

In accordance with 10CFR50.73(a)(2)(i)(B), enclosed is the subject report concerning surveillance testing of one High Pressure Safety Injection pump.

Very truly yours,

Dwight C. Mims

Dwight C. Mims
Director, Licensing

DCM/tfs

enclosure

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S PDR

JEH

U. S. NRC
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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 Two

DOCKET NUMBER (2)

05000368

PAGE (3)

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TITLE (4) Surveillance Testing Of One High Pressure Safety Injection Pump Did Not Verify Operability
As Required By Technical Specifications Due To Procedure Deficiencies

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	07	94	94	004	00	11	04	94	FACILITY NAME	DOCKET NUMBER
OPERATING MODE (9)		1	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

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 NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)

EXPECTED

MONTH

DAY

YEAR

YES

NO

SUBMISSION

(If yes, complete EXPECTED SUBMISSION DATE.)

X

DATE (15)

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

On October 7, 1994, Arkansas Nuclear One, Unit 2 identified that surveillance testing of an Engineered Safety Features (ESF) component had not been performed in a manner that adequately verified operability as required by Technical Specifications (TS). The condition involved testing the "swing" High Pressure Safety Injection (HPSI) pump start feature when powered from either Emergency Diesel Generator (EDG). Further review revealed that testing had not been performed to verify that two Service Water (SW) pumps would not start on a bus being powered from one EDG. Upon discovery, actions were taken to ensure compliance with TS requirements. Interim administrative controls were established. Testing verified operability of components of potential concern. The cause of the condition was inadequate surveillance procedures. Appropriate procedures will be revised prior to their next use. A task force has been established to develop rules and guidelines for determining ESF testing requirements.

NRC FORM 366A (5-92)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB NO. 3150-0104 EXPIRES 5/31/95	
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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 at steady-state conditions at approximately 100 percent power.

B. Event Description

On October 7, 1994, during a review of methods being used to test Engineered Safety Features (ESF) [JE] "swing" components, it was discovered that a High Pressure Safety Injection (HPSI) [BQ] pump was not being fully tested by the current surveillance testing procedure. On the following day, further reviews revealed that concerns existed with testing of individual contacts in the ESF start circuitry for one Service Water (SW) [BI] pump.

The ESF 18 month response time surveillance test procedure was found to specify testing of the "swing" HPSI pump (2P-89C) Safety Injection Actuation System (SIAS) [JE] actuation while aligned to either train of off-site power. Actuation while aligned to either train with power being supplied from the respective Emergency Diesel Generator (EDG) [EK] was not being verified by the surveillance. At 1540 hours on October 7, 1994, HPSI pump 2P-89C was declared inoperable and the Technical Specification (TS) 3.5.2 Action requirement (72 hours) was entered since the pump was designated as the operable "green" train HPSI pump. At 1724 hours, HPSI pump 2P-89B was aligned to the "green" train and 2P-89C placed in pull-to-lock (PTL) to allow exit from the TS 3.5.2 Action. The existing test method was found not to verify 2P-89C SIAS breaker closure signal continuity through auxiliary contacts of either EDG output circuit breaker. A Special Work Plan verified satisfactory performance of SIAS start actuation for 2P-89C from both trains by 1812 hours on October 8, 1994.

ANO expanded the scope of the ESF component surveillance test methodology review after the initial condition was discovered. On October 8, 1994, other concerns were identified with adequate testing of individual contacts in ESF start circuitry. These contacts prevent redundant pumps from starting and loading on 4160V ESF buses [EB] while the bus is being powered from its respective EDG. The "swing" SW pump (2P-4B) is prevented from automatically starting and loading onto a bus powered by an EDG by auxiliary contacts in the breaker of the other SW pump powered from the train to which 2P-4B is aligned. SW pumps 2P-4A and 2P-4C have ESF start time delays of 4.5 seconds, and pump 2P-4B has a delay of 6.0 seconds. This is intended to ensure that the "swing" pump will only start if the breaker for the other pump aligned to that train fails to close. The operation of these auxiliary contacts was not being documented in any of the associated 18 month surveillance tests, although the configuration of the test was such that starting of the second pump would likely have been noted as an anomaly. Upon learning of the condition, ANO-2 Operations personnel placed the hand switch for 2P-4B in PTL and placed caution tags on hand switches for all SW pumps that directed declaration of the appropriate EDG to be inoperable if two SW pump hand switches were both out of PTL on the same ESF bus. A Night

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Order was issued to Operations personnel establishing interim administrative controls. Testing of SW pump controls was completed to verify operability at 1756 hours on October 11, 1994.

A potentially similar test discrepancy was identified on the ESF auto-start circuits for the three HPSI pumps. Each HPSI pump has auxiliary contacts associated with the redundant pump's circuit breaker that prevents it from starting if its hand switch is not in PTL and another HPSI pump is aligned to the same train with its breaker closed. Because there is no difference in start time delay between the three HPSI pumps, administrative controls had previously been established to ensure that the designated standby HPSI pump was maintained in PTL to prevent the possibility of two HPSI pumps starting at exactly the same time on ESF actuation. Without having routinely tested the breaker auxiliary contacts, it appeared that no documented assurance could be provided that two HPSI pumps would not have loaded on one EDG if an ESF actuation signal occurred with the redundant pump out of PTL. Upon notification of the condition, ANO-2 Operations personnel verified that the standby pump was in PTL and placed caution tags on controls for all HPSI pumps. A Night Order was issued to Operations personnel establishing interim administrative controls. Testing of HPSI pump PTL switch continuity was completed to verify operability at 1756 hours on October 11, 1994. Subsequent review determined that the previously established administrative controls for maintaining the redundant pump control switch in PTL were sufficient to prevent two pumps from starting on a bus powered from one EDG, and testing of the control contacts was therefore not required.

C. Root Cause

The cause of this condition was determined to be procedure inadequacy. The root cause could not be definitely determined; however, it was established that testing requirements for ESF control circuitry had not been adequately defined. The inadequacies resulted from a failure to consider all important control functions during procedure development or revision. The surveillance procedures for ESF testing were written to test functions rather than individual contact logic. Previous reviews of surveillance procedures against TS requirements failed to reveal the inadequacies because the procedures met the literal requirements of the specifications. The earlier reviews are believed not to have required a level of specificity in the review of electrical schematic drawings to assure that requirements simulating postulated accident configurations were imposed during the tests. A contributing cause of this condition was the evolution of expectations concerning TS testing toward a broader and more in-depth scope than was originally intended. Also, testing of "negative" or "inhibit" functions has not always been considered in procedure development or revision.

D. Corrective Actions

A review team composed of individuals from several site organizations was formed. During the period from October 7 through October 10, they reviewed all 4160V safety-related schemes and related procedures, along with the 480V charging pump [CB] schemes, for further potential inadequacies. No additional reportable

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conditions were identified during this effort. The review found that testing of 4160V undervoltage relays did not explicitly document whether these relays or relays at the 480V level resulted in the EDGs starting; however, an engineering evaluation concluded that testing was adequate to verify TS requirements.

A task force was established to develop rules and guidelines for determining ESF testing requirements. By November 12, 1994, this task force will provide recommendations for testing ESF components that will be based upon consideration of present test requirements, the evolving industry sensitivity to improved testing methods, and other verifications determined to be prudent by the site staff. Whether such testing is to be considered part of TS surveillance testing and be performed on the same periodicity will also be addressed. As a result, additional reviews of electrical schemes and procedures may be required.

Appropriate surveillance procedures will be revised prior to their next required use. This is expected to be during the next refueling outage currently scheduled to begin on September 6, 1995.

E. Safety Significance

Since each function and contact of concern was tested and found to be operable, the significance of the condition involves the potential for having an unanticipated load placed upon the EDGs during an accident condition or failure of one HPSI pump to start under certain configurations. Several factors minimize the significance of the condition. Testing of ESF systems and components has historically involved more than the minimum literal TS requirements. There is a low probability of a 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 Project, 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 the condition is considered to be minimal.

F. Basis for Reportability

Failure to complete surveillance tests that adequately verify operability of ESF components is an operation prohibited by Technical Specifications reportable pursuant to 10CFR50.73(a)(2)(i)(B). Not having tested the "swing" HPSI pump actuation while aligned to either train with power being supplied by the respective EDG constituted such a failure.

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G. Additional Information

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

A similar condition is being reported in Licensee Event Report (LER) 50-313/94-003.

Although there have been previous ANO LERs dealing with missed or inadequate surveillance tests due to inadequate procedures, none of them constituted a previous similar event because neither the same failure nor the same sequence of events was involved.