



Entergy

Entergy Operations, Inc.
1448 S.R. 333
Russellville, AR 72802
Tel 501 858 5000

1CAN080404

August 16, 2004

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

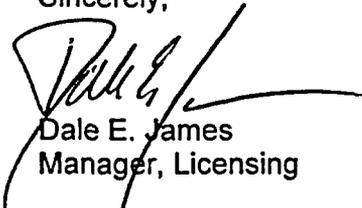
Subject: Licensee Event Report 50-313/2004-001-01
Arkansas Nuclear One - Unit 1
Docket No. 50-313
License No. DPR-51

Dear Sir or Madam:

In accordance with 10CFR50.73(a)(2)(i)(B), enclosed is a supplement to the subject report concerning a condition prohibited by technical specifications due to an inoperable channel of source range nuclear instrumentation. The purpose of this supplement is to provide the results of the failure analysis.

This correspondence contains no new commitments.

Sincerely,



Dale E. James
Manager, Licensing

DEJ/fpv

Enclosure

IE22

cc: Dr. Bruce S. Mallett
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

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

Institute of Nuclear Power Operations
700 Galleria Parkway
Atlanta, GA 30339-5957
LEREvents@inpo.org

LICENSEE EVENT REPORT (LER)

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503.

FACILITY NAME (1) Arkansas Nuclear One - Unit 1	DOCKET NUMBER (2) 05000313	PAGE (3) 1 OF 4
---	--------------------------------------	---------------------------

TITLE (4) Operation Prohibited by Technical Specifications due to an Undetected Inoperable Channel of Required Source Range Nuclear Instrumentation During Core Alterations Caused by a Signal Processing Unit Circuit Breaker Failure.

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
04	29	2004	2004	001	01	08	16	2004	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	20.2201(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)	X 50.73(a)(2)(i)(B)	50.73(a)(2)(v)(D)	Specify in Abstract or NRC Form 366A

LICENSEE CONTACT FOR THIS LER (12)

NAME Fred Van Buskirk, Nuclear Safety and Licensing Specialist	TELEPHONE NUMBER (Include Area Code) 479-858-3155
--	---

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIC	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIC
B	IG	52		N					

SUPPLEMENTAL REPORT EXPECTED (14)

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

ABSTRACT (16)

At 2251 CDT on April 29, 2004, with Arkansas Nuclear One, Unit 1 (ANO-1) in Mode 6 for refueling outage 1R18, operators discovered that one of two redundant trains of source range neutron flux monitoring instrumentation was inoperable. ANO-1 technical specifications (TS) require one source range monitor to be operable in Mode 6 and one additional monitor to be operable during core alterations. A review of plant computer historical data determined that the indication for the green train source range nuclear instrument failed at 1052 on April 29, 2004, but was not immediately detected because the count rates indicated on both channels were at the extreme low end of the scale. At the time of the failure, core off-load activities were in progress and continued until all fuel assemblies were removed from the reactor core at 2159. Therefore, for approximately 11 hours the unit was in a condition prohibited by TS due to the undetected inoperability of one of the two required source range channels. The redundant source range channel remained operable and unaffected by this condition. The cause of this event was determined to be an undetected failure of the signal processor drawer circuit breaker. Following replacement of the failed components and post maintenance testing, the source range channel was declared operable.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Arkansas Nuclear One - Unit 1	05000313	2004	001	01	2 OF 4

NARRATIVE (17)

A. Plant Status

At the time this condition was discovered, Arkansas Nuclear One, Unit 1 was shutdown and in Mode 6 for refueling outage 1R18.

B. Event Description

At 2251 on April 29, 2004, during the removal of inverter Y-28 [EF] from service for planned maintenance, the ANO-1 shift manager observed that the plant computer [ID] indication for the green train source range nuclear instrumentation [IG] did not exhibit the expected response when its power supply was de-energized. Specifically, operators anticipated that the indicated count rate would decrease when the inverter was shutdown; however, the indication did not change.

The control room staff began an investigation by reviewing historical trend data on the plant computer, the Safety Parameter Display System (SPDS) [ID], and operator log readings taken at 0835 and 1944 CDT. Due to the extremely low readings, the operator logs did not provide conclusive evidence as to the time of failure of the affected instrument channel. However, it was determined from the evaluation of the plant computer and SPDS data that the green train source range nuclear instrumentation channel had failed at 1052 CDT. Additionally, the review determined that the redundant red train source range instrumentation was functioning normally.

During a portion of the time that one source range channel was inoperable, the failure had not yet been detected and transfer of fuel assemblies from the reactor vessel to the spent fuel pool continued. While such core alterations are in progress, ANO-1 technical specifications require that two source range neutron flux monitors shall be operable. With one of the required channels inoperable, core alterations and any operations that would dilute RCS boron concentration to less than the technical specification limit must be immediately suspended. Contrary to this requirement, while one of the required monitors was inoperable, the transfer of fuel assemblies continued until the core off-load was complete. This condition prohibited by technical specifications was present from 1052 until fuel off-loading activities were completed at 2159 on April 29, 2004. Once core alterations were terminated, no fuel remained in the core and the technical specification requirement was no longer applicable.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Arkansas Nuclear One - Unit 1	05000313	2004	001	01	3 OF 4

NARRATIVE (17)

C. Root Cause

An analysis has been performed to determine the specific cause of the failure of the source range instrumentation. The results of the evaluation have determined that the probable event initiator was a random failure of the signal processor drawer circuit breaker (circuit breaker found open). Technicians also observed that the breaker felt mechanically weak (i.e., moved easily from trip to close positions). Although additional failed components were identified (i.e., power supply and pre-amplifiers), they were not event initiators, but were a consequence of weaker electronic components that were stressed when the system was re-energized to support troubleshooting and repair activities.

It has also been concluded that the configuration of the Gamma Metrics source range instrumentation does not provide sufficient continuous functional monitoring capability for detection and annunciation of a channel failure during core alterations; particularly when indicated count rates are at the extreme low end of the scale.

D. Corrective Actions

Prior to resumption of core alterations for the core reload, the failed circuit breaker, the power supply, and two pre-amplifiers were replaced. The instrumentation was then tested and operability was demonstrated by performing a Channel Operability verification in accordance with the Source Range Channel Calibration procedure. This procedure is used to support compliance with technical specification surveillance requirements. Test results were satisfactory and the green train source range monitoring channel was returned to operable status.

Planned corrective action includes development of a method for continuous functional monitoring of Gamma Metrics source range instrumentation to enable the timely detection of a failure of a required channel.

E. Safety Significance

The basis for the requirement for an additional channel of source range neutron flux monitoring during core alterations is to ensure redundant monitoring capability when positive reactivity changes are being made to the core. At the time of this event,

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Arkansas Nuclear One - Unit 1	05000313	2004	001	01	4 OF 4

NARRATIVE (17)

ANO-1 was in Mode 6 and a full core off-load of fuel assemblies from the reactor vessel to the spent fuel pool was in progress. When the source range monitoring channel failure occurred, 36 of 177 fuel assemblies remained in the reactor vessel. Transfer of fuel assemblies continued until all of the fuel had been removed from the reactor vessel and relocated to the spent fuel pool. This was accomplished approximately 11 hours after the failure of the required green train source range monitor. Although this failure was not immediately detected, the redundant source range instrument channel was unaffected by this condition and remained operable throughout the remainder of the core off-load activity.

While the likelihood of positive core reactivity changes was diminished with the continued removal of the fuel assemblies, any unexpected changes in core reactivity would have been detected by the operable channel, and operators would have been alerted of a significant change in neutron flux. The unavailability of one train of source range neutron flux monitoring instrumentation did not adversely impact the ability to perform required actions based on this parameter.

For these reasons, the safety significance of this condition was determined to be minimal.

F. Basis for Reportability

This report of a condition prohibited by technical specifications is submitted in accordance with 10CFR50.73(a)(2)(i)(B).

G. Additional Information

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].