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April 4, 1990

2CAN049012

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

SUBJECT: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
Licensee Event Report No. 50-368/90-006-00

Gentlemen:

In accordance with 10CFR50.73(a)(2)(iv) and 10CFR50.73(a)(2)(i)(B), attached is the subject report concerning procedural deficiencies which caused nuclear instrumentation channels to be declared inoperable resulting in a manual actuation of the reactor protection system and caused the performance of inadequate channel functional tests.

Very truly yours,

E. C. Ewing
General Manager
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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Arkansas Nuclear One, Unit Two										DOCKET NUMBER (2) PAGE (3) 015010101 31 61 81201014									
TITLE (4) Procedural Deficiencies Cause Nuclear Instrumentation Channels to be Declared Inoperable Resulting in a Manual Actuation of the Reactor Protection System and Cause the Performance of Inadequate Channel Functional Tests																			
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 Names								Docket Number(s)		
01	31	01	59	01	01	01	01	49									015010101		
OPERATING MODE (9) THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more of the following) (11)																			
POWER LEVEL		20.402(b)				20.405(c)				X 50.73(a)(2)(iv)				73.71(b)					
(10) 01010		20.405(a)(1)(i)				50.36(c)(1)				50.73(a)(2)(v)				73.71(c)					
		20.405(a)(1)(ii)				50.36(c)(2)				50.73(a)(2)(vii)				Other (Specify in					
		20.405(a)(1)(iii)				X 50.73(a)(2)(i)				50.73(a)(2)(viii)(A)				Abstract below and					
		20.405(a)(1)(iv)				50.73(a)(2)(ii)				50.73(a)(2)(viii)(B)				in Text, NRC Form					
		20.405(a)(1)(v)				50.73(a)(2)(iii)				50.73(a)(2)(x)				366A)					
LICENSEE CONTACT FOR THIS LER (12)																			
Name										Telephone Number									
Dana Millar, Nuclear Safety and Licensing Specialist										Area Code 501291641-1312010									
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										
SUPPLEMENTARY REPORT EXPECTED (14)										EXPECTED SUBMISSION DATE (15)									
[] Yes (If yes, complete Expected Submission Date) [X] No										Month Day Year									
ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)																			

On March 5, 1990, while performing the Logarithmic (Log) Power Level Nuclear Instrumentation channel functional test (OP 2105.015) in preparation for a reactor startup, two of the channels did not satisfy the requirements of the test procedure and were declared inoperable. With these conditions the minimum number of operable channels required by Technical Specifications was not met. Control Room operators manually initiated a reactor trip by opening the reactor Trip Circuit Breakers. A bank of Control Element Assemblies, which had been withdrawn a few inches for testing, fully inserted. On March 6, 1990, after a review of OP 2105.015, it was determined that the acceptance criteria was incorrect. It was also determined that OP 2105.015 did not adequately perform a channel functional test as defined by Technical Specifications. Monthly test procedures performed by Instrumentation and Controls (I&C) technicians using different procedures (OP 2304 series) have the correct values for channel indications and do satisfy the requirements of a channel functional test. Functional tests of the Log Power Level channels were satisfactorily performed prior to reactor startup on March 7, 1990, using the I&C procedures.

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Arkansas Nuclear One, Unit Two	0151010101 31 61 81	91 01 --	01 01 61 --	01 01 01 21 01 01 4	1014

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

A. Plant Status

At the time of occurrence of this event Arkansas Nuclear One, Unit Two (ANO-2) was in Mode 3 (Hot Standby). Reactor Coolant System (RCS) [AB] was approximately 545 degrees Fahrenheit and RCS pressure was about 2250 psia. The Logarithmic (Log) Power Level Nuclear Instrumentation channel functional testing was in progress in preparation for a reactor startup following a maintenance outage while in Hot Standby.

B. Event Description

On March 5, 1990, at approximately 2007 hours, while performing the Log Power Level Nuclear Instrumentation channel functional tests (OP 2105.015), it was determined that the Technical Specification requirement for the minimum number of operable Log Power Level channels was not satisfied. Technical Specification 3.3.1.1 requires that a minimum of three of the four Log Power Level channels be operable whenever the reactor Trip Circuit Breakers (TCBs) are closed.

Prior to Operations personnel commencing the Log Power Level channel functional tests (OP 2105.015), the 'A' Log channel had been previously placed in a bypassed condition with maintenance in progress on this channel. As a prerequisite to performing the functional tests of the other three channels, no channel can be in a bypassed condition, therefore, 'A' channel was removed from bypass. The appropriate functional logic units for channel 'D' were placed in bypass and the functional test of this channel performed satisfactorily. Channel 'D' was returned to service and channel 'C' placed in a bypassed condition. The functional test on channel 'C' was performed, however, not completed. Channel 'C' was removed from bypass and returned to service. Channel 'B' was placed in bypass and the functional test commenced. Approximately two minutes into the performance of 'B' channel functional test, it was determined that 'C' channel was inoperable. To comply with Technical Specifications the reactor TCBs were opened and a shutdown margin calculation was performed and verified to be adequate. When the TCBs were opened, a bank of the Control Element Assemblies (CEAs), which was withdrawn a few inches for testing purposes, inserted fully into the core with no other complications noted. After the channel 'B' functional test was completed, it was determined that channel 'B' was also inoperable.

As a result of the failure of the functional tests on channel 'B' and 'C', a review of OP 2105.015 was performed. On March 6, 1990, ANO identified that the test acceptance criteria was incorrect. It was also identified that the test was inadequate as a channel functional test. As defined by Technical Specifications, a channel functional test for a Log Power bistable channel shall be the injection of a simulated signal into the sensor to verify operability including alarm and/or trip function. The functional test performed using OP 2105.015 injected a test signal which verified proper operation of the indicating circuits (meter readouts) associated with each channel, however, did not verify operability of the trip or alarm function of the channels.

The surveillance requirements of Technical Specification 3.3.1.1 require that a Log Power channel functional test of each channel be performed monthly and prior to a reactor startup if not performed in the previous seven days. The monthly tests are performed by Instrumentation and Controls (I&C) technicians using different procedures (OP 2304.034, 2304.035, 2304.036 or 2304.037) and satisfactorily perform the channel functional test as defined by Technical Specifications and have been performed on a monthly interval as required. However, the channel functional tests prior to reactor startups are performed by Operations personnel using OP 2105.015, therefore, this surveillance requirement has not been satisfactorily performed prior to a reactor startup previous to the discovery of this discrepancy.

C. Root Cause

The Log Power Level channels are functionally tested by injecting a simulated reactor power level signal (test signal) into the detector circuits and verifying proper response by monitoring the resultant indications on control room instrumentation. The test procedure specifies the required instrumentation readout, (i.e., acceptance criteria) which must be observed to demonstrate proper channel operation. During a maintenance outage in December 1989, the nuclear instrumentation channels were calibrated. The I&C procedures were performed and the procedure revised to reflect the adjustments which were made to the channels during the calibration. The Operations procedure OP 2105.015 was however, not revised. As a result of not revising OP 2105.015, when the tests were performed on March 5, 1990, the channel indications for 'B' and 'C' channels did not meet the acceptance criteria specified by the procedure. Because of this procedure inadequacy, the channels were declared inoperable, resulting in an unnecessary manual actuation of the Reactor Protection System (RPS) [JC].

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Also, as a result of the evaluation OP 2105.015, the procedure was identified to be inadequate as a channel functional test. The root cause of the inadequate procedure was personnel error during procedure development. The individual tasked with writing the original Operations channel functional test procedure to be performed prior to reactor startups apparently did not recognize that the test procedure did not satisfy the requirements of a bistable channel functional test as defined by Technical Specifications. Additionally, the deficiency was not identified by personnel responsible for independent reviews of safety related procedures, nor was it noted during review and approval of the procedure by the Plant Safety Committee. The initial issue of OP 2105.015 (Revision 0) was written with the same testing methods as used in the current revision.

Two causes were identified as a result of the initial condition. The first cause was an isolated case where a procedure was not revised after channel calibrations were performed. The second cause was determined to be personnel error during the development of the procedure.

D. Corrective Actions

Following the discovery of this discrepancy, satisfactory channel functional tests were performed by I&C technicians using the applicable 2304 series procedures prior to the next reactor startup on March 7, 1990.

Normally, two procedures governed by different disciplines (i.e., Operations and I&C) are not used to meet similar surveillance requirements, therefore, the failure to revise OP 2105.015 after the nuclear instrumentation channels were calibrated was an isolated case.

The plant startup procedure which directs the Operations staff to perform the channel functional test on the Log Power channels has been revised to perform the test using the monthly I&C test procedures (2304 series). Therefore, in the future when a reactor startup is performed, channel functional tests will be performed which satisfy the requirements of Technical Specifications.

The ANO Business Plan has established a program to perform an evaluation of the ANO surveillance program to identify problem areas and develop an action plan to resolve those problems identified. This evaluation will be completed by May 15, 1990. Additionally, a surveillance program which will reverify and revise procedures as necessary to ensure that the procedures consistently identify the surveillance requirements and document operability has been established. The scheduled completion date for this activity is July 1, 1992.

E. Safety Significance

The Log Power Nuclear Instrumentation channels are part of the RPS instrumentation. The RPS consists of logic, switchgear and other equipment necessary to monitor selected Nuclear Steam Supply System conditions and to effect reliable and rapid reactor shutdown (reactor trip) if any or a combination of the monitored conditions reach a Limiting Safety System Setting. The system functions are to protect the core, the fuel design limits and the RCS pressure boundary for Anticipated Operational Occurrences and unanticipated accidents.

Four measurement channels, with electrical and physical separation, are provided for each parameter used in the generation of trip signals. During normal operation, with four channels operable, a 2-out-of-4 coincidence logic of like trip signals is required to generate a reactor trip signal. Channel bypasses are provided to remove a channel from service for maintenance or testing. With a channel bypassed, the trip logic is converted to a 2-out-of-3 basis of like trip signals. When the TCBs are closed, the purpose of the High Log Power Level trip is to ensure the integrity of the fuel cladding and RCS pressure boundary in the event of an unplanned reactor criticality from a shutdown condition. When the TCBs are open, the Log Power level channels are used for reactivity monitoring purposes and Control Room annunciation in the event of an unplanned criticality.

When channels 'B' and 'C' were determined inoperable, it resulted in opening the TCBs and performing a reactor shutdown margin calculation. The results of the shutdown margin calculations were satisfactory and the CEAs were verified fully inserted, therefore, there were no safety concerns.

The channel functional tests, which had been performed prior to reactor startups did not prove that the trip or alarm function of the Log Power channels would actually generate a reactor trip upon reaching the specified setpoint. The monthly channel functional tests, which adequately demonstrated channel function, are required to be performed any time the reactor TCBs are closed in

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Modes 1, 2, 3, 4 or 5. It is reasonable to assume that channel functional tests had been satisfactorily performed within 30 days prior to each reactor startup. There is, therefore, a high probability that an automatic reactor trip would have occurred if a high power level had occurred on the Log Power channels. Additionally, with the available Control Room monitoring instrumentation, appropriate Operator action (i.e., manual trip of the reactor) would be taken if a high power level were to have occurred.

When the Log Power Level channels were tested using the I&C procedures (2304 series) prior to the reactor startup on March 7, 1990, each channel functioned properly. Therefore, it can be concluded that the Log Power channels would have performed their safety function and this condition was not safety significant.

F. Basis for Reportability

This event is reportable pursuant to 10CFR50.73(a)(2)(iv) as a manual actuation of an Engineered Safety Feature (ESF), i.e., Reactor Protection System. This condition is also reportable pursuant to 10CFR50.73(a)(2)(i)(B), operation prohibited by Technical Specifications. Technical Specification 4.0.3 states that failure to perform a surveillance within the specified time interval shall constitute a failure to meet the operability requirements for a Limiting Condition for Operation. Although channel functional tests were performed at the required time intervals, the testing was inadequate. On March 6, 1990, at approximately 1045 hours, the NRC was notified via the ENS of the manual reactor trip pursuant to 10CFR50.72(b)(2)(ii).

G. Additional Information

Similar events in which a personnel error has resulted in procedural deficiencies have been reported in 50-313/89-005-00, 50-368/86-015-00, 50-368/86-016-00, 50-368/89-009-00 and 50-368/90-003-00.

The 10CFR50.72 notification was not made in a timely manner following the opening of the reactor TCBs because it was not considered to be a manual actuation of the RPS by Operations personnel who were performing the reportability determination of this event. After further evaluation of the circumstances, it was concluded that the event constituted a manual actuation of the RPS.

To enhance the current process used in evaluating events or plant conditions for reportability, training will be provided for Operations personnel on 10CFR50.72 reporting criteria. The training will be completed by June 22, 1990.

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