

January 30, 1997

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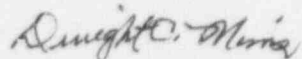
U. S. Nuclear Regulatory Commission
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Subject: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
Licensee Event Report 50-368/96-005-01

Gentlemen:

In accordance with 10CFR50.73(a)(2)(i)(B), enclosed is a supplement to the subject report concerning surveillance testing of the Plant Protective System and Post-Accident Monitoring Instrumentation. This supplement results from an engineering evaluation of the initial operability assessments of all conditions identified by the surveillance review team. The status of one of those conditions changed to "reportable" based upon this evaluation.

Very truly yours,



Dwight C. Mims
Director, Nuclear Safety

DCM/tfs

enclosure

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U. S. NRC

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cc: Mr. Leonard J. Callan
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U. S. Nuclear Regulatory Commission
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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 (MNBB 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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Arkansas Nuclear One - Unit 2

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05000368

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TITLE (4) Surveillance Testing Of Some Features Of The Plant Protective System And Post-Accident Monitoring Instrumentation Not Performed As Required By Technical Specifications Due To Inadequate Procedures Caused By Misinterpretation Of 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
11	20	96	96	005	01	01	30	97	FACILITY NAME	DOCKET NUMBER
OPERATING MODE (9)		5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (Check one or more) (11)							
POWER LEVEL (10)		00	20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)	
			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	
			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 NRPDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRPDS

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)

During review of corrective actions involving a trip setpoint, an ANO-2 Maintenance Engineer discovered that surveillance testing of the Plant Protective System (PPS) operating bypass logic was being performed but not as frequently as required by Technical Specifications (TS). A multi-discipline assessment team, including representatives from the PPS designer and another plant with a similar design, reviewed other PPS instrumentation testing procedures for technical adequacy, completeness, frequency of performance, and timing of performance. Other failures to comply with TS requirements were identified. Since the unit was in Mode 5, operability of the affected systems was not required. While not tested as part of a surveillance procedure, temperature elements were determined to be operable based upon satisfactory testing performed as part of the process of replacement. Except for those conditions where testing during replacement had fulfilled the surveillance test requirement, tests were satisfactorily performed to confirm operability prior to startup from the outage during which the conditions were discovered. Results of the assessment team evaluation were presented to the Plant Safety Committee. The cause for failure to conform to requirements was inadequate procedures caused by misinterpretations of the Technical Specifications. The need to expand the scope of the surveillance program review is being evaluated.

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A. Plant Status

At the time this condition was discovered, Arkansas Nuclear One, Unit 2 (ANO-2) was in cold shutdown conditions (Mode 5) with Reactor Coolant System (RCS) [AB] at 98 degrees and vented to atmosphere.

B. Event Description

On November 20, 1996, ANO-2 discovered that surveillance testing of the operating bypass logic had not been performed as frequently as required by Technical Specifications (TS).

At ANO-2, the Plant Protective System (PPS) [JC] consists of the Engineered Safety Features Actuation System (ESFAS) [JE] and the Reactor Protective System (RPS) [JC]. The PPS contains two types of bypasses, operating bypasses and trip channel bypasses. The operating bypasses are used during routine startup and shutdown. These bypasses must be manually inserted but are automatically removed when plant conditions reach a point where the bypassed function is required. Operating bypasses are capable of defeating or blocking all four channel trips within the measurement channel if the permissives are satisfied. The RPS/ESFAS pressurizer pressure bypass and the Refueling Water Tank (RWT) low level bypass disable the low pressurizer pressure trip, Safety Injection Actuation Signal (SIAS) [BQ], and Recirculation Actuation Signal (RAS) [BP], when pressurizer pressure is less than 360 psia. The RPS/ESFAS high/low steam generator level bypass disables steam generator level trips and Emergency Feedwater Actuation Signal (EFAS) [BA] when RCS hot leg temperature is less than 190 degrees. The high logarithmic power level bypass disables the high logarithmic power level trip when power is above 10E-4 percent. The Departure from Nucleate Boiling Ratio (DNBR) and Local Power Density (LPD) bypasses disable trips from those inputs if reactor power is less than 10E-4 percent. Once operating bypasses are automatically removed, they will not be reinstated until the permissive conditions return and the bypass switch is returned to the bypass position. The other type of bypass is the trip channel bypass. These trip channel bypasses are utilized to bypass individual inputs to the protection system logic for maintenance or testing. The logic for this type of bypass was designed such that each parameter may have only one measurement channel trip bypassed at any time. The trip logic is converted from a 2-out-of-4 to a 2-out-of-3 logic for the parameters being bypassed. These bypasses must be manually initiated and removed.

One of the TS surveillance requirements for RPS instrumentation, 4.3.1.1.2, states, "The logic for the bypasses shall be demonstrated OPERABLE prior to each reactor startup unless performed during the preceding 92 days. The total bypass function shall be demonstrated OPERABLE at least once per 18 months during CHANNEL CALIBRATION testing of each channel affected by bypass operation." A similar surveillance requirement for ESFAS instrumentation, 4.3.2.1.2, states, "The logic for the bypasses

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shall be demonstrated OPERABLE during the at power CHANNEL FUNCTIONAL TEST of channels affected by bypass operation. The total bypass function shall be demonstrated OPERABLE at least once per 18 months during CHANNEL CALIBRATION testing of each channel affected by bypass operation."

During review of corrective actions for a condition involving the high logarithmic power trip setpoint, a Maintenance Engineer discovered that logic for the operating bypasses was being tested only at the 18-month frequency. The more frequent testing required by the specifications quoted above was only being performed for trip channel bypass functions. Upon discovery, the operating bypass channels were declared inoperable until conformance with the surveillance requirements was established. None of these functions were required to be operable in plant conditions existing at the time of discovery.

A multi-discipline team, including representatives from the Nuclear Steam Supply System vendor (the PPS design organization) and another plant with a PPS design similar to ANO-2, performed an assessment of the ANO-2 PPS surveillance procedures to evaluate conformance with Technical Specifications requirements. The review was expanded to also include some Post-Accident Monitoring Instrumentation testing procedures. The following additional conditions involving incomplete conformance were identified.

Note 6 to TS Table 4.3-1 specifies that channel functional tests shall include injection of simulated process signals into the channel as close to the sensors as practicable to verify operability, including alarm and/or trip functions. This note applies to testing requirements for the Core Protection Calculators (CPCs) and Control Element Assembly Calculators (CEACs), part of the RPS, on a refueling interval basis. During the assessment team review, it was determined that the intent of this note was clarified in the original license correspondence to require that testing be accomplished by injecting a test signal for each sensor input of the CPCs and CEACs and monitoring for trip output when the setpoint is reached. Although the refueling interval testing for the CPCs and CEACs has included the injection of test signals for each sensor input, it has not included the verification of trip output during the test signal injection for each sensor input.

TS Table 4.3-1 requires channel calibration tests of RPS instrumentation at a refueling frequency. Each of the individual indicators was being calibrated by disconnecting the leads, providing a known input signal, and adjusting the indicator response as required. Inputs to the instrument loop were also being calibrated, but voltage drop across the resistor for the indicator was not being checked. This test method did not comply with TS definition 1.9 that specifies a channel calibration test "shall encompass the entire channel including the sensor...". A similar condition was identified involving calibration of the Pressurizer pressure input to the RCS Subcooling Margin Monitor required by TS Table 4.3-10.

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Temperature elements that provide input to the SG level operating bypasses described above were not being calibrated as part of the channel calibration testing required by TS Table 4.3-1. A similar condition existed for temperature elements providing input to the RCS Subcooling Margin Monitor required by TS Table 4.3-10.

Monthly functional testing of LPD and DNBR required by Table 4.3-1 had not been verifying that all associated bistable relays changed state.

Technical Specification Table 4.3-2 items 8.b and 8.c require injection of simulated signals to perform monthly functional testing of SG pressure and differential pressure inputs to EFAS. While simulated signals had been injected to verify proper action of the comparators for these signals, operation of relays driven by the comparators was being verified only by the use of test switches.

During a review of the initial operability assessments for each of the conditions identified by the review team, another of those conditions was determined to have met requirements for being reported. The excure linear power Nuclear Instrumentation channels are required to be calibrated daily, monthly, and quarterly by Item #2 of TS Table 4.3-1. The daily and monthly requirements have notes explicitly defining and limiting their scope. The quarterly requirement contains no limitation other than exclusion of the detectors from being tested. Therefore, the quarterly test is subject to the standard definition of a calibration that requires testing over the "necessary range." ANO-2 had been using a combination of the daily and monthly tests to satisfy the quarterly requirement, but neither of these tested over the range of the instrument channel.

C. Root Cause

The original ANO-2 surveillance procedures for PPS calibration and functional tests were prepared and approved in 1977. These procedures included testing of bypasses; however, the monthly tests only contained verification of logic preventing two concurrent trip channel bypasses for each parameter. The ANO-2 initial Technical Specifications were issued in July 1978. Both the TS surveillance test requirements and the test method in the ANO procedures have remained essentially unchanged since that time.

The Technical Specifications lack clear definitions of the scope of required surveillance testing with respect to bypass circuits in RPS and ESFAS. This caused individuals who prepared the original procedures and those later reviewing those procedures for TS compliance to make interpretations and technical judgments with respect to the requirements. The words "logic for the bypasses" have been interpreted consistently as applying only to testing of the trip channel bypass logic. Contributing to this

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interpretation could have been the way Technical Specifications address bypasses. Surveillance Tables 4.3-1 and 4.3-2 explicitly require testing of logic circuits containing the trip channel bypasses on a monthly basis. No line item is provided in the tables to require surveillance testing of the operating bypass features similar to those line items for the protective features. Descriptions of operating bypass functional requirements are contained in notes to operability Tables 3.3-1 and 3.3-3 but not in the surveillance section. Another possible contribution to the misinterpretation is believed to have been use of the words "each channel affected by bypass operation" in the 18-month frequency requirement for RPS testing. The only type of bypass that exists in some measurement channels and not in others is the operating bypass. Use of technical judgment in the absence of clear definition of requirements led the individuals who developed the original surveillance procedures and those who subsequently reviewed the procedures for compliance with Technical Specifications to misinterpret the testing frequency requirement for operating bypasses.

The other conditions identified by the review team also involved deficient procedures that appear to have been generated through misinterpretation of Technical Specifications requirements. The conditions are similar because they reflect the difficulty of translating TS requirements written in generic terms to specific hardware testing steps involving complex instrumentation and control systems. They also are influenced by the evolution of the perception of allowable latitude in interpretation over time to a more narrow and more strict reading. This has caused procedures developed several years ago to fail to conform to current interpretations. Previous reviews and audits of surveillance requirements verified that procedures existed for each requirement but, in general, appear not to have gone into sufficient depth of detail to evaluate the adequacy of the procedural steps or methodology against an exact wording of testing definitions. Over the past several years there has also been an increased awareness that TS requirements are not clearly stated in versions of the ANO-2 vintage. The planned conversion to Improved Standard Technical Specifications (NUREG-1432) is intended to correct these problems in the long term.

D. Corrective Actions

Prior to startup from the outage in which the conditions were discovered, tests were performed as required to satisfactorily demonstrate system or equipment operability except where completion of a current, valid test could be documented. By virtue of their having been tested as part of replacement activities, temperature elements that had not been tested as part of the routine surveillance calibration were determined to be operable. Surveillance procedures for those temperature elements will be revised and testing completed before startup from the refueling outage currently scheduled to start in April 1997.

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A multi-discipline team, described above, performed an assessment of the ANO-2 instrumentation surveillance procedures to evaluate conformance with Technical Specifications requirements. This review included technical adequacy, completeness, frequency of performance, and timing of performance. The assessment was completed prior to plant startup. Conditions other than those identified above were documented and resolved as not being failures to comply with TS requirements. The results of the assessment team were presented to the Plant Safety Committee prior to plant startup. An evaluation of the initial operability assessments for each condition identified by the surveillance review team was completed by System Engineering.

Based upon the results of the assessment following identification of this condition, the need for additional reviews of surveillance testing procedures and the scope of such reviews, if indicated, are being evaluated. This activity is expected to be completed by February 17, 1997.

E. Safety Significance

Although not tested as frequently as required, operating bypass functions were being tested by the surveillance program. The operating bypasses were also verified to be functional by routine performance of steps contained in procedures for plant heatup, plant startup, and power operation. No instances have been identified where the operating bypasses failed to function due to not having performed the more frequent surveillance test. The other features that were not being tested exactly as required by the current interpretation of Technical Specifications were found to function satisfactorily during performance of the revised surveillance tests. For these reasons, this condition is judged to have had minimal actual safety significance.

F. Basis for Reportability

Failure to perform the surveillance testing as required constituted operation prohibited by Technical Specifications. This report is submitted pursuant to 10CFR50.73(a)(2)(i)(B). The multiple conditions related to PPS and Post-Accident Monitoring Instrumentation testing are being reported under one Licensee Event Report in accordance with guidance provided in the answer to question 14.14 in Supplement 1 to NUREG-1022.

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G. Additional Information

Previous ANO Licensee Event Reports (LERs) involving surveillance testing not in compliance with Technical Specifications due to misinterpretations of requirements have not involved the same failures to conform described in this report. A factor in discovering this condition was heightened awareness of the importance of compliance generated as a corrective action for the condition described in LER 50-368/96-002-00 (ANO letter 2CAN059601 dated May 9, 1996) concerning RAS push button testing. One of the corrective actions for that condition involved a review of surveillance procedures for the PPS to verify that TS requirements were being met. This review verified that procedures contained specific steps related to the TS requirements but did not address the adequacy of those steps.

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