

L I C E N S E E E V E N T R E P O R T (L E R)

FACILITY NAME (1) Arkansas Nuclear One - Unit One DOCKET NUMBER (2) PAGE (3)
101510101311131110F1012

TITLE (4) High RCS Pressure Reactor Trip Caused by Main Feedwater Pump Trip

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)			
Month	Day	Year	Sequential Number	Revision Number	Month	Day	Year	Facility Names			Docket Number(s)	
01	4	21	1	0	0	0	5	11	7	81	4	10151010101

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 (10)	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 20.405(a)(1)(iii)	<input type="checkbox"/> 20.405(a)(1)(iv)	<input type="checkbox"/> 20.405(a)(1)(v)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)	<input type="checkbox"/> 50.73(a)(2)(x)	73.71(b)	73.71(c)	Other (Specify in Abstract below and in Text, NRC Form 366A)
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LICENSEE CONTACT FOR THIS LER (12)

Name	Patrick C. Rogers, Plant Licensing Engineer	Telephone Number	51011916141311171
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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

SUPPLEMENT REPORT EXPECTED (14)

EXPECTED SUBMISSION DATE (15)	Month	Day	Year
<input type="checkbox"/> Yes (If yes, complete Expected Submission Date) <input checked="" type="checkbox"/> No			

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

On April 21, 1984, while operating at 100% full power (FP), an alarm came in for thrust bearing wear on one of the main feedwater pump turbines (K-2A). The leads for the alarm/trip circuitry were lifted in preparation for checking the circuitry when one of the leads came in contact with the adjacent terminal thereby completing the trip circuit. K-2A tripped and a runback was initiated. Reactor power was reduced to ~78% FP when RCS pressure reached the high pressure trip setpoint. Plant systems responded to the trip satisfactorily, and trip recovery was routine. After the trip, inspection of K-2A revealed that the thrust bearing clearances had not changed appreciably since the last inspection. The alarm/trip circuitry and the alarm/trip instrumentation were calibrated and associated circuitry returned to service.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)			LER NUMBER (6)			PAGE (3)										
				Sequential		Revision											
				Year	Number	Number											
Arkansas Nuclear One, Unit One	1015	01010	31	11	31	81	4	--	0	01	4	--	0	0	01	210	1012

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

At 0910 hours on April 21, 1984, while operating at 100% FP, an alarm came in for thrust bearing wear on main feedwater pump turbine K-2A. Due to previous problems with this circuitry, Operations and Maintenance personnel reached a preliminary conclusion that the alarm resulted from electronic drift rather than excessive thrust bearing wear. After substantial review of instruction manuals, drawings, etc. a job order was issued to lift the leads for the thrust bearing wear trip circuitry allowing the electronics to be checked. The potential for a main feedwater pump trip during this activity was recognized by both Operations and Maintenance personnel. This task had been accomplished in the past without mishap. As a precaution, Operations personnel were stationed appropriately to improve the likelihood of successfully accomplishing a runback resulting from any unexpected trip of the feedwater pump. After clearances were obtained, an I&C technician commenced lifting the thrust bearing wear trip leads. The leads for the "normal thrust" trip circuit were successfully lifted. The first lead for the "reverse thrust" trip circuit was being removed from the terminal board when the lead inadvertently came in contact with the other "reverse thrust" trip terminal thereby completing the trip circuit. This resulted in K-2A tripping and a runback by the Integrated Control System resulted. Operations personnel attempted to avert a reactor trip by manually opening the electromagnetic relief valve and the pressurizer spray valve, but with reactor power at ~78% FP, the reactor tripped at 1612 hours as a result of high RCS pressure. The emergency feedwater (EFW) system automatically actuated on low steam generator level. Manual control of EFW was taken and the auxiliary feedwater pump was placed in service to control steam generator levels. The maximum RCS pressure during the transient was 2310 psig, and the minimum RCS pressure was 1945 psig. Maximum RCS average temperature was 588°F, and minimum RCS temperature was 552°F. Pressurizer level varied between a maximum of 265 inches to a minimum of 115 inches. Plant systems responded to the trip satisfactorily and trip recovery proceeded in a routine manner with no significant problems noted. Prior to restart the thrust bearing clearances were checked and were found to have not changed appreciably since the last inspection. As with the last inspection of the thrust bearing clearances, measured values were outside the manufacturer's recommendation. The manufacturer (Westinghouse) was consulted, and the clearances were verified to be acceptable for continued operation of the feedwater pump turbine. The electronics were recalibrated and the alarm and trip setpoints were adjusted to correlate with the thrust bearing clearances. The trip circuitry was returned to service. The error was not cognitive. The I&C Technician involved and his supervisor recognized the potential of a unit trip while performing this job. The I&C Technician was performing this job for the first time. However, he is an experienced technician and well qualified to perform this activity. Communications between Operations and Maintenance were good and did not contribute to the error. The job was properly controlled, coordinated and planned and was worked under an adequate job order. Operations was fully aware of the work being performed. This event did not occur as a result of procedure error. There is no approved procedure to provide instructions for lifting the leads on K-2A thrust bearing trip since the activity is simple and does not require a procedure. The I&C Technician had thoroughly studied the job prior to starting and there was no misunderstanding of what was required and which leads had to be lifted. Some unusual characteristics that contributed to the error were the following:

- 1) The leads are made of stranded wire and is "springy" and two wires were terminated at the same point adding to the "springiness".
- 2) A ring type termination lug is used. The termination screw fits very snugly in the termination lug and has to be completely removed with the termination lug in order to lift the leads.
- 3) The terminal screws are ~ $\frac{1}{4}$ " apart with a small bakelite barrier between the terminals. The top of the barrier is slightly higher than the screw head, making access restricted, and
- 4) The work area is a little cramped.

In summary, the feedwater pump trip was caused by a physical personnel error and not a mental personnel error. The I&C Technician allowed one of the K-2A reverse thrust trip leads to spring up and contact the other reverse thrust trip terminal as he was lifting the lead.



ARKANSAS POWER & LIGHT COMPANY

POST OFFICE BOX 551 LITTLE ROCK, ARKANSAS 72203 (501) 371-4000

May 17, 1984

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U. S. Nuclear Regulatory Commission
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Washington, D.C. 20555

Subject: Arkansas Nuclear One - Unit 1
Docket No. 50-313
License No. DPR-51
Licensee Event Report
No. 84-004-00

Gentlemen:

In accordance with 10CFR50.73(a)(2)(iv), attached is the subject report concerning a reactor trip due to an error during trouble shooting activities associated with the main feedwater pump thrust bearing alarm/trip circuit.

Very truly yours,

for Dan Howard
John R. Marshall
Manager, Licensing

JRM:RJS:ac

Attachment

cc: Mr. Richard P. Denise, Director
Division of Resident Reactor Projects
and Engineering Programs
U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 1000
Arlington, TX 76011

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