

James A. FitzPatrick
Nuclear Power Plant
P.O. Box 41
Lycoming, New York 13093
315 342-3840



New York Power
Authority

Radford J. Converse
Resident Manager

February 25, 1992
JAFFP-92-0171

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

SUBJECT: DOCKET NO. 50-3.3
LICENSEE EVENT REPORT: 92-007-00 - FAILURE OF
ANALOG TRANSMITTER TRIP SYSTEM (ATTS) TRIP RELAYS
DUE TO THERMAL AGING

Dear Sir:

This report is submitted in accordance with 10 CFR
50.73(a)(2)(v).

Questions concerning this report may be addressed to Mr.
Mark Abramski at (315) 349-6596.

Very truly yours,

A handwritten signature in dark ink, appearing to read 'R. Converse'.

RADFORD J. CONVERSE

RJC:MA:llm

Enclosure

cc: USNRC, REGION I
USNRC Resident Inspector
INPO Records Center

020136

P064705448

IE22
1/1

9203030061 920224
PDR ADOCK 05000333
S PDR

LICENSEE EVENT REPORT (LER)

APPROVED OMR NO. 2188-0104
EXPIRES - 6/31/93

FACILITY NAME (1)										DOCKET NUMBER (2)										PAGE (3)																																
JAMES A. FITZPARTICK NUCLEAR POWER PLANT										0150003133										1 OF 015																																
TITLE (4)																																																				
FAILURE OF ANALOG TRANSMITTER TRIP SYSTEM (ATTS) TRIP RELAYS DUE TO THERMAL AGING																																																				
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			23			92			92			007			00			02			24			92																0150000111												
THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)																																																				
OPERATING MODE (9)										20.402(x)										20.406(x)										50.734(2)(x)										73.71(x)												
POWER LEVEL (10)										20.406(x)(1)(B)										50.734(x)(1)										X 50.734(2)(x)										73.71(x)												
01010										20.406(x)(1)(B)										50.734(x)(2)										50.734(2)(x)										OTHER (Specify in Abstract below and in Text, NRC Form 364A)												
										20.406(x)(1)(B)										50.734(2)(1)										50.734(2)(x)(A)																						
										20.406(x)(1)(B)										50.734(2)(B)										50.734(2)(x)(B)																						
										20.406(x)(1)(B)										50.734(2)(1)										50.734(2)(x)																						
LICENSEE CONTACT FOR THIS LER (12)																																																				
NAME															TELEPHONE NUMBER																																					
															AREA CODE																																					
															3115 314191-16151916																																					
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																																																				
CAUSE			SYSTEM			COMPONENT			MANUFACTURER			REPORTABLE TO NRC			CAUSE			SYSTEM			COMPONENT			MANUFACTURER			REPORTABLE TO NRC																									
X			JE			IRILY A			31418			Y																																								
SUPPLEMENTAL REPORT EXPECTED (14)																																																				
X YES (If yes, complete EXPECTED SUBMISSION DATE)															NO																																					
															EXPECTED SUBMISSION DATE (15)																																					
															019 011 912																																					

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

ABSTRACT

INTERIM REPORT

EIIIS Codes are in []

On 1/23/91 while the plant was shut down and in the cold condition, technicians were performing a routine surveillance of the Analog Transmitter Trip System (ATTS) when an excessive time delay due to a sticking relay was noted. The failed relay was replaced and visual examination indicated signs of thermal stress on the relay internals. The coil spool was discolored, cracked and brittle. The delay in relay drop out time is attributed to coil spool debris inhibiting relay plunger movement. The normally energized relay had been in service for approximately 4 years longer than the vendor recommended service life of 3 years. These relays were also used in the numerous Reactor Protection System, Emergency Core Cooling System and Primary Containment Isolation System actuation logic [JE]. A detailed root cause analysis shall be performed to verify that failure was due to excessive thermal aging and identify potential programmatic deficiencies. A supplemental LER will be submitted when this analysis is complete.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES 8/31/85

FACILITY NAME (1) JAMES A. FITZPATRICK NUCLEAR POWER PLANT	DOCKET NUMBER (2) 0 5 0 0 0 3 3 3	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		9 2	— 0 0 7	— 0 0	0 2	OF	0 5

TEXT (If more space is required, use additional NRC Form 368A's.)

DESCRIPTION

INTERIM REPORT

EiIS Codes are in []

On January 23, 1992, the plant was shutdown and in the cold condition, the vessel head was removed, primary containment was open and preparations for fuel off-load were in process. Instrumentation and Control (I&C) technicians were performing a routine surveillance (calibration) on the Analog Transmitter Trip System (ATTS) when they noticed an excessive time delay from the time a push-to-test button was pressed and the time the required annunciator responded. This time delay was on the order of 30 seconds. Troubleshooting indicated that the excessive delay time was due to a sticking relay in the ATTS card-out-of-file annunciator circuit. The function of this circuit is to indicate when an ATTS master (or slave) trip unit (analog comparator) is not fully inserted into the circuit board connector.

The failed relay was replaced with a spare unit from stock and was retained for technical evaluation. Visual inspection of the failed relay found the coil wrap to be discolored, the coil leads were discolored and appeared to be melted where they came in contact with the relay body and there was evidence of outgassing (mist) on the plastic relay case. The relay was then disassembled and its internal components were examined. The insulation on the coil leads was found to be melted and brittle, and the coil spool was discolored and severely embrittled. It appeared that debris from the embrittled coil spool was inhibiting movement of the relay plunger.

The function of the ATTS system is to compare process analog inputs (pressure, level or temperature) and provide bistable outputs when the process variables exceed predetermined setpoints. The system implementation is such that an analog comparator (master or slave trip unit) drives a Trip Relay which then drive engineering safety feature actuation system (JE) logic circuits such as Reactor Protection System (RPS), Emergency Core Cooling System (ECCS) or Primary Containment Isolation System (PCIS) actuation relays. The ATTS Trip Relays have the same model number as the failed card-out-of-file relay.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

FACILITY NAME (1) JAMES A. FITZPATRICK NUCLEAR POWER PLANT	DOCKET NUMBER (2) 0 5 0 0 0 3 3 3	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		9 2	— 0 0 7	— 0 0	0 3	OF	0 5

TEXT: If more space is required, use additional NRC Form 305A (2/17)

The failed card-out-of-file relay was used in a normally energized application which caused the thermal degradation of the relay components. The ATTS system design is such that the Trip Relays, which drive the RPS are used in a "fail safe", deenergize to actuate (normally energized) application. Twenty-four of these normally energized relays were selected to be immediately replaced as it was thought (at the time) that those channels were required to be operable to perform fuel off load. The twenty-four replacement relays were tested to demonstrate acceptable drop out time as these relays were installed spares. It was determined at a later date that the replacement relays had exceeded their recommended shelf life. Each of the relays removed exhibited signs of thermal aging.

Concurrent with this activity, industry operating experience and plant records were reviewed for reference to this failure mode. This review indicated that there is inconsistent documentation relative to the recommended service life for these relays in the normally energized application. The GE piece part drawing indicates a design life of 10 years, GE environmental tests indicate a normally energized service life of 3 years while the manufacturer (Amerace) recommends 4.5 years. The manufacturer also recommends a 10 year limit on shelf life which also applies to relays in the normally deenergized application. The subject relays have been in service since the ATTS system was retrofitted via plant modification in 1985. These relays have date codes indicating they were manufactured in 1979. Based on these dates the normally energized relays have exceeded their most conservative recommended service life (for the application) by 4 years and the normally deenergized relays have exceeded their recommended shelf life by 3 years.

Because the original failure mode of the relays was a delay in drop out time, plant surveillance procedures (response time tests) were reviewed to determine if an incipient failure in a critical channel (RPS, ECCS or PCIS) would have been detected. This review indicated that surveillance tests would not have detected an incipient failure. Plant technical specifications were then reviewed to determine if surveillance tests were consistent with technical specification requirements. The surveillance tests (RPS response time tests) were in accordance with the technical specifications as written. At this point it became evident that the technical specifications as written may be either inadequate or incomplete relative to RPS response time testing requirements.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES 8/31/85

FACILITY NAME (1) JAMES A. FITZPATRICK NUCLEAR POWER PLANT	DOCKET NUMBER (2) 0 5 0 0 0 3 3 3 9 2	LER NUMBER (8)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
			0 0 7	0 10	0 14	OF 0 5	

TEXT (If more space is required, use additional NRC Form 385A's.)

The Nuclear Safety Evaluation and other licensing basis documents for the ATTS modification were then reviewed to determine if the technical specifications should have been changed prior to implementation of the ATTS modification. This review identified a requirement to perform response time testing of the subject relays and their associated process channels. This indicates that both the RPS response time surveillance test and the technical specification are inadequate and must be revised.

CAUSE

The cause of the observed relay failure is tentatively concluded to be excessive thermal aging resulting from exceeding the vendor's recommended service life limit in the normally energized application. Industry operating experience supports this conclusion. A mechanistic root cause analysis shall be performed to verify this conclusion.

The cause of the surveillance test and technical specification inadequacies appears to be a programmatic deficiency in the modification and surveillance processes. A similar deficiency may exist in the preventive maintenance program as is evidenced by the failure of the preventive maintenance program to address the vendor's service life recommendations for the subject relays. A programmatic assessment must be performed in order to identify all root causes and determine corrective action(s).

ANALYSIS

This event is reportable under the provisions of 10CFR50.73(a)(2)(v). This event is reportable because (a postulated) simultaneous failure of the subject relay to "drop out" when deenergized would have inhibited a reactor scram. This event is also reportable because an inadequacy in the modification process did not identify critical parameters and did not translate those requirements into the necessary surveillance test changes and technical specification changes. This event is also reportable because the industry operating experience review program did not translate the vendor service life recommendations into a regular replacement interval in the preventive maintenance program.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) JAMES A. FITZPATRICK NUCLEAR POWER PLANT	DOCKET NUMBER (2) 0 5 0 0 0 3 3 3	LER NUMBER (5)			PAGE (3) 0 5 OF 0 5
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
		9 2	0 0 7	0 0	

TEXT (If more space is required, use additional NRC Form 305A (11/77))

CORRECTIVE ACTION

The following corrective actions shall be implemented:

1. A comprehensive programmatic root cause investigation shall be performed to identify specific programmatic deficiencies which caused or contributed to these failures. Corrective actions shall be recommended and implemented as appropriate.
2. A mechanistic root cause analysis shall be performed to verify that excessive thermal aging is the cause of the hardware failure.
3. Existing ATTS relays shall be replaced with new relays from spare stock.
4. Tests shall be performed to determine the "as found" drop-out times for the "aged" RPS ATTS relay population.
5. A technique and procedure shall be developed to perform response time testing as required.
6. The results of these tests and analyses shall be submitted in a supplemental LER no later than September 1, 1992.

ADDITIONAL INFORMATION

Failed Components:	Reactor Protection System ATTS Trip Relays
Component:	FGPBC750
Manufacturer:	Amerace
Manufacturer NPRDS Code:	A348
Similar Events:	Previous similar events cannot be determined until the root cause of this event has been determined. The updated report will identify similar events (if any).