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New York Power Authority

William Fernandez II
Resident Manager

January 14, 1991
JAFP-91-0039

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

SUBJECT: DOCKET NO. 50-333
LICENSEE EVENT REPORT: 90-027-00
Reactor Scram - Feedwater Flow Control Valve

Dear Sir:

This Licensee Event Report is submitted in accordance with 10 CFR 50.73(a)(2)(iv).

Questions concerning this report may be addressed to Mr. Hamilton Fish at (315) 349-6013.

Very truly yours,

WILLIAM FERNANDEZ

WF:HCF:lar

Enclosure

cc: USNRC, Region I
USNRC Resident Inspector
INPO Records Center
American Nuclear Insurers

Cont No 9201160415

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NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
JAMES A. FITZPATRICK NUCLEAR POWER PLANT	0 5 0 0 0 3 3 3	1 OF 0 4

TITLE (4) Reactor Scram During Start-Up Due to High Neutron Flux Due to Failed Air Operator Diaphragm on Reactor Feedwater Low Flow Control Valve

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)
1 2	1 5	9 0	9 0	0 2 7	0 0	0 1	1 4	9 1		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	0 0 6	20.402(b)	20.405(c)	X 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 (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
Hamilton C. Fish	AREA CODE 3 1 5 3 4 9 - 6 0 1 3

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	
X	S J	F C V	M 1 2 0	Y							

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

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

EIIS Codes are in []

A reactor scram from six percent power occurred during a start-up on December 15, 1990 at 2140. The cause was a failure of a fabric-woven Buna-N diaphragm which had been in service for 15 years in the air operator for the reactor feedwater low flow control valve and air leakage from the operator stem packing gland. The failure of the valve to stroke full open resulted in an inability to supply sufficient feedwater flow to the reactor. This resulted in decreasing reactor water level and the necessity to use the reactor feed pump (RFP) discharge valve to control water level. After several controlled jogs in the open direction of the RFP discharge valve, the increase in water flow resulted in a high neutron flux scram of the reactor due to exceeding the 15 percent power limit while the mode switch was in the start-up mode position. Corrective action included repairing the reactor feedwater low flow control valve operator, revising the start-up procedure to verify full stroke capability of the valve, adding a caution limiting the acceptable open demand signal for the valve to 70 percent. The plant was restored to service at 0658 on 12/17/90.

Related LER: 90-026.

NRC Form 366
(9-83)

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Description

Reactor start-up began at 1350 on December 15, 1990. Reactor criticality was achieved at 1600. Feedwater was being supplied to the reactor vessel by one condensate pump and one condensate booster pump. Reactor vessel level was being regulated by the feedwater low flow control valve in the automatic mode. The reactor pressure setpoint was being raised to 550 psig using the turbine electro-hydraulic control (EHC) system in preparation for start-up of a turbine driven reactor feedwater pump. At 2055, warm-up of the main turbine was begun. One turbine main steam bypass valve was full open. The reactor mode switch correctly remained in the start-up/hot standby position with reactor power at approximately 6 percent.

At approximately 2133, at a reactor pressure of 490 psig and a reactor power level of 7 percent, a decrease in reactor vessel water level was observed. The low flow control valve "open" demand signal increased from 70 percent to 100 percent. Vessel level continued to slowly decrease. A second condensate pump was started at 2134. Vessel level continued to slowly decrease. In an effort to maintain vessel level by reducing the steaming rate, the control rods in rod worth minimizer (RWM) groups 15 and 16 and approximately half the control rods in RWM group 17 were inserted in accordance with the established rod movement sequence. A second condensate booster pump was started at 2137 and preparations were made to start a turbine driven reactor feed pump (RFP). At approximately 2138, the EHC setpoint was reduced by approximately 40 psig to 510 psig to reduce the feedwater to reactor differential pressure to improve the feed flow to the reactor and to maintain operation within the heat-up and cooldown guidelines. The vessel level continued to decrease from the normal operating level of 200 inches above Top of Active Fuel (TAF) to 179.5 inches as the start-up of the RFP was in progress. The RFP motor operated discharge valve was given a slight opening jog. At 2139, reactor vessel level turned, increased a few inches, but then turned again and began to decrease. Reactor power had decreased to about 3 percent. The discharge valve was given a second jog open. Again vessel level increased a few inches but then turned and began to decrease. Following a third jog open the vessel level turned and continued in the upward direction. Vessel level and power were monitored for the effects of the additional feedwater. As level and power continued to increase from about 2 percent toward 9 percent, the RFP discharge valve was jogged in the "close" direction.

At 2140, a high neutron flux trip (less than or equal to 15 percent power while in the start-up mode) from average power range monitor (APRM) B resulted in a half-scram on reactor protection system (RPS) B. Within seconds a high neutron flux trip on APRM A resulted in a full scram.

Reactor vessel level continued to gradually increase following the scram. Operators manually tripped the RFP as the vessel level approached the high level trip setpoint of 222.5 inches above TAF. Vessel level reached a maximum height of 225 inches above TAF. Vessel level was returned to the normal operating range with the reactor feedwater low flow control valve in automatic. No further difficulties were experienced with water level control.

Following inspection and repair of the low flow control valve, the plant was restored to service at 0658 on December 17, 1990. LER-90-026 reported a total off-line time of 4 days, 17 hours, and 6 minutes which included the delay due to the scram described in this LER and the off-line time due to the scram on December 12, 1990 (LER-90-026).

Cause

The scram was caused by neutron flux in the reactor core in excess of the 15 percent power (neutron flux) trip point used during the start-up/hot standby mode of operation. The highest recorded APRM neutron flux measurement was 15.55 percent on APRM B. The other maximum recorded flux values ranged from 12.63 to 14.67 percent. The average power range monitor (APRM) setpoints had been verified to be within the calibration guidelines prior to reactor start-up. An increase in feedwater flow into the reactor resulted from the controlled jogging open of the reactor feed pump discharge valve. This resulted in increased moderator density, increased moderation of neutrons, and resultant increased neutron flux in the core.

The need to open the RFP discharge valve to restore vessel water level resulted from failure of the reactor feedwater low flow control valve. This valve is operated by air acting on a flexible diaphragm. The diaphragm was found to have three small through the wall radial cracks around the periphery. In addition, following replacement of the diaphragm, excessive air leakage from the stem packing glad was observed to limit valve travel to less than one inch. Valve control stroke was effectively reduced from the normal 2-inch range to only 3/4-inch. The diaphragm was the original fabric weave Buna-N material installed more than 15 years ago. The valve was visually observed for free movement prior to start-up and appeared to operate satisfactorily. Actual measurements of the stroke length were not performed. The actual stroke length required to meet the required flow capability of this valve was increased from 1 inch to 2 inches by a plant modification performed approximately 6 years ago. The revised stroke length was not incorporated into plant drawings.

The causes of the scram were the inability to feed the reactor vessel at the proper rate through the low flow control valve due to the failed diaphragm and air leakage from the operator valve stem packing gland.

Analysis

As an automatic scram, this event is reported under the provisions of 10 CFR 50.73(a)(2)(iv) which requires reporting of any event or condition that resulted in a manual or automatic actuation of any Engineered Safety Feature.

FSAR Section 14.2, "Unacceptable Safety Results for Accidents", was reviewed with respect to this event. Based on the instrument signals, the appropriate trips occurred. Systems functioned as designed. There were no adverse consequences to plant safety resulting from this event.

Corrective Action

1. The reactor feedwater low flow control valve operator was repaired and a drawing revision is being processed to reflect the 2-inch stroke length.

2. The start-up and shutdown procedure (OP-55) will be revised to provide verification that the low flow control valve operates smoothly throughout its full stroke.

3. A "Caution" has been added to the start-up and shutdown procedure to restrict start-up reactor steam flow such that the demand "open" signal for the reactor feedwater low flow control valve will not exceed 70 percent.

Additional Information

Related LER: 90-026

Failed Component Data:

Function:	Reactor Feedwater Low Flow Control Valve Operator
Plant Component Identification:	34FCV-137(OP)
Manufacturer:	Masoneilan
Model:	38-2X871
Type:	Air Diaphragm Operator
NPRDS Vendor Code:	M120
NPRDS Component Code:	VALVOP