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NewYorkPower Authority

Michael J. Colomb
Site Executive Officer

April 28, 2000
JAFP-00-0101

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

Subject: **Docket No. 50-333**
LICENSEE EVENT REPORT: LER-00-003 (DER-00-1174)

Reactor Scram Due to Manual Trip of the Main Turbine

Dear Sir:

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

There are no commitments contained in this report.

Questions concerning this report may be addressed to Mr. Robert Steigerwald at (315) 349-6209.

Very truly yours,

MICHAEL J. COLOMB

MJC:RS:las
Enclosure

cc: USNRC, Region 1
USNRC, Project Directorate
USNRC Resident Inspector
INPO Records Center

IE22

NRC FORM 366 (6-1998) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), 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. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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TITLE (4)

Reactor Scram Due to Manual Trip of the Main Turbine

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
									N/A	05000
04	01	00	00	003	00	04	28	00	FACILITY NAME N/A	DOCKET NUMBER 05000

OPERATING MODE (9)	N
POWER LEVEL (10)	25

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
	20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)
	20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
	20.2203(a)(2)(ii)		20.2203(a)(4)	X	50.73(a)(2)(iv)		OTHER
	20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Mr. Robert Steigerwald, Sr. Licensing Engineer	315-349-6209

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
E	WF	V	A610	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 15 single-spaced typewritten lines) (16)

On April 1, 2000, with the reactor at approximately 25 percent power an automatic scram occurred due to a manual trip of the main turbine. Planned maintenance was in progress to repair a small main steam drain line pipe leak, which required the condenser air ejector recombiner to be removed from service. At approximately 17:04 when the recombiner was removed from service , the recombiner bypass valve, 01-107AOV-104, failed closed, isolating the condenser off gas system from the main condenser. This caused a lowering trend in condenser vacuum. Operators entered the associated Abnormal Operating Procedure AOP-31. At approximately 17:31 condenser vacuum had degraded to the "manual turbine trip region" contained in Figure 1 of AOP-31. The CRS assumed the reactor protection system turbine trip scram was bypassed, based on current power level, ordered a manual trip of the turbine. Upon initiation of the turbine trip an automatic reactor scram occurred from the turbine trip scram logic. The associated transient is bounded by analysis contained in the Final Safety Analysis Report. Corrective actions included repair of the failed valve, an Equipment Failure Evaluation, and evaluations of additional training required to improve some identified personnel performance errors.

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Description:

On April 1, 2000, with the reactor at approximately 25 percent power an automatic scram occurred due to a manual trip of the main turbine [TA]. Planned maintenance was in progress to repair a main steam drain line leak, which required the condenser air ejector recombiner to be removed from service. Normally, when the recombiner is removed from service the recombiner bypass valve, 01-107AOV-104, automatically opens. When the operator secured the recombiner the recombiner bypass valve was observed to have opened. Approximately 10 minutes into the degraded condenser vacuum condition the recombiner bypass valve was found closed. With the bypass valve closed and the recombiner secured there is no path for the condenser air ejector discharge, which isolates the condenser off gas system [WF] from the main condenser [SH]. This caused non-condensible gasses to build up in the condenser causing a lowering trend in condenser vacuum.

Upon observing the lowering condenser vacuum, the control room operating crew entered Abnormal Operating Procedure, AOP-31, "Loss of Condenser Vacuum" in an attempt to stabilize condenser vacuum. Condenser vacuum degraded to the point where a manual turbine trip was required per the procedure (AOP-31, Figure 1). This point was reached at approximately 25% reactor power. The Control Room staff focused solely on the fact that power was below 29% (turbine trip scram nominal setpoint) and believed that tripping the turbine would not result in a reactor scram. It was not noted that annunciator 09-5-1-52, "TCV FAST CLOSURE & TSV TRIP BYPASSED" was clear, signifying that the turbine trip scram was still enabled. A manual turbine trip was ordered by the Control Room Supervisor. Upon tripping the turbine an automatic reactor scram occurred as designed.

Prior to the scram, a temporary pipe clamp on a main steam drain line downstream of main steam valve 29MOV-101A was to be removed as part of the maintenance. The pipe clamp was being used to temporarily patch a small leak in a 1 and 1/4 inch main steam drain line. The control room staff was aware that increased condenser air in-leakage would be observed when the temporary pipe clamp was removed. Approximately four minutes before authorization was given to remove the pipe clamp, the recombiner was shutdown. Following the recombiner shutdown, 01-107AOV-104 failed closed, effectively isolating the Steam Jet Air Ejectors (SJAE). The temporary patch was then removed. Due to the lack of a "stabilization period" between the recombiner shutdown and the pipe clamp removal, the decreasing vacuum trend was thought to be solely related to in-leakage from the

Description: (cont'd.)

removed pipe clamp. Because of this mind-set, the vacuum recovery effort was focused on reinstalling the temporary pipe clamp. During the recovery effort the Control Room observed Offgas flow indication to be reading zero and realized this was inconsistent with increased air in-leakage. This indication was not followed up on until the patch was replaced and condenser vacuum was noted to still be decreasing. It was then discovered that 01-107AOV-104 was closed.

During the transient following the scram operators took manual control of the feedwater system [SK] to control Reactor Pressure Vessel (RPV) water level. The lowest water level attained was 162.6 inches above the Top of Active Fuel (TAF). A group II, Primary Containment [JM] Isolation, Reactor Water Clean-Up (RWCU) [CE] isolation and Reactor Building [NG] Isolation occurred as a consequence of reactor water level falling below 177 inches above the TAF. Reactor pressure control was maintained via the turbine bypass valves.

Cause:

A loss of condenser vacuum occurred when the recombiner was shutdown per OP-24A, "Off Gas System," due to a failure of the recombiner bypass valve, 01-107AOV-104. The bypass valve failed in the closed position, effectively isolating the SJAE discharge when the recombiner was shutdown. Non-condensible gases built up in the main condenser causing vacuum to degrade to a point where a main turbine trip was required.

Valve 01-107AOV-104 is an Air Operated Valve (AOV) and upon removal of air pressure to the operating diaphragm the valve will open. The associated solenoid operated valve (SOV) is normally energized porting air to the AOV diaphragm keeping the AOV in the closed position. An Equipment Failure Evaluation determined that the associated SOV failed to fully close when de-energized. The SOV valve seat is made of an elastomer material (Buna-N). The SOV valve seat had become embrittled and broke apart. Pieces of the SOV valve seat became lodged in between the seat and disk preventing the SOV from closing. The SOV failure was attributed to age related degradation of the valve seat (Cause Code E). The cause of the failure was embrittlement of the core assembly seat due to age, accelerated by heat from the normally energized coil.

Extent of Conditions:

An extent of conditions evaluation included normally energized ASCO type 8320 SOVs. Of a population of 95 SOVs, 30 had a history of replacement. The remaining 65 were evaluated and 5 were replaced prior to start up, no additional SOV seat failures were found.

Human Performance Issues:

The control room crew did not recognize that the Reactor Protection System logic for the turbine trip scram was still enabled prior to tripping the turbine. However, a scram would have been required due to the condenser off-gas being isolated.

The control room crew did not properly interpret the "zero" offgas flow indication reading in the control room until after the temporary patch was re-installed.

Analysis:

This event is bounded by a previously analyzed transient contained in the Final Safety Analysis Report (FSAR). The bounding transient analyzed in the FSAR is a Main Turbine Trip with or without Turbine Bypass Valves. The analyzed transient assumes an initial condition of 100 percent reactor power. At the time of the turbine trip and subsequent scram the reactor was approximately 25 percent reactor power and within the capability of the turbine bypass valves. All safety systems were available. Therefore, the risk significance and transient severity was low.

Corrective actions:

1. Repaired valve 01-107AOV-104. Performed an Equipment Failure Evaluation on the failed SOV. **(Completed)**

2. Performed extent of conditions evaluation on the failed SOV. Replaced an additional 5 ASCO model 8320 SOVs. **(Completed)**

3. Review the current SOV preventive maintenance program and evaluate the effects of heat and aging of the elastomers. Initiate preventive maintenance tasks as appropriate. **(Scheduled completion date: 07/31/00)**

4. Reviewed Lessons Learned with shift operating personnel. **(Completed)**

5. Evaluate the need for additional training on the approach to engineering setpoints (e.g. RPS bypass for Main Turbine Trips). **(Scheduled completion date: 06/01/00)**

6. Evaluate the need for training on believing indications, maintaining a broad perspective, management oversight, and conservative decision making. **(Scheduled completion date: 06/01/00)**

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TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

Similar Events:

None

Failed Component:

Manufacturer: ASCO
Model Number: Solenoid Operated Valve 8320
Vendor Code: A610
Component Code: Valve

Applicability to NEI 99-02 Rev. 0:

This event did not result in a safety system functional failure. This event counts as an "Unplanned Scram" Performance Indicator in the Initiating Events cornerstone.