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L-00-069

***Beaver Valley Power Station, Unit No. 1
Docket No. 50-334, License No. DPR-66
LER 2000-005-00***

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

In accordance with Appendix A, Beaver Valley Technical Specifications, the following Licensee Event Report is submitted:

LER 2000-005-00, 10 CFR 50.73(a)(2)(iv), "Manual Reactor Trip in Response to Degraded Condenser Vacuum."


Lew W. Myers

Attachment

RG14-001

IE22

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LICENSEE EVENT REPORT (LER)

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

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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Beaver Valley Power Station Unit 1

DOCKET NUMBER (2)

05000334

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TITLE (4)

Manual Reactor Trip in Response to Degraded Condenser Vacuum

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
04	17	2000	2000	005	00	05	16	2000	FACILITY NAME	DOCKET NUMBER
OPERATING MODE (9)		1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)		100 %	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)		<input checked="" type="checkbox"/> 50.73(a)(2)(iv)		OTHER	
			20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)			
			20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)			

LICENSEE CONTACT FOR THIS LER (12)

NAME

Thomas S. Cosgrove, Manager Licensing

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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
A	SA	PCV	M120	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

At 1309 hours on April 17, 2000, the Unit 1 reactor was manually tripped from approximately 100% power due to degrading condenser vacuum. The degraded condenser vacuum was caused by inadequate steam supply to the condenser air ejectors due to the malfunctioning of auxiliary steam pressure control valve PCV-1AS-100. The Unit was manually tripped after reaching the condenser vacuum low-low alarm setpoint. Unit response to the reactor trip and Unit recovery were uncomplicated. PCV-1AS-100 was repaired, tested, and returned to service. As part of corrective actions to this event, an evaluation of I&C task analysis documentation, and maintenance documentation of as-found and as-left conditions will be performed. Performance of a manually initiated reactor trip constitutes a manual actuation of an engineered safety feature and is reportable per 10 CFR 50.72(b)(2)(ii), and 10 CFR 50.73(a)(2)(iv). The calculated risk associated with this event is small.

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

PLANT AND SYSTEM IDENTIFICATION

Westinghouse Pressurized Water Reactor (PWR)

Auxiliary Steam System (AS) {SA}*

Main Steam System (MS) {SB}*

Auxiliary Steam System Pressure Control Valve PCV-1AS-100 {SA/PCV}*

* Energy Industry Identification System (EIIS) system and component function identifier codes appear in the text as {SS/CCCC}

CONDITION PRIOR TO OCCURRENCE

Unit 1: Mode 1 at approximately 100% power.

There were no systems, structures, or components that were inoperable that contributed to the event.

DESCRIPTION OF EVENT

At 1309 hours on April 17, 2000, the Unit 1 reactor {AC/RCT} was manually tripped from approximately 100% power due to degrading condenser {SG/COND} vacuum. The degrading condenser vacuum was the result of auxiliary steam pressure control valve PCV-1AS-100 {SA/PCV} closing, rendering the steam air ejectors {SH/EJR} inoperable. The steam air ejectors are used to remove non-condensable gas from within the condenser. The Unit was manually tripped after annunciator A7-3, "Condenser Vacuum Low-Low" {IB/ANN} alarmed. Emergency Operating Procedures (EOPs) were entered and the Unit was stabilized. The EOPs were exited and Unit recovery from the reactor trip was satisfactorily completed.

The following provides a chronology of occurrences regarding this event.

April 17, 2000:

1303 hours The Unit was operating in Mode 1 at approximately 100% power.

1304 hours Control Room annunciator A2-81, "Auxiliary Steam Local Panel Trouble" {IB/ANN} alarmed. This annunciator provides, in part, indication of a loss of auxiliary steam pressure. Utility licensed operators noted that the auxiliary steam pressure was at approximately 135 psig and was decreasing. Auxiliary steam pressure is normally maintained around 140 psig.

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DESCRIPTION OF EVENT (Continued)

Utility licensed and utility non-licensed operators were dispatched to auxiliary steam pressure control valve, PCV-1AS-100, to investigate. PCV-1AS-100 is an air operated globe valve manufactured by Masoneilan International Inc., Model #20521, which maintains auxiliary steam pressure when supplied from the main steam header.

≈1306 hours Upon arrival, the operators found PCV-1AS-100 to be fully shut. Attempts were made to open PCV-1AS-100 by taking manual control of the valve controller, PIC-1AS-100 {SA/PCO}. This is a pneumatic pressure controller which receives a steam pressure signal downstream of PCV-1AS-100 and converts it to a control air signal to operate PCV-1AS-100. All attempts to open PCV-1AS-100 were unsuccessful.

≈1307 hours Operators in the field attempted to open the manual bypass valve, MS-30 {SB/V}, but were unable to turn the valve without mechanical assistance. MS-30 is a manual globe valve manufactured by the Crane Company, Model 6021213-37.

1308 hours Operators in the field began opening MS-30 using valve wrenches. Control Room Annunciator A7-4, "Condenser Vacuum Low" alarmed. Annunciator A7-4 has a setpoint of 25 in-Hg-Vacuum (5 in-Hg-Absolute). Soon after, Control Room Annunciator A7-3, "Condenser Vacuum Low-Low" alarmed, which has an alarm setpoint of 5 in-Hg-Absolute.

1309 hours Upon receiving annunciators A7-4 and A7-3, the Nuclear Shift Supervisor directed that the reactor be manually tripped due to the low condenser vacuum. Meanwhile, manual bypass valve MS-30 was being opened, and local indication showed auxiliary steam pressure increasing. An operator was dispatched to inform the control room of the restoration of auxiliary steam through bypass valve MS-30. However, by the time Control Room personnel were informed of this development, the reactor had already been tripped. Main condenser vacuum had degraded to 6.5 in-Hg-Absolute at the time of the reactor trip. The automatic turbine trip setpoint is 10 in-Hg-Absolute.

REPORTABILITY

Performance of a manually-initiated reactor trip constitutes a manual actuation of an engineered safety feature (e.g., the Reactor Protection System). This requires NRC reporting within four hours of the occurrence, per the reporting criteria of

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REPORTABILITY (Continued)

10 CFR 50.72(b)(2)(ii), and LER reporting within 30 days of the occurrence, per the reporting criteria of 10 CFR 50.73(a)(2)(iv). At 1556 hours on April 17, 2000, a 4-hour notification (Report #36901) was made to the NRC in accordance with 10 CFR 50.72 (b)(2)(ii).

ANALYSIS OF THE EVENT

The closure of PCV-1AS-100 interrupted auxiliary steam flow to the condenser steam air ejectors, and rendered the air ejectors inoperable. The steam air ejectors are used to remove non-condensable gas from within the condenser and maintain condenser vacuum. The closure of PCV-1AS-100 resulted in a decrease in condenser vacuum, which rapidly approached the low-low condenser vacuum turbine trip setpoint.

The manual reactor trip was a conservative preemptive action prior to reaching the automatic turbine trip setpoint of 10 in-Hg-Absolute. In addition, tripping the reactor prior to a complete loss of the condenser as a heat sink, and local operator actions to recover auxiliary steam, prevented challenges to the main steam safety valves.

CAUSE OF THE EVENT

Closer inspection of PCV-1AS-100 revealed that the actuator packing nut and associated packing had disengaged from the gland. The disengagement of the packing resulted in a loss of actuator air pressure to the valve. This caused the valve operator to drive PCV-1AS-100 shut and remove auxiliary steam to the condenser air ejectors. With no auxiliary steam pressure, the steam air ejectors were rendered inoperable. The resultant increase in non-condensable gas within the condenser degraded condenser vacuum to approximately 6.5 in-Hg-Absolute when the order was given to trip the reactor.

The maintenance history of PCV-1AS-100 was researched. This search revealed that the valve was overhauled during Refueling Outage 13 per Maintenance Procedure 1/2CMP-75-Mason-38-18L. This was the first overhaul for this actuator. The event response team concluded that inadequate work practices and incorrect assumptions were applied during the installation of the packing gland nut. A review of corrective action documents written in the past five years identified only one incident involving a loose actuator packing gland nut. Therefore, this was determined to be an isolated event.

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CORRECTIVE ACTIONS

Immediate Corrective Actions:

1. PCV-1AS-100 was repaired, tested, and returned to service.
2. The event response team for this event identified seven other actuators that have a similar potential failure mode, and were overhauled during Refueling Outage 13. These seven actuators were inspected and were in an acceptable configuration with adequate gland nut thread engagement.
3. The actuator air packing gland on PCV-1AS-100 was monitored for 7 days to ensure that the corrective work was effective. During the monitored period no problems were identified with the actuator packing, however, a non-related steam leak in the valve packing did occur.
4. The I&C Technician who overhauled the valve actuator was counseled.

Further corrective actions to prevent recurrence are:

1. An evaluation of procedural enhancements will be conducted on the maintenance procedure to determine the adequacy of I&C Task Analysis Documentation.
2. An evaluation will be conducted of the adequacy of how maintenance personnel document the as-found and as-left condition of components that are worked.
3. A Training Needs Analysis will be performed to identify possible enhancements to I&C training on valve actuator packing.

Corrective action completion is being tracked through the corrective action program.

SAFETY IMPLICATIONS

In response to the degrading main condenser vacuum, Operations shift management directed that the reactor be manually tripped. This action was conservative and pre-empted an automatic turbine trip which would have occurred if the transient were permitted to continue. Following the manual reactor trip, plant safety systems functioned as designed, and the main condenser remained available as a heat sink. The Unit was stabilized and station recovery was satisfactorily completed. The calculated risk associated with this event is small.

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PREVIOUS SIMILAR EVENTS

A review of the BVPS corrective action program documents and Licensee Event Reports found two similar events.

Problem Report 1-95-367, Failed Air Line from Valve Controller to PCV-1AS-100. This is a site Corrective Action Program document.

BVPS Unit 1 LER 99-001-00, Manual Reactor Trip Due to Continuing Degradation of Main Condenser Parameters.