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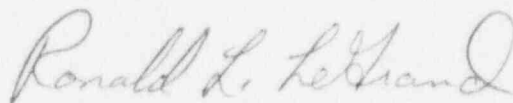
June 16, 1997
NPD1VPO:0701

*Beaver Valley Power Station, Unit No. 1
Docket No. 50-334 License No. DPR-66
LER 97-012-00*

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 97-012-00, 10 CFR 50.73(a)(2)(i), "Technical Specification 3.0.3 Entry Due to Two Analog Rod Position Indicator Channels Inoperable."



R. L. LeGrand

JEH/ds

Attachment



9706250116 970616
PDR ADOCK 05000334
S PDR



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EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), 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.

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1) Beaver Valley Power Station Unit 1	DOCKET NUMBER (2) 05000334	PAGE (3) 1 OF 4
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TITLE
Technical Specification 3.0.3 Entry Due to Two Analog Rod Position Indicator Channels Inoperable

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
05	15	97	97	012	00	06	16	97		
OPERATING MODE (9)		1	20.402(b)			20.405(c)			50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)		100	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
			20.405(a)(1)(iii)		X	50.73(a)(2)(i)			50.73(a)(2)(viii)(A)	(Specify in abstract below and in Text
			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)	NRC Form 366A)

LICENSEE CONTACT FOR THIS LER (12)

NAME R. L. LeGrand, Vice President Nuclear Operations and Plant Manager	TELEPHONE NUMBER (include Area Code) (412) 393-7622
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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

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 (Limited to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On May 15, 1997, while performing testing involving the movement of control rods, control bank D rods H-02 and P-08 were observed per the Analog Rod Position Indication (ARPI) system to be reading outside the ± 12 step allowable band (as compared to the group demand counter values) authorized by Technical Specifications (TSs) 3.1.3.1 and 3.1.3.2. In accordance with action statements, ARPI primary voltages for these two rods were then obtained. These also indicated that the two control rods were outside the ± 12 step allowable band. Technical Specification 3.1.3.1 b was entered at 1205. At 1330, when the movable incore flux map determined the rods were aligned correctly, TS 3.1.3.2 c was entered as of 1205. TS 3.1.3.2 c.1.f requires entry into TS 3.0.3 when 2 or more ARPIs are inoperable.

As an immediate corrective action, Abnormal Operating Procedure 1.1.7 (entitled Rod Position Indication Malfunction) was entered, and movable incore flux mapping and quadrant power tilt ratio manual calculations were performed. These actions indirectly verified that the control rods were in their expected positions. A Basis for Continued Operation (BCO) was prepared to evaluate the reliability of the ARPI system. The BCO concluded that the ARPI system is operable, with a high level of confidence that important to safety functions can be performed. Compensatory measures recommended by the BCO have been put in place and are adopted as corrective actions.

This event is reportable in accordance with 10 CFR 50.73 (a) (2) (i) (b), condition or operation prohibited by Technical Specifications.

The cause of this event is calibration drift of the ARPI system due to an existing detector anomaly associated with rod H-02 position indication in combination with design limitations. A modification to upgrade the ARPI system will be completed during the upcoming Unit 1 Refueling Outage, and is expected to improve performance.

Based upon the fact that control rods H-02 and P-08 were in their expected position, there is no safety consequence to this event. The health and safety of the public were not affected.

LICENSEE EVENT REPORT (LER)**TEXT CONTINUATION**

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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

Control Rod Drive Position Indication System {AA/ZI}*

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

IDENTIFICATION OF OCCURRENCE

Discovery Date: May 15, 1997

CONDITIONS PRIOR TO OCCURRENCE

Unit 1: Mode 1, 100% Reactor Power

Unit 2: Mode 1, 100% Reactor Power

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

DESCRIPTION OF EVENT

On May 15, 1997, with Unit 1 operating in Mode 1 at 100% power, Operators were performing Reactor Surveillance Tests 2.3 (Nuclear Power Range Calibration) and 3.2 (Incore Moveable Detector Flux Mapping). This requires the movement of control rods and subsequent dilutions and borations to change flux levels in the core while maintaining stable thermal power output. Rods were inserted in three separate stages in order to obtain various target flux values. At 1200, after the final rod insertion to a demand value of 206 steps, readings for control rod positions were taken utilizing the Analog Rod Position Indication (ARPI) system. During 1200 readings in control bank D, rod H-02 was found to be indicating at 227 steps and rod P-08 at 219 steps. Group demand counters at this time were reading 206 steps. Using these observed ARPI and group demand counter values, control rods H-02 and P-08 showed misalignments of 21 steps and 13 steps, respectively. These values are outside of the ± 12 step band centered on the group demand counter value allowed in Technical Specification (TS) Limiting Condition for Operation (LCO) 3.1.3.1 for movable control assemblies. Abnormal Operating Procedure 1.1.7 entitled Rod Position Indication Malfunction was entered, and ARPI primary coil voltage readings were obtained for rods H-02 and P-08 at 1208. Rod H-02 voltage was measured at 25.05 V and P-08 at 24.85 V. These voltages indicated that both rods were at 228 steps. TS LCO 3.1.3.1 b was entered at 1205. At 1230, the NSS requested Reactor Engineering to determine indirectly the positions of these two rods by performing a movable incore flux map. This was satisfactorily completed at 1330 and TS LCO 3.1.3.1 b was exited. TS LCO 3.1.3.2.c was entered as of 1205. TS 3.1.3.2.c.1.f requires entry into TS 3.0.3 when 2 or more ARPIS are inoperable.

At 1330, rod P-08 ARPI indication read 217 steps with a group demand counter indication at 208. Because this indicated misalignment was less than 12 steps, the rod position indication system for P-08 was declared operable and TS 3.0.3 was exited. At 1420, operators started restoring rods to their full out position. At 1435, rod H-02 ARPI read within 12 steps of the group demand counter, and TS 3.1.3.2.c was exited.

On May 16, 1997, the Nuclear Safety Review Board (NSRB) reviewed this and three previous other events where rod H-02 indication drifted beyond the 12 step limit and recommended to the Division Vice President-Nuclear Operations that rod H-02 be declared inoperable. He concurred and Technical Specification 3.1.3.2.c action was re-entered and is currently in effect.

LICENSEE EVENT REPORT (LER)**TEXT CONTINUATION**

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

CAUSE OF EVENT

The cause of this event is calibration drift of the ARPI system due to an existing detector anomaly associated with rod H-02 position indication in combination with design limitations described in the analysis section below. Sources of system inaccuracies which may change in response to changing external conditions (such as reactor power or control rod position) can result in unpredictable rod position indication drift.

ANALYSIS

Efforts to correct problems associated with rod position indication have been made in both the technical and administrative areas:

Technical - Changes to the operation and calibration of the system were attempted to try to improve system accuracy. The development of non-linear meter scales to account for ARPI detector non-linearity and the development of primary voltage curves to provide back-up indication were also completed. These have not been entirely successful.

Administrative - A number of TS changes have been initiated. One change, to permit a tolerance of ± 16 steps (vice ± 12) was tested during Cycle 2. Although promising, it was not approved as a permanent change.

The major sources impacting ARPI accuracy have been identified. These are: 1) detector non-linearity; 2) detector temperature effects originating from various sources such as changes in drive shaft (i.e. rod) position, ambient temperature changes around the detectors, and plant power level; 3) detector magnetic interaction effects originating from various sources such as adjacent detector coil stack crosstalk, magnetic interactions while stepping rods, and possible permeability differences in drive shaft materials; 4) Changes in system power supply parameters, and 5) electronic and meter calibration drift. The above effects have been considered during design of a Beaver Valley Unit 1 ARPI system upgrade included as a future corrective action.

CORRECTIVE ACTIONS**COMPLETED:**

1. As an immediate corrective action, Abnormal Operating Procedure 1.1.7 (entitled 'Rod Position Indication Malfunction') was entered, and incore movable flux mapping and quadrant power tilt ratio manual calculations were performed. This indirectly verified that control rods were in their expected positions.
2. Control rod H-02 rod position indication system channel was calibrated per procedure 1MSP-1.21-I. on May 16, 1997.
3. Control rod H-02 was declared inoperable on May 16, 1997, following NSRB review.
4. A Basis for Continued Operation (BCO) was written to evaluate the reliability of the ARPI system to indicate rod position. The conclusion reached was that the ARPI system is operable, with a high level of confidence that important to safety functions can be performed. Compensatory actions developed as part of the BCO process have been put in place as described in other corrective actions to this LER.

LICENSEE EVENT REPORT (LER)

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

5. Operations personnel have received guidelines per Night Order dated May 23, 1997 on how to monitor and respond to ARPI functions until future corrective actions are completed.

FUTURE:

6. The ARPI detector for rod H-02 will be repaired or replaced during the upcoming Unit 1 Refueling Outage.
7. An upgrade to the ARPI system to improve system reliability will be completed during the upcoming Unit 1 Refueling Outage.

REPORTABILITY

This event is reportable in accordance with 10 CFR 50.73 (a) (2) (i) (B), condition or operation prohibited by Technical Specifications

SAFETY IMPLICATIONS

Based upon the fact that control rods H-02 and P-08 were in their expected position, there is no safety consequence to this event. The health and safety of the public were not affected.

PREVIOUS SIMILAR EVENTS

A review of LERs for Beaver Valley Unit 1 did not identify any similar occurrences within the last two years. Beaver Valley Unit 2 utilizes a rod position indication system of a different design.