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May 20, 1991
ND3MNO:3136

Beaver Valley Power Station, Unit No. 2
Docket No. 50-412, License No. NPF-73
LER 91-001-00

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

Gentlemen:

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

LER 91-001-00, 10 CFR 50.73.a.2.i.B, "Inoperable Rod
Deviation Alarm".

Very truly yours,

T. P. Noonan
General Manager
Nuclear Operations

DC/sl

Attachment

IE 22
1/1

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U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Beaver Valley Power Station Unit 2	0 5 0 0 0 4 1 2	1 OF 0 5

TITLE (4)

Inoperable Control Rod Position Deviation Alarm

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)
									N/A	0 5 0 0 0
0 4	2 0	9 1	9 1	0 0 1	0 0	0 5	2 0	9 1		0 5 0 0 0

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
		20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)	1 0 0	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) X	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	
		AREA CODE
T. P. Noonan, General Manager Nuclear Operations		4 1 2 6 4 3 — 1 2 5 8

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
A	I D	X X X X	X X X X	N						

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)

On 4/20/91, after inserting control rods 14 steps to support reactor engineering, the operators noted the computer point for average control rod position disagreed with the point that summed total rod steps by more than the allowed 12 steps. This should have activated the rod position deviation alarm, but no alarm had occurred. The computer engineer was consulted and determined that the computer's rod position deviation alarm had been bypassed, preventing the alarm from annunciating. Further investigation determined that the alarm had inadvertently been bypassed on 4/12/91 during a computer cold start/reboot sequence. On that date, the computer engineer performing the reboot, reinitiated the reboot procedure before the initial startup sequence was complete. By terminating the first startup prior to completion, the alarm bypass was activated and not restored by the second reboot. The station has modified the computer software to provide an alarm to the reactor operator whenever this or similar points are bypassed. All personnel in the computer group are being trained on the potential effects of terminating a computer startup prior to its completion. Review of the manual operator rod position logs show that no rod position deviation had occurred while the rod deviation alarm was inoperable.

NRC FORM 366A
(6-89)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

APPROVED OMB NO. 3150-0104
EXPIRES 4/30/92

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS
INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD
COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS
AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR
REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO
THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE
OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
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Beaver Valley Power Station Unit 2	0 5 0 0 0 4 1 2	9 1	— 0 0 1	— 0 0	0 2 OF 0 5

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

Description of Event

On 4/20/91, an operator performing a routine observation of the plant computer noted a condition that apparently should have resulted in a control room alarm. The computer point for control rod demand position, as determined by tracking the rod control system step pulses, showed a demand position for the Bank D control rods of 214 steps. However, the computer point that monitored the actual control rod position, as determined by the average of the digital rod position indicators (DRPI), showed an actual Bank D position of 228 steps. The 14 step difference between actual and demand positions should have activated the computer generated rod position deviation alarm, which has a setpoint of a 12 step difference. No such alarm had occurred. The Nuclear Shift Supervisor was notified and the rod position deviation alarm was declared inoperable.

Cause of Event

Initial investigation by the computer engineer determined that the computer software bypass flag had been set to "ON" for rod position deviation alarm. With this bypass flag set to "ON", the computer will not initiate a rod position deviation alarm or update the value of the average of the digital rod position indicators.

A surveillance test is performed on this alarm on a monthly frequency. The most recent test had been performed successfully on 3/26/91. On 4/20/91, operators attempted the test with the bypass flag set to "ON" and confirmed that it could not be completed satisfactorily with the bypass flag "ON". This verified that the bypass flag had not been set to "ON" as of 3/26/91.

Further investigation determined that the bypass flag had inadvertently been set to "ON" during a computer cold start/reboot sequence on 4/12/91. On that date, the computer engineer performing the reboot omitted a step in the startup sequence. While the startup was still in progress, the engineer noted his error and terminated the startup. He then reperformed the startup sequence correctly and rebooted the computer.

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

During a computer startup, the software automatically sets several bypass flags to "ON". This is to prevent nuisance alarms during a computer restart. During such a restart, computer generated data is inaccurate and does not reflect actual plant conditions. Thus any alarms generated during this period would be meaningless. At the end of the restart process, the bypass flags are normally reset to "OFF" and their associated alarms are returned to service. The only exception to this bypass reset is if a bypass flag had been set to "ON" prior to initiating a restart. If a bypass flag is "ON" prior to a restart being initiated, the restart sequence will not automatically reset it to "OFF". This provision allows the computer operator to manually bypass alarms that are non-functional due inoperable equipment or other plant conditions.

On 4/12/91, the computer engineer initiated the first restart. This restart set the rod position deviation alarm bypass flag to "ON". Before the restart sequence progressed to the point where the bypass flag was reset to "OFF", the engineer terminated the sequence and initiated a second restart sequence. Since when the second restart sequence was initiated, the rod position deviation alarm bypass flag was "ON", the bypass flag was not reset to "OFF" at the conclusion of the restart sequence, but was left "ON".

This event was not due to an error by the computer engineer. The above described manipulations of the bypass flags by the computer software during computer startup were not known to either computer or operations personnel prior to this event. Although the function of the bypass flags is identified in the computer documentation, the set/reset sequence of the bypass flags during startup is not described. This sequence was discovered through a line by line search of the program assembly language code, conducted in response to this event.

This event was not immediately discovered on 4/12/91 as the involved computer points are not required to be monitored by plant personnel on a regular frequency. Additionally, when the bypass flag is set to "ON", its associated computer point that displays the calculated average of the digital rod position indicators is out of service and not automatically updated. During the computer restart when the bypass flag was set "ON" on 4/12/91, this point was set to a default of 228 steps, which corresponds to all rods being fully withdrawn. During steady

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(6-89)

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state power operations, the station normally maintains the rods at or near the fully withdrawn position. This was the case for the majority of the interval from 4/12/91 until 4/20/91. Any operator that had observed the computer points during this time would not have noted a discrepancy because the rod demand position computer point (from the rod control step pulser) would have agreed with the indicated rod position computer point (from I R I). At the time of discovery, the control rods had been inserted to 214 steps to change the flux distribution to support normal testing by the reactor engineering.

Previous Similar Events

There have been no previous events to this type at Unit 2. Unit 1 LER's 90-006 and 90-020 involved events where the computer calculated Axial Flux Difference Monitor was inoperable due to computer failures. Also Unit 1 LER 91-001 involved an event where the Axial Flux Difference Monitor was inoperable due to an I&C technician failing to return a computer point to service after maintenance.

Corrective Actions

1) In accordance with Technical Specifications requirements, operators initiated manual logging of control rod positions once per four hours. After the bypass flag was reset to "OFF" and the alarm verified to be operable, the operators returned to their normal once per eight hour logging of rod positions.

2) The computer software has been modified to provide visual alarms in the control room whenever the rod position deviation alarm or similar computer generated alarms are bypassed.

3) The plant computer documentation is being revised to describe the manipulation of the bypass flags during the computer startup sequence.

4) All computer group personnel assigned to the plant computer system are being trained on the potential effects of terminating a computer startup prior to completion.

Additionally, a description of this event has been placed on the INPO Nuclear Network system. This will serve to alert other plants to the potential for failures of this type.

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Reportability

As the rod position deviation alarm was found to have been
inoperable from 4/12/91 until 4/20/91 without any compensatory
actions (ie. increased frequency of manual logging) being taken
in that period, this event is being reported under
10CFR50.73.a.2.i.B as a condition prohibited by Technical
Specifications.

Safety Implications

There were no safety implications due to this event. With the
rod position deviation alarm inoperable, Technical Specifications
require the operators to increase their frequency of manual
logging of rod positions from their normal rate of once per eight
hours to once per four hours. A review of the manual logs for
the period when the rod position deviation alarm was bypassed
verified that no rod position deviation occurred during this
interval. The apparent rod position deviation that initiated
this event (ie. computer points for actual and demand rod
positions mismatching) was a result of the bypass flag being set
to "ON". With this flag set to "ON", the subroutine that
calculates the average of the digital rod position indicators
(DRPI) is blocked. This causes that point to be inaccurate. At
the time of the event, operators verified that the actual DRPI
indicators agreed with the demand position. Besides the rod
position deviation alarm, the operators have several other
indications of rod position available to them. The digital rod
position indication system includes a large graphical display of
the position of the control rods. This display is in the center
of the main vertical board in the control room and is visible and
readable from all locations in the operating area. The nuclear
instrumentation system also provides alarms for abnormal flux
distribution or high flux rate of change that would indicate a
mis-positioned or dropped rod.

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