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NRC-91-135

10 CFR 50.73

November 27, 1991

U.S. NUCLEAR REGULATORY COMMISSION
Document Control Desk
Mail Station P1-137
Washington, DC 20555

Gentlemen:

DOCKET 50-266
LICENSEE EVENT REPORT 91-014-00
NUCLEAR INSTRUMENTATION TURBINE RUNBACK CAUSED
BY A VOLTAGE SPIKE ON POWER RANGE CHANNEL N44
POINT BEACH NUCLEAR PLANT, UNIT 1

Enclosed is Licensee Event Report 91-014-00 for Point Beach Nuclear Plant, Unit 1. This report is provided in accordance with 10 CFR 50.73(a)(2)(iv), "Any event or condition that resulted in a manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor Protection System (RPS)." This report describes a turbine runback on November 3, 1991, that was caused by a voltage spike on Power Range Nuclear Instrumentation Channel N44.

Please contact us if there are any questions.

Very truly yours,

James J. Zach
Vice President
Nuclear Power

Enclosure

Copies to NRC Regional Administrator, Region III
NRC Resident Inspector

NRC FORM 366 (6-89) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

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)	PAGE (3)
Point Beach Nuclear Plant, Unit 1	0 5 0 0 0 2 6 6	1 OF 0 4

TITLE (4): Nuclear Instrumentation Turbine Runback Caused by a Voltage Spike on Power Range Channel N44

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 1	0 3	9 1	9 1	- 0 1 4	- 0 0	1 1	2 7	9 1		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
N		20.402(b)	20.405(c)	X 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)	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
John A. Palmer - Manager, Instrument and Control	AREA CODE 4 1 4 7 5 5 - 2 3 2 1

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)		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)

ABSTRACT

At 1140 on November 3, 1991, while Unit 1 was operating at 100% power, a 20% runback of the turbine generator occurred. This runback was caused by an output transient on Power Range Nuclear Instrumentation Channel N44. The Reactor Protection System sensed a dropped control rod and initiated the turbine runback. Following the runback, the load increase was commenced at 1145. Full power was attained at 1228.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

EVENT DESCRIPTION

At 1140 on November 3, 1991, while Unit 1 was operating at 100% power, a 20% runback of the turbine generator occurred because of a positive voltage spike on Power Range Nuclear Instrumentation Channel N44. The channel's dropped rod circuitry sensed the subsequent decrease of voltage to normal levels and interpreted it as a power decrease of ≥2.5% in less than five seconds. This activated the dropped rod circuitry, initiating the turbine runback. The positive voltage spike was sensed at the outputs of both the A and B detectors of channel N44.

After the runback, channel N44 was placed in rod stop bypass. This removes the turbine runback feature from that power range channel while allowing the channel to remain in operation, providing indication and input to the Reactor Protection System. At 1145, the load increase was commenced, with full power being achieved at 1228. A four-hour NRC red phone notification, as required by 10 CFR 50.72(b)(2)(ii), was made at 1206, and the NRC Resident Inspector was informed.

Instrument and Control has been monitoring the outputs from detectors A and B, the positive 25 volt power supply, and the negative 25 volt power supply since the runback took place. On November 5, 1991, another positive voltage spike was detected on the outputs of both the A and B detectors. Concurrent with this voltage spike, the output of the negative 25 volt circuit momentarily failed low. This suggests that a problem exists with the negative 25 volt circuit.

Thorough inspections of the circuit wiring and circuit cards have been performed. A search for electrical grounds within the circuit has also been performed. These inspections revealed no problems.

Since no other problems were detected in the inspections of the circuit, we believe the negative 25 volt power supply may be the potential source of the problem. This power supply was replaced on November 7, 1991. The power supply removed from the system has subsequently been artificially loaded and monitored in the Instrumentation and Control shop. No further voltage spikes have been detected on any of the equipment being monitored.

COMPONENT AND SYSTEM DESCRIPTION

The Nuclear Instrumentation System, manufactured by Westinghouse, consists of four power range channels designated N41 through N44. Each channel has a dual section uncompensated ion chamber to monitor neutron flux in its associated quadrant of the core. This dual section configuration produces two separate detector signals. The "A" signal is proportional to the power generated in the upper half of the core, and the "B" signal is proportional to the power generated in the lower half of the core. These two detector signals are combined at the summing junction of the summing and level amplifier to produce an output DC

voltage from 0 to 10 volts that is proportional to the power generated in the reactor core from 0 to 120% power. This voltage is used to provide level trip signals for reactor protection, alarms to warn of abnormal conditions, and signals for remote recording, indicating, and computing equipment.

The dropped rod (negative rate) circuit is one circuit that receives the voltage output from the summing and level amplifier. If this circuit senses a power decrease of $\geq$2.5% in less than five seconds, it will generate a signal that will trip the dropped rod bistable. Tripping of this bistable in any one of four power range channels will cause a turbine runback to take place. This bistable must be manually reset after it has tripped.

A turbine runback is accomplished by two different methods. The first method is the load reference runback. When the signal is received from the dropped rod circuit, the turbine load reference is decreased at a rate of 200% per minute for six seconds (a 20% turbine runback). The second method is the load limit runback. This runback is identical in its operation to the load reference runback, except that it is also interlocked with turbine first stage pressure. This interlock will limit the runback, ensuring it stops at 80% of turbine full load.

CAUSE AND CORRECTIVE ACTIONS

The cause of the runback has been determined to be a positive voltage spike on the output of both the "A" and "B" detectors of channel N44, followed by its subsequent return to normal levels. This return to normal levels occurred at a rate that exceeded $\geq$2.5% in less than five seconds. This generated the rod drop signal which resulted in the turbine runback.

The voltage spike that occurred on November 5, 1991 and the subsequent troubleshooting suggest that the negative 25 volt power supply may be the source of the voltage spiking. Since it has been replaced, no voltage spikes have been observed on channel N44.

In an attempt to confirm that the original negative 25 volt power supply was the source of the problem, it has been hooked up to an artificial load and is being monitored. There have been no abnormalities observed.

REPORTABILITY

This Licensee Event Report is being filed in accordance with 10 CFR 50.73(a)(2)(iv), "Any event or condition that resulted in the manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor Protection System (RPS)." The four-hour notification was made to the NRC in accordance with 10 CFR 50.72(b)(2)(ii), and the NRC Resident Inspector was informed.

SAFETY ASSESSMENT

There were no safety consequences from this event. All plant systems functioned and responded as designed. The health and safety of plant personnel and the public were not endangered.

SIMILAR OCCURRENCES

A review of Licensee Event Reports was performed. The following events were all caused by voltage spikes on a power range channel associated with Unit 1:

LER	UNIT	CAUSE OF THE TURBINE RUNBACK
85-006-00	1	Voltage spike on power range channel, N41
90-006-00	1	Voltage spike on power range channel, N43
91-009-00	1	Voltage spike on power range channel, N44
91-011-00	1	Voltage spike on power range channel, N41
91-013-00	1	Voltage spike on power range channel, N44

The corrective actions in response to LER 91-013-00 resulted in the replacement of the channel N44 detector and its high-voltage power supply. This action was taken because N44's detector, prior to its replacement, was an older generation detector. Conversations with Westinghouse, the manufacturer of the detectors, revealed that this older generation of detectors was susceptible to premature failure with the first sign of impending failure being voltage spiking at the detector output.

The detector for channel N44 was replaced on October 26, 1991, because of its recent history of voltage spiking. LER 91-009-00 discusses an event that occurred on August 27, 1991. This event was seen as the precursor to the event discussed in LER 91-013-00 which occurred on October 3, 1991. The events discussed in this Licensee Event Report suggest that the older generation detector may have been only a part of the overall problem. Unit 1 still has one of the older generation detectors installed and Unit 2 has two of the older generation of detectors installed.