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The Northeast Utilities System

Ted C. Feigenbaum
Senior Vice President &
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December 28, 1994

United States Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

Reference: Facility Operating License No. NPF-86, Docket No. 50-443

Subject: Licensee Event Report (LER) No. 94-018-00: "Missed Technical Specification Surveillance Requirements"

Gentlemen:

Enclosed please find Licensee Event Report (LER) No. 94-018-00 for Seabrook Station. This submittal documents an event which was identified on November 28, 1994. This event is being reported pursuant to 10CFR50.73(a)(2)(i).

Should you require further information regarding this matter, please contact Mr. James M. Peschel, Regulatory Compliance Manager, at (603) 474-9521, extension 3772.

Very truly yours,

Ted C. Feigenbaum

TCF:JRM/act

Enclosures: NRC Forms 366, 366A

JE22

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NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

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)	DOCKET NUMBER (2)	PAGE (3)
Seabrook Station	05000443	1 OF 5

TITLE (4)
MISSED TECHNICAL SPECIFICATION SURVEILLANCE REQUIREMENT

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
11	28	94	94	-- 018 --	00	12	28	94		05000
									FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)	100		20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)
			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, NRC Form 366A)
			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 (Include Area Code)
Mr. James M. Peschel, Regulatory Compliance Mngr.	(603)474-9521 ext. 3772

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 15 single-spaced typewritten lines) (16)

On November 28, 1994 at approximately 1600 hours, part of the Main Plant Computer System (MPCS)[ID] experienced a power loss that caused the Rod Deviation Monitor to become inoperable.

The Rod Deviation Monitor is a MPCS software program that is used to compare the rod position demanded by the Rod Control System to the rod position detected by the Digital Rod Position Indication (DRPI) system.

Technical Specification 3.1.3.1 Limiting Condition for Operation requires that demanded rod position be in agreement with detected rod position within + or - 12 steps. The surveillance requirement that verifies this condition is normally performed every 12 hours, however, if the Rod Deviation Monitor is inoperable the surveillance must be performed every 4 hours.

When the aforementioned power loss occurred, the MPCS assigned the shutdown rod position data as "unreliable" and a "Rod Deviation Monitor Inoperable" alarm was received on the Video Alarm System (VAS)in the main control room. Operators did not immediately recognize that receipt of this alarm necessitated the initiation of the 4 hour surveillance. The 12 hour surveillance continued until 1030 hours on November 29, 1994, at which time the 4 hour surveillance was initiated.

Since a period of time exceeding the 4 hour surveillance requirement elapsed while the Rod Deviation Monitor was inoperable, a condition prohibited by Technical Specifications existed.

There were no adverse safety consequences associated with this event. During the period of time where the 4 hour surveillance was missed, there was no call for rod motion. In addition positive indication of rod position remained available while the Rod Deviation Monitor was inoperable.

Two causes of the event have been determined; the lack of an alarm response procedure for the "Rod Deviation Monitor Inoperable" alarm, and the misunderstanding of rod position data as presented by the MPCS.

I. Background

Reactor power is controlled through the movement of neutron absorbing control and shutdown rods. Rods are withdrawn from the reactor core to increase power and are inserted into the reactor core to decrease power.

Rod movement is achieved using electro-magnetic jacking devices called Control Rod Drive Mechanisms (CRDM). These mechanisms are located on top of the reactor vessel head and include a pressure boundary housing; electro-magnetic coils, mechanical latch assemblies, and a grooved drive rod.

Each CRDM drive rod is connected to a series of individual neutron absorbing rods that have been mechanically ganged together to form rod clusters. These rod clusters are located in selected fuel bundles within the reactor core and are arranged into "banks" so that reactivity changes across the core will be uniform whenever rods are moved. The shutdown rods and control rods are both arranged into banks.

If rod movement is called for, the Rod Control System sends a programmed sequence of electrical currents to the CRDM coils. When energized in the proper sequence, these coils cause the mechanical latches to engage and move the drive rod either up or down inside the pressure boundary housing in 5/8" incremental "steps". A series of rod step counters located on the main control board record each time the Rod Control System demands rod movement.

The position of the drive rod inside the CRDM pressure housing is detected by the Digital Rod Position Indication (DRPI) system. This system uses a series of stacked coils arranged concentrically around the CRDM pressure housing. As the drive rod moves up and down within the housing it penetrates and changes the magnetic fields of the stacked coils. When the magnetic fields change, the associated electric currents of those coils also change and rod position can be determined. The DRPI system includes a main control board display unit that provides operators with **detected** rod position information that is accurate within + or - 4 steps.

The CRDMs are considered to be highly reliable components in effecting rod movement, however, there is the potential that the Rod Control System could call for rod motion but the CRDM does not respond properly and rod motion does not occur. Such circumstances result in a disagreement between demanded rod position and actual rod position. Any such differences can be detected by comparing the indications of the rod step counters to the indications of the DRPI display unit. In addition, the plant computer is programmed to identify rod position disagreements.

II. Event Description

On November 28, 1994 at approximately 1600 hours while plant workers were restoring an electrical distribution panel cover, a circuit breaker that feeds part of the MPCS was inadvertently opened. Five of the plant's ten Intelligent Remote Termination Units (IRTU) were affected by the power interruption.

An IRTU is a component of the MPCS [ID] that functions to receive, condition, and store data obtained from plant systems. IRTUs transform data received in diverse electrical form such as voltage, resistance, or pulse, into binary form that is suitable for use by the main plant "host" computers.

IRTU #1, processes all detected shutdown and control rod bank position information supplied by the DRPI system. Demand position supplied by the Rod Control System is processed by IRTUs #2 (shutdown banks) and #3 (control banks). The above mentioned power loss only affected the even numbered IRTUs, i.e. #2,4,6, 8, and 10.

The shutdown bank rod position information that is supplied by the Rod Control System to IRTU #2 is in the form of electrical pulses. A single pulse is provided for each 5/8" step demand for rod motion. Electronic counters inside these IRTUs count the pulses and maintain a history of every call for rod motion. The counter information is used by the host computers to calculate the **demanded** rod position for all rod banks.

The host computers use the calculated **demanded** rod position information obtained from the Rod Control System in conjunction with the **detected** rod position information obtained from the DRPI system in a software program referred to as the "Rod Deviation Monitor". The Rod Deviation Monitor compares the two sets of rod position information and activates an alarm if there is disagreement of more than + or - 12 steps.

When a power loss is experienced by an IRTU as was the case in this event, data stored by that IRTU is lost and communication with the host computers is prevented. The host computers respond to this condition by assigning an "unreliable" quality code to the data last received from the affected IRTU. If the affected IRTU is one that provides data to the Rod Deviation Monitor, a VAS alarm point "Rod Deviation Monitor Inoperable" (B6744) will be activated.

When power was restored to IRTU #2, all data processed by the IRTU, except for the shutdown banks rod position data, returned to a reliable status. The existing design of the MPCS rod demand caused shutdown rod bank position to remain unreliable when power was restored to IRTU #2. Thus, the "Rod Deviation Monitor Inoperable" alarm remained in the alarm condition.

Technical Specification Limiting Condition for Operation 3.1.3.1 requires the following:

> All full-length shutdown and control rods shall be OPERABLE and positioned within $\pm$ 12 steps (indicated position) of their group step counter demand position.

Technical Specification Surveillance Requirement 4.1.3.1.1 states:

> The position of each full-length rod shall be determined to be within the group demand limit by verifying the individual rod positions at least once per 12 hours, except during times when the rod position deviation monitor is inoperable; then verify the group positions at least once per 4 hours.

The surveillance requirement is satisfied by a control room operator recording the main control board rod step counters indications and the DRPI display indications.

Prior to the power interruption to IRTU #2, the surveillance was being performed every 12 hours as required. When alarm B6744 was activated signifying that the Rod Deviation Monitor was inoperable, the surveillance should have been performed on the 4 hour frequency. However, operators did not take immediate action to initiate the augmented surveillance for two reasons. First the alarm did not have an associated response procedure available to direct operators to perform the 4 hour surveillance and second, the validity of this alarm came under question.

Without the guidance of an alarm response procedure, operators sought verification of the alarm prior to taking what might have been unnecessary action. When a MPCS display containing relevant rod position data was called up for review, confusing information was observed. For example, the shutdown rod bank position indications were as expected (fully withdrawn at 230 steps) but this data was assigned an unreliable quality code of NCAL (not calculated). The control rod bank position indications were also as expected but unlike the shutdown bank positions, this data was assigned a reliable quality code. The MPCS calculated value for the deviation between rods in the same bank was as expected and designated as reliable, and, the associated Rod Deviation MPCS alarm was not activated. In addition, this same MPCS display showed both the "Rod Deviation Monitor Inoperable" alarm and the non-TS related "Rod Insertion Limit Monitor Inoperable" alarm as being in the alarm state. This RIL alarm was known to have had a previous history of unreliability.

In addition to checking rod position data provided by the MPCS, operators checked and compared the indications of the DRPI display and the rod step counters and verified them to be in agreement within the + or - 12 step TS requirement. The "Rod Deviation" alarm that is generated by the DRPI system whenever rods within a bank become misaligned from one another by more than 12 steps, was also checked and was found not to be in the alarm condition.

Recent computer software problems experienced since the replacement of the MPCS hardware during the station's third refueling outage coupled with the conflicting rod position information obtained from the MPCS and that observed on the DRPI display and rod step counters led operators to conclude that the "Rod Deviation Monitor Inoperable" alarm was not valid and therefore the increased rod position surveillance frequency was not warranted.

Some existing uncertainty regarding the definition of "Rod Deviation Monitor" also influenced the operators decision not to initiate the 4 hour surveillance. Operators were aware of three separate alarms that contained the words "Rod Deviation" but TS surveillance requirement 4.1.3.1.1 referred to a "rod *position* deviation monitor". The word *position* was not associated with any of these alarms and therefore, additional doubt was cast over the receipt of alarm B6744 necessitating the start of the augmented surveillance.

The 12 hour surveillance continued until a further investigation into the cause of the alarm proved it to be valid. Operations initiated the 4 hour surveillance on November 29, 1994 at approximately 1030. The augmented surveillance continued until the alarm was cleared by the Computer Engineering department at approximately 1630 of the same day.

The MPCS software was then reprogrammed such that future IRTU power interruptions will not result in the presentation of similar "unreliable" rod position data.

III. Safety Consequences

There were no safety consequences associated with this event. The interruption of power to IRTU #2 caused the host computer calculated **demanded** rod position for shutdown banks to become unreliable. However, there was no call for shutdown rod bank movement during the entire event and therefore, no deviation between **demanded** and **detected** rod position occurred.

IV. Cause of the Event

Two causes of the event have been determined:

1. The lack of an alarm response procedure associated with the "Rod Deviation Monitor Inoperable" alarm point B6744.

2. The rod position data as presented to operators by the MPCS allowed for a misinterpretation of alarm validity.

V. Corrective Actions

The following corrective actions have been or will be taken:

1. An alarm response procedure will be developed for the "Rod Deviation Monitor Inoperable" alarm. The procedure will contain proper instructions for operators regarding the initiation of the 4 hour rod position surveillance requirement.

2. Clarifying definitions of "Rod Deviation Monitor" and other like "Monitors" referenced in Technical Specifications will be developed.

3. A review of all alarm points will be made to see if there are other VAS alarm points that do not have an alarm response procedure available.

4. MPCS software enhancements will be implemented so that misleading or confusing rod position information will not be presented to operators when data is not reliable.

VI. Plant Conditions

The plant was in Mode 1 at 100% power when the missed Technical Specification surveillance requirement was missed.

VII. Previous Occurrences

This is the first reportable event at Seabrook Station involving a missed surveillance of rod position.