NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

# LICENSEE EVENT REPORT (LER)

| FACILITY NAME (1) | DOCKET NUMBER (2) | PAGE (3) |
|---|---|---|
| SEABROOK STATION | 0 5 0 0 0 4 4 3 | 1 OF 0 4 |

TITLE (4)

Delta T/Tavg Protection Channel Operational Test

| 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) |
| 0 9 | 1 6 | 9 2 | 9 2 | — 0 1 9 | — 0 1 | 0 1 | 1 1 | 9 3 | | 0 5 0 0 0 |
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THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)

| OPERATING MODE (9) | | | | | | | |
|---|---|---|---|---|---|---|---|
| 6 | 20.402(b) | 20.405(c) | 50.73(a)(2)(iv) | 73.71(b) |
| POWER LEVEL (10) | 20.405(a)(1)(i) | 50.36(c)(1) | 50.73(a)(2)(v) | 73.71(c) |
| 1 0 | 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 |
|---|---|
| Mr. James M. Peschel, Regulatory Compliance Manager, ext. 3772 | AREA CODE 6 0 3 4 7 4 1 - 9 5 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)


On September 16, 1992, North Atlantic Energy Service Corporation (North Atlantic) determined that the existing method for performing the required Analog Channel Operational Test (ACOT) of the Loop Delta Temperature/Average Loop Temperature Protection Channels [JC] was not adequate. During subsequent review it was determined that the ACOT of the Wide Range Reactor Coolant Temperature Channels also was not adequate. The NRA card, which converts the ohmic value from the Reactor Coolant System resistance temperature detectors (RTDs) to a proportional voltage, in each of the four channels has not been included in the ACOTs. A simulated signal, using a decade box, was injected as close to the RTDs as practical as is required by Technical Specifications. However, the decade box was adjusted to verify trip bistable setpoints were within tolerance without comparing the ohmic value of the decade box with the output voltage of the NRA card to ensure the NRA card drift was within an acceptable tolerance.

There are three Seabrook Station Technical Specifications which are affected by this event. Technical Specification Surveillance Requirement 4.3.1.1 requires, in part, that an ACOT be performed on the Overtemperature ΔT and the Overpower ΔT channels at least once every quarter on a staggered test basis while in Modes 1 and 2. Technical Specification Surveillance Requirement 4.3.2.1 requires, in part that an ACOT be performed on the feedwater isolation on low Tavg coincident with a reactor trip channels at least once per month while in Modes 1 and 2. Technical Specification Surveillance Requirement 4.4.9.3.1 requires, in part, that an ACOT be performed on the power operated relief valve (PORV) actuation channels at least once every 31 days when the PORVs are used for overpressure protection. Successful performance of these surveillances demonstrates the OPERABILITY of the associated instrumentation, interlocks, and automatic trip logics.

North Atlantic has determined that there were no adverse safety consequences as a result of this event.

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

## DESCRIPTION OF EVENT

On September 16, 1992 North Atlantic personnel determined that the Station Procedures for performing the Analog Channel Operational Tests (ACOTs) on the ΔT/Tavg Protection Channels did not adequately test the complete loop. The Technical Specification definition of an Analog Channel Operational Test is as follows:

> An ANALOG CHANNEL OPERATIONAL TEST shall be the injection of a simulated signal into the channel as close to the sensor as practicable to verify OPERABILITY of alarm, interlock and/or trip functions. The ANALOG CHANNEL OPERATIONAL TEST shall include adjustments, as necessary, of the alarm, interlock and/or Trip Setpoints such that the Setpoints are within the required range and accuracy.

The narrow range Reactor Coolant System Hot leg and Cold leg Resistance Temperature Detectors (RTD) are used in the loop delta temperature (ΔT) and average loop temperature (Tavg) channels. These parameters are used in the Overtemperature ΔT and Overpower ΔT reactor trips. There are four channels of ΔT and Tavg, one for each loop, with protective action occurring when at least two of the four channels indicate a ΔT or Tavg value which exceeds their setpoint.

The Station Procedures did in fact direct the signal injection (i.e, a decade box) at a point which was as close to the sensor as practicable. However, the data reference point was established at the output of the NRA cards (the circuits which convert the resistance values of the Reactor Coolant System RTDs to a proportional voltage) instead of at the input. The decade box was adjusted to yield the desired output voltage as measured by a digital voltmeter at the output of the NRA card. The ohm value of the decade box was not considered or recorded. Thus, while the channels were verified to operate properly with a simulated voltage as measured at the output of the NRA card, the ACOT method used did not verify that the NRA card accurately produced a representative voltage for a simulated resistance. Channel calibrations of the ΔT/Tavg Protection Channels verified the proper operation of the NRA cards.

During the evaluation of this event, North Atlantic determined on December 10, 1992 that the NRA cards in the Wide Range Reactor Coolant System Temperature Channels were also not adequately tested during the ACOTs of the Wide Range Temperature instruments. The Wide Range Reactor Coolant System Temperature instruments provide input to the low temperature overpressure protection portion of the pressurizer pressure and level control system. Channel calibrations of the Wide Range Temperature instruments verified the proper operation of the NRA cards.

There are three Seabrook Station Technical Specifications which are affected by this event. Technical Specification Surveillance Requirement 4.3.1.1 requires, in part, that a channel calibration be performed on the Overtemperature ΔT and the Overpower ΔT channels at least once every 18 months, with an Analog Channel Operational Test (ACOT) performed at least once per quarter on a staggered test basis while in Modes 1 and 2. Technical Specification Surveillance Requirement 4.3.2.1 requires, in part, that a channel calibration be performed of the feedwater isolation on low Tavg coincident with a reactor trip channels at least once every 18 months, with an ACOT performed at least once per month while in Modes 1 and 2. Successful performance of specified surveillances demonstrates the OPERABILITY of the associated instrumentation, interlocks, and automatic trip logics. Technical Specification Surveillance Requirement 4.4.9.3.1 requires, in part, that a channel calibration be performed on the PORV actuation channel at least once every 18 months with an ACOT performed at least once every 31 days when the PORVs are used for overpressure protection.

Since the NRA cards were not tested as part of the monthly operational test of the ΔT/Tavg protection channels and the wide range temperature channels, an ACOT, as

defined in the Technical Specifications, was not fully accomplished. Since the plant has been operating without portions of Technical Specification Surveillance Requirements 4.3.1.1, 4.3.2.1 and 4.4.9.3.1 being fully accomplished, this condition is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B) as operation prohibited by the plants's Technical Specifications.

## SAFETY CONSEQUENCES

Calibration of the ΔT/Tavg channels is required by Technical Specifications to be performed at least once every 18 months, with ACOTs performed in between calibrations to verify channel operability. However, because the ACOTs were not fully accomplished, the operability of the ΔT/Tavg channels was not demonstrated as required by Technical Specifications. The required calibrations were fully performed, including verification that NRA cards were within their specified tolerance. Maintenance history records were reviewed to identify all calibrations that were performed on the four ΔT/Tavg protection channels. This included calibrations scheduled during refueling outages to meet the 18 month criteria specified by Technical Specifications and calibrations performed as a retest for work requests that investigated indications that a channel may have drifted outside its calibration tolerance (e.g. a deviation alarm or a Main Control Board indication on one channel that was different than the other three).

Although the drift of the ΔT/Tavg protection channels in several cases was outside of the analysis margins of the Westinghouse Protection System Setpoint Study, in all cases there was never more than one channel outside of the setpoint study tolerance at one time. In the single case when two channels were out of calibration tolerance at the same time, one channel was still within the setpoint study margin. Thus, with only one instrument inoperable, there were at all times three operable channels to provide the required safety function. In regard to the wide range temperature instruments, a review of work requests and repetitive task sheets associated with calibrations of the wide range temperature instruments concluded that the associated resistance to voltage converter cards did not experience drift outside the allowed tolerances. Thus, the low temperature overpressure protection control function of the wide range temperature instruments and accurate wide range temperature indication were never outside the assumed accuracy.

## ROOT CAUSE

The root cause of this event was the lack of a complete technical review of all Instrumentation and Control (I&C) procedures after the Westinghouse Setpoint Methodology was issued in 1986. The procedures utilized for performing the ACOTs should have been reviewed using the assumptions made in the Westinghouse Setpoint Methodology.

## CORRECTIVE ACTIONS

1. A channel calibration of the Overtemperature ΔT, the Overpower ΔT, and the Wide Range Reactor Coolant System Temperature channels was completed during the second refueling outage that concluded in November 1992.

2. Station Procedures IX1662.420, IX1662.421, IX1662.422, and IX1662.423, "Delta T/Tavg Protection Channel Operational Test", have been revised to require a comparison of the specified input resistance value generated by the decade box with the output voltage of the NRA card to verify that the output voltage is within the required tolerance. These procedures are available for review at Seabrook Station.

3. Station Procedures IX1662.424 and IX1662.425, "Wide Range RCS Hot Leg Temperature Operational Test", will be revised to require comparison of the specified simulated resistance value generated by the decade box with the output voltage of the NRA card to verify that the output voltage is within the required tolerance. These procedure revisions are expected to be completed by January 15, 1993.

4. As reported in LER 92-009-00, North Atlantic has established a Technical Specification Task Force to review procedures governing the performance of Technical Specification surveillance testing to ensure that the procedures fully comply with the intended requirements. This event is within the scope of the Task Force review and will be included in this effort.

PLANT CONDITIONS

The plant was in Mode 6, with a reactor coolant system temperature of 105°F and with pressure at 0 psig. However, the condition identified in this report existed during previous full power operation.

North Atlantic provided the initial report of this event in Licensee Event Report 92-19-00 on October 16, 1992.

North Atlantic has reported other instances of inadequate Technical Specification Surveillance testing in Licensee Event Reports 92-004-00, 92-008-00, and 92-009-00.