

U. S. NUCLEAR REGULATORY COMMISSION
REGION 1

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Licensee: North Atlantic Energy Service Corporation

Facility: Seabrook, New Hampshire 03874

Location: Post Office Box 300
Seabrook, New Hampshire 03874

Dates: December 15, 1997 - December 18, 1997 and
January 20, 1998 - January 21, 1998

Inspector: Keith A. Young, Reactor Engineer, DRS, EEB

Approved by: William H. Ruiand, Chief
Electrical Engineering Branch
Division of Reactor Safety

EXECUTIVE SUMMARY

Seabrook Generating Station, Unit 1
NRC Inspection Report 50-443/97-09

The report covers a six-day inspection conducted by a regional engineering inspector.

Maintenance

Based on the inspector's review of documents related to Seabrook Station's M&TE calibration program (including procedures, root cause analysis, and engineering evaluation) and on his interviews of the M&TE staff, the inspector concluded that:

- The M&TE calibration program at Seabrook Station is acceptable with the exception of the noted violations. (Section M3.1)
- The instrumentation and control (I&C) technician's use of procedures and equipment to perform calibrations of M&TE is acceptable. Also, the M&TE morning meetings are useful for discussing current and future M&TE issues. These meetings allow for the open exchange of ideas in the M&TE laboratory. (Section M4.1)

Report Details

II. Maintenance

M3 Maintenance Procedures and Documentation

M3.1 Measuring and Test Equipment (M&TE) Procedure and Document Review

a. Inspection Scope (35750)

The purpose of this inspection was to evaluate and determine the adequacy of the M&TE calibration program at Seabrook Station. The inspector reviewed the administrative procedure that provides control of calibrating M&TE, reviewed set point methodology, and reviewed several issues related to the adequacy of the M&TE calibration program. The inspector also reviewed the M&TE Change Management Plan including root cause analysis and reviewed selected station operating procedures.

b. Observations and Findings

The inspector found that the M&TE calibration program at Seabrook Station was acceptable with the exception of the violations outlined in section M3.2 and the unresolved issue associated with section M3.5. The inspector reviewed several M&TE calibration issues as discussed in sections M3.3, M3.4, M3.6, M3.7, M3.8, M3.9, and M4.1 to substantiate that an acceptable M&TE program was in place at Seabrook Station.

c. Conclusions

The inspector concluded that the M&TE calibration program at Seabrook Station was acceptable with the exception of the noted violations and an unresolved issue.

M3.2 Procedure MA 2.3 Review

a. Inspection Scope (35750)

The inspector reviewed procedure MA 2.3, "Control and Calibration of Measuring and Test Equipment," Revision 15, to determine implementation of accuracy ratios between the procedure and the UFSAR. The inspector also reviewed procedure MA 2.3 to determine its adequacy.

b. Observations and Findings

The inspector found differences between how the UFSAR and the implementing procedures applied M&TE accuracy ratios. The UFSAR, section 17.2.12.3 required a 4:1 accuracy ratio to be maintained from the primary standard to the end use equipment and procedure MA 2.3 required a 4:1 accuracy ratio to be maintained from the primary standard to the field standard. The inspector confirmed that procedure MA 2.3 had not been updated to control M&TE accuracies from primary to end use equipment as stated in the UFSAR. Furthermore, the inspector noted

that procedure MA 2.3 had been previously changed without the licensee performing a 10 CFR 50.59 evaluation. The inspector determined that the licensee changed procedures as described in the UFSAR and failed to perform a written safety evaluation to determine that the change did not involve an unreviewed safety question. Specifically, the licensee changed procedure MA 2.3 and failed to perform a written safety evaluation to determine that no unreviewed safety question existed. This was a violation against 10 CFR 50.59(b)(1). (VIO 50-443/97-09-01)

The inspector also found that procedure MA 2.3 was inadequate in that it did not require a formal evaluation of the impact of revised M&TE on the end use equipment or engineering verification. The inspector found that the licensee's control of M&TE allowed revisions to M&TE without formal review and is not consistent with the requirements of 10 CFR 50, Appendix B, Criterion XII, "Control of Measurement and Test Equipment" and with UFSAR Section 17.2.12.3, "Calibration," which states, "Less accurate standards may be acceptable when the use of such standards and the basis of calibration acceptance is authorized and documented." (VIO 50-443/97-09-02)

c. Conclusions

The inspector concluded that procedure MA 2.3 and the UFSAR differed in how they apply M&TE accuracy ratios and that procedure MA 2.3 was inadequate in that it allowed M&TE to be accepted without engineering or end use evaluations.

M3.3 Instrument Setpoint Document Review

a. Inspection Scope (35750)

The inspector reviewed document number 39140, "Instrument Setpoint," Revision 1, to verify if M&TE accuracy assumptions from the M&TE to end use equipment was bounding for setpoint calculations.

b. Observations and Findings

The inspector verified that the M&TE accuracy assumptions from the M&TE to end use equipment was bounding for setpoint calculations. The inspector found that section 5.5.1, "Measuring and Test Equipment Accuracy" maintained the 4:1 accuracy ratio from the primary standard to end use equipment and provided a basis for bounding setpoint calculations. The inspector noted variables in the setpoint calculation equation allowed for M&TE accuracy assumptions and bounds setpoint calculations. The inspector determined that this was acceptable.

c. Conclusions

The inspector concluded that M&TE accuracy assumptions from the M&TE to end use equipment was bounded within setpoint calculations.

M3.4 Calibration of Equipment by Non-Approved Subtier Vendors

a. Inspection Scope (35750)

The inspector reviewed the licensee's actions of calibrating some equipment by non-approved subtier vendors to determine if this was a wide spread problem at Seabrook Station.

b. Observations and Findings

The inspector found that there was no wide spread problem of equipment being calibrated by non-approved subtier vendors at Seabrook Station. The inspector reviewed adverse condition report (ACR) 96-1281, and found that the instance in which this occurred was isolated to one vendor. ACR 96-1281 identified accelerometers being shipped to Hayes Instruments for calibration and Hayes Instruments forwarding the devices to their original manufacturer for calibration. The licensee identified 17 pieces of equipment that was calibrated by a non-approved subtier vendor. In all cases, the calibration was performed by the original equipment manufacturer to the equipments specifications. Additionally, the inspector found that the purchase order provides control of what vendor is authorized to calibrate equipment and the receipt inspection program provided checks and balances to determine if a non-approved vendor was used. The inspector found no further instances of equipment being calibrated by a non-approved vendor.

c. Conclusions

The inspector concluded that there was no generic problem with non-approved equipment calibration at Seabrook Station and acceptable equipment calibration controls were in place.

M3.5 Calibration of Instrumentation to a Lesser Accuracy

a. Inspection Scope (35750)

The inspector reviewed the licensee's actions of calibrating instrumentation to a lesser accuracy than specified by procedures without being identified as restricted or needing evaluation a broad problem at Seabrook Station.

b. Observations and Findings

The inspector found that the licensee has not completed their overall review of the impact of revised M&TE accuracies. The inspector found through discussions with licensee personnel, that an effort to perform an assessment on all instruments to determine safety significance was instituted. This issue remains unresolved pending licensee completion of their review and subsequent review by the NRC.
(URI 50-443/97-09-03)

c. Conclusions

The inspector concluded that the licensee had not completed their review of revised M&TE accuracies.

M3.6 Equipment Not Calibrated at Standard Conditions

a. Inspection Scope (35750)

The inspector reviewed the licensee's actions of not calibrating equipment at standard conditions to determine if M&TE temperature effects are bounded by engineering calculation M&TE assumptions including setpoint methodology assumptions.

b. Observations and Findings

The inspector found the licensee had performed an evaluation of equipment not being calibrated at standard conditions. The inspector found the licensee's evaluation of this issue to be consistent with ISA-S67.04, "Setpoints for Nuclear Safety-Related Instruments," concerning the Root Sum of the Squares (RSS) treatment of M&TE uncertainties included M&TE temperature effects. The inspector also found that the licensee's evaluation of this issue adequately addressed the broad implications of calibrating M&TE at non-standard conditions. Additionally, the inspector reviewed calculation CAL-R-1, "Reactor Protection System (RPS) - Engineered Safety Features (ESF)/Actuation," and verified that M&TE temperature effects are bounded by engineering calculation M&TE assumptions including set point methodology assumptions.

c. Conclusion

The inspector concluded that the licensee's evaluation of equipment not being calibrated at standard conditions to be acceptable and that M&TE temperature effects were bounded by engineering calculation M&TE assumptions including set point methodology assumptions.

M3.7 Engineering Evaluation Review

a. Inspection Scope (35750)

The inspector reviewed engineering evaluation SS-EV-0021, Revision 1, to determine if the licensee had updated this document to eliminate the reference to a draft standard.

b. Observations and Findings

The inspector found that the licensee had updated engineering evaluation SS-EV-0021, Revision 1 to eliminate the reference to a draft standard (ISA-dS67.06, Response Time Testing of Nuclear Safety-Related Instrument Channels in Nuclear

Power Plants). The inspector found that the licensee had changed this reference to ISA-S67.06 - 1984, the appropriate document to reference. The inspector agreed with this change.

c. Conclusions

The inspector concluded that ISA-S67.06 - 1984 was the appropriate document to reference in the licensee's engineering evaluation.

M3.8 Change Management Plan and Root Cause Analysis Review

a. Inspection Scope (35750)

The inspector reviewed the Change Management Plan and the Root Cause Analysis to evaluate the adequacy of the licensee's actions to restructure the M&TE calibration program at Seabrook Station.

b. Observation and Findings

The inspector found that the licensee's plans to restructure the M&TE calibration program was presented through implementation of the Change Management Plan. The inspector reviewed the Change Management Plan, approved December 13, 1997, which outlines restructuring of the M&TE process to meet the needs of Seabrook Station. The restructuring effort was the result of several corrective actions outlined in the M&TE Calibration Facility Evaluation and Root Cause Analysis, conducted from May 13, 1997, through July 15, 1997, and Seabrook Station Measuring and Test Equipment Organizational and Programmatic Root Cause Analysis Phase II Results, approved September 23, 1997. The inspector determined that these corrective actions were scheduled to be implemented into the M&TE calibration program and are expected to address deficiencies in the M&TE calibration program as outlined in the root cause analysis. The inspector noted that the schedule in the Change Management Plan is expected to implement these corrective actions by December 1998. These corrective actions included technical basis documentation and validation, M&TE user program restructuring, M&TE administrative program restructuring, tool control user programs and response to ACR-recommended corrective actions.

c. Conclusions

The inspector concluded that the actions taken by the licensee to restructure the M&TE program at Seabrook Station were acceptable.

M3.9 Review of Selected Station Operating Procedures

a. Inspection Scope (35750)

The inspector reviewed several randomly selected station operating procedures for calibrating M&TE to determine the adequacy of these procedures.

b. Observations and Findings

The inspector found that the randomly selected station operating procedures were adequate for performing calibrations of M&TE. The inspector reviewed the following station operating procedures for calibrating M&TE.

- ID0601.002, "M&TE Calibration for Fluke Model 8600A Digital Multimeter," Revision 5;
- ID0601.245, "M&TE Calibration for Fluke Model 8840A", Revision 0;
- ID0601.106, "M&TE Calibration for Torque Wrenches," Revision 5;
- ID0601.018, "M&TE Calibration for Fluke 80T-150 Temperature Probe," Revision 5;
- ID0601.110, "M&TE Calibration for Omega 450 Series Digital Thermometers," Revision 4;
- MTDI-11-1, "M&TE Calibration for Outside Micrometers," Revision 1;
- MTDI-1020, "M&TE Calibration for AMP Crimping Tools," Revision 0; and
- ID0601.194, "M&TE Calibration for Fluke 2168A Digital Thermometer with Probe," Revision 2.

The inspector found that the procedures had adequate procedural steps to perform acceptable calibrations of the identified M&TE. This included proper calibration standard preconditioning (equipment warm-up), equipment to be calibrated preconditioning, and environmental determinations for calibration. The inspector also found that the procedures contained appropriate documentation including maintenance record, test equipment specification sheet, calibration form, data form, tool control system usage record, and checkout sheet. All reviewed procedures appropriately maintained a 4:1 or better accuracy ratio between the M&TE and the end use equipment.

c. Conclusions

The inspector concluded that the reviewed station operating procedures were adequate to perform calibrations of M&TE at Seabrook Station.

M4 Maintenance Staff Knowledge and Performance

M4.1 Witness Calibration of M&TE and Observation of Morning Meeting

a. Inspection Scope (35750)

The inspector witnessed the calibration of a selected piece of M&TE equipment to evaluate staff knowledge of the calibration process. The inspector also observed a M&TE morning meeting to determine if relevant M&TE issues were discussed and if the M&TE staff had a questioning attitude toward each other and the M&TE supervisor.

b. Observations and Findings

The inspector found that the M&TE staff had sufficient knowledge of the calibration process. The inspector randomly selected a Fluke 8810A Digital Multimeter (ID# FLS 756) to witness the M&TE calibration process. The calibration was performed by an instrument and control (I&C) technician who used the appropriate procedure (ID0601.071, Revision 3) for the equipment being calibrated to begin the calibration process. The inspector reviewed the procedure and found that the appropriate documentation and procedural steps were in place to perform an acceptable calibration of the selected M&TE. The I&C technician properly warmed-up the calibration standards and equipment to be calibrated, determined and recorded proper environmental conditions, determined if the 4:1 accuracy ratio was being maintained between the primary standard and end use equipment, and selected the appropriate data forms to record the parameters of the equipment being calibrated. The inspector noted that all primary standards used for this calibration had valid calibration stickers. The inspector found that the I&C technician was knowledgeable about the procedure and the equipment used to calibrate the M&TE. The inspector also noted that proper procedural steps were in place to disposition primary standards that do not meet the 4:1 criteria. Discussions with other I&C technicians revealed that the licensees approach to M&TE calibration process was uniform. The inspector concluded that the approach to the calibration for this particular piece of M&TE was acceptable.

The inspector found that the M&TE morning meetings were useful for information exchange of relevant M&TE issues and that the M&TE staff had a questioning attitude toward each other and the M&TE supervisor. On December 17, 1997 the inspector observed a M&TE morning meeting which is said to occur every Monday, Wednesday, and Friday. When necessary, ad hoc meetings were called by the M&TE supervisor. The meeting was attended by seven M&TE personnel (the M&TE supervisor, four technicians, and two administrative assistants). The inspector noted that the meeting provided pertinent information to the M&TE staff concerning current and future issues. Issues covered in this meeting concerned plant status, training, current ACR status, equipment needs, and personnel issues. The inspector noted that M&TE I&C technicians and administrative assistants freely voiced opinions. They also showed a questioning attitude toward each other and the

M&TE supervisor. The M&TE supervisor responded to the staff appropriately. The inspector determined that these meetings are useful for the M&TE staff and are effective at keeping communications open between the staff and management.

c. Conclusions

The inspector concluded that the M&TE I&C technician's use of procedures and equipment to perform calibrations of M&TE was acceptable. The inspector also concluded that the M&TE morning meetings were useful for discussing current and future M&TE issues and these meetings allowed for open exchange of ideas in the M&TE laboratory.

V. Management Meetings

X1 Exit Meeting Summary

The inspector presented the inspection results to members of licensee management at an exit meeting on January 21, 1998. The licensee acknowledged the findings presented.

The inspector asked the licensee whether any material reviewed during the inspection should be considered as proprietary information. No proprietary information was identified.

The licensee provided briefing information on the M&TE calibration program at Seabrook Station to the inspector after the entrance meeting was completed. This information is provided as an enclosure 2 to this inspection report.

PARTIAL LIST OF PERSONS CONTACTED

Seabrook

W. Alcusky, Instrumentation & Control Engineer
 R. Bergeron, Electrical Engineering Manager
 A. Chesno, Maintenance Technical Manager
 R. Cooney, Assistant Station Director
 B. Drawbridge, Director of Services
 W. Hinton, Metrology Laboratory Supervisor
 M. Makowicz, Corrective Action Manager
 G. McDonald, Nuclear Quality Manager
 M. Ossing, Senior Project Engineer
 J. Peschel, Regulatory Compliance Manager
 J. Peterson, Maintenance Manager

NRC

R. Lorson, Senior Resident Inspector
 J. Brand, Resident Intern
 W. Ruland, Chief, Electrical Engineering Branch

INSPECTION PROCEDURES USED

IP 35750: QA Program for M&TE
 IP 92903: Follow-up - Engineering

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

VIO 50-443/97-09-01	Failure to Perform a 10 CFR 50.59 Evaluation When Procedure MA2.3 was Changed
VIO 50-443/97-09-02	M&TE was not Properly Controlled
URI 50-443/97-09-03	Assessment of Instruments to Determine Safety Significance

M&TE CHANGE MANAGEMENT PLAN

The M& TE Change Management Plan implements the following four (4) task teams:

Technical Basis Documentation and Validation

- Revision of Specification Sheets to document the attributes for each piece of equipment, providing appropriate references to engineering evaluation.
- Resolution of restriction and accuracy issues to ensure deviations from vendor recommendations have been evaluated. Potential impact on safety-related systems, structures, and components has been addressed in an official engineering evaluation.
- Consolidation of basis information for equipment performance, calibration and use of M&TE, changes to accuracy and calibration cycle, and industry accepted methodology.

M&TE User Program

- Revision of user program to strengthen and formalize lateral integration between the calibration facility, user groups, and engineering, as well as reduce the level of burden sensed by those involved. Issues involving failure reports, restricted use, vendor M&TE, and the equivalent equipment decision process will be addressed.

M&TE Administrative Program

- Revision of administrative program to formalize the integration between calibration facility, user groups, and engineering and to define programmatic and regulatory requirements. Validation against the UFSAR and associated ANSI specifications, M&TE Program and Engineering interface issues, engineering controls, and M&TE program requirements will be evaluated and defined.

Tool Control Program

- Revision of program to include overall direction and purpose, address accountability and personal ownership of tools, identify facility and software improvements, and improve outage contractor tool issue and control.

METROLOGY FACILITY OPERATION

DAY TO DAY OPERATION:

- *All M & TE issues are documented and resolved within the Corrective Action Program*
- *Continued reinforcement of a questioning attitude*
- *Establishment of a department goal for continued improvement*
- *Use of tri-weekly meeting for reinforcement and feedback*
- *Implementation of continued team building training*

CORRECTIVE ACTION PROCESS:

- *Issuance of the change management plan(CMP)*
- *Station Director and Maintenance Manager support of CMP*
- *Provision of adequate resources*
- *Monitoring of effectiveness*

TRAINING AND BENCHMARKING:

- *Task Analysis to ensure adequate qualifications*
- *Training needs to improve general and metrology skills have been identified*
- *Training programs to be developed in support of Maintenance Technical 1998 strategic plan*
- *Use of best practices from benchmarking*

BENEFITS:

- *Multiple department involvement in solution development*
- *User training will provide understanding of program changes*
- *Multiple department impacts of M&TE program will be identified*

METROLOGY LAB COMMUNICATIONS

Metrology program success requires active communications with both internal and external stakeholders, as delineated below.

- MA 2.3 Control And Calibration Of Measuring And Test Equipment

Delineates the programmatic requirements for implementation of the M & TE Program

(Status) A complete revision is required as addressed in the change management plan.

- Metrology Lab Calibration Procedures

Provides direction and guidance for the performance of Met Lab activities

(Status) This effort is complete and controlled by the Met. Lab.

- M & TE Equipment Specification Sheets

Delineates to the end user and Engineering the specific calibration data

(Status) Revision and verification is in progress and is expected to be complete by June.

- M & TE Equivalency

Provides the end user with equivalent test equipment to that specified

(Status) Presently an informal system exists which will be proceduralized as part of the change management plan.

- Restricted Use Tags

Delineates to the end user all restrictions associated with a particular piece of M & TE

(Status) All Engineering evaluations are presently in final review with a scheduled completion of 1/15/98.

- M & TE Failure Reports

Provides end user with M & TE failures requiring evaluation and documenting that evaluation

(Status) The present process in place is supplemented by the informal support of the M & TE Lab Supervisor. Revision of this process is being addressed in the change management plan.

UFSAR REQUIREMENTS

- **UFSAR Section 17.2.12.3 Requirements:**

Primary Standards shall have an accuracy of four times the required accuracy of the end use equipment being calibrated.

Less accurate standards are acceptable when use the use of such standards, and the basis of calibration acceptance is authorized and documented.

- **NAQA Section 12.2.4.3 Requirements:**

Primary standards shall have an accuracy of at least four times the required accuracy of the end use equipment being calibrated.

Less accurate calibration standards may be acceptable when the use of such standards, and the basis of calibration acceptance, are authorized and documented.

- **Metrology Laboratory (MA 2.3):**

Ensures that the UFSAR and NAQA requirements for a 4 : 1 ratio are met (primary standard to field standard).

Where the 4:1 criterion is not met, the calibration tolerance applied to the field standard is reduced (guard banding) to provide an equivalent calibration.

- **Engineering Evaluation SS - EV - 97 - 0021:**

Assess the safety significance of the reported M & TE calibration discrepancies.

Select a representative safety significant sample population to provide reasonable assurance.

Instrument loop selection criteria:

Parameter diversity e.g. flow, level, temperature and pressure

Instrument loops which support the "Accident Analyses"

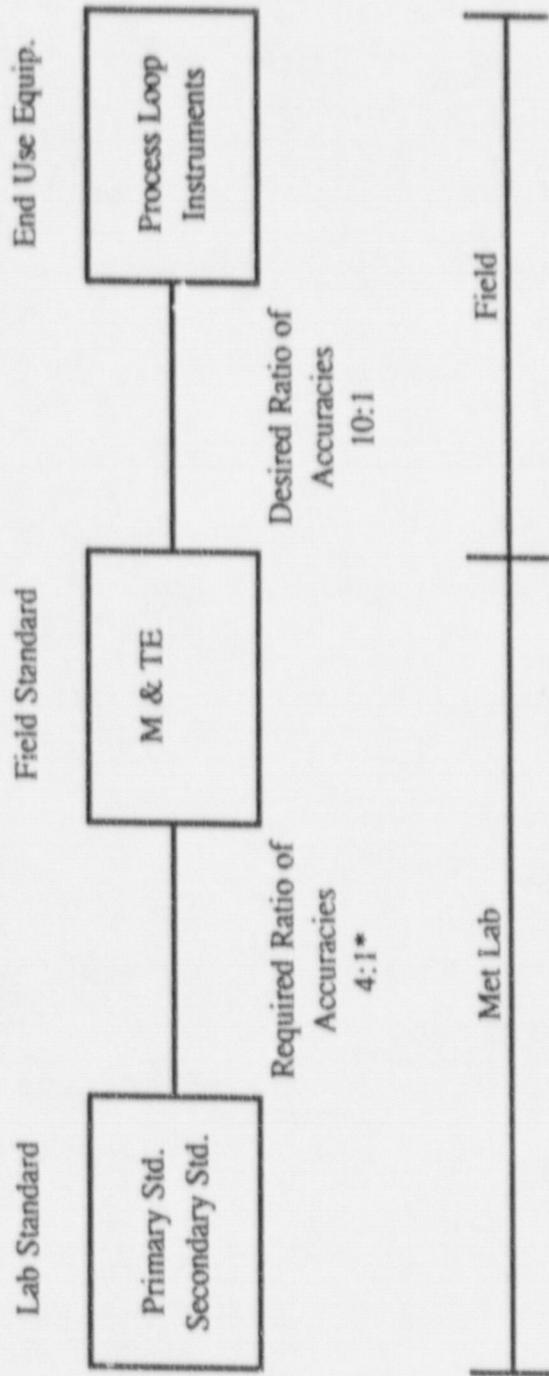
Instrument loops which contain minimum margin

Verification of the 4:1 ratio between the primary standard and the field standard, or equivalent (guard banding)

Conclusions:

The evaluation demonstrated that the identified M & TE discrepancies do not have safety significance, that a 10 CFR 50.59 safety evaluation is not required as the evaluation did not identify the necessity to make changes to the facility or procedures as described in the UFSAR, perform tests or experiments not described in the UFSAR, change the Operating License or require the implementation of a set point change or recalibration. None of the previously identified M & TE discrepancies affect the margin of safety.

Calibration Block Diagram



* Per MA 2.3 Section 4.4.2.2 - Deviations require justification and documentation