U.S. NUCLEAR REGULATORY COMMISSION

OFFICE OF INSPECTION AND ENFORCEMENT

Division of Quality Assurance, Vendor, and Technical Training Center Programs

Report No.:	50-423/85-60
Docket No.:	50-423
Licensee:	Northeast Utilities Service Company
Facility Name:	Millstone Unit No. 3
Inspection At:	Millstone Unit No. 3 Site, Waterford, Connecticut
Inspection Conducted:	August 26 through August 30, 1985 September 12 and 13, 1985 September 18 and 19 1985

Inspection Team Members:

Team Leader:	E. Imbro, Senior Inspection Specialist, IE
Mechanical Systems:	T. DelGaizo, Consultant, WESTEC Services
Mechanical Components:	J. Blackman, Consultant, WESTEC Services
Civil/Structural:	I. Husain, Consultant, SMA of Conn. A. Unsal, Consultant, HARSTEAD Engineering
Electrical:	C. Crane, Consultant, WESTEC Services G. Lewis, Inspection Specialist, IE
Instrumentation and Controls:	J. Kaucher, Consultant, WESTEC Services
Present at August 30, 1985 Exit Briefing:	J. Milhoan, Section Chief, IE

E. V. Imbro 10/8/85

Eugene V. Imbro
Inspection Leader, IE

Approved by:

James L. Milhoan 10/16/85

James L. Milhoan
Section Chief, QA Branch

Distribution
J. M. Taylor, IE
R. H. Vollmer, IE
B. K. Grimes, IE
J. G. Partlow, IE
G. T. Ankrum, IE
J. L. Milhoan, IE
E. V. Imbro, IE
G. S. Lewis, IE
DCS 016 (Docket No. 50-423)
QAB Reading
DQAVT Reading
E. C. Wenzinger, RI
B. J. Youngblood, NRR
B. Doolittle, NRR
NRC PDR
Local PDR
H. Thompson, NRR
T. E. Murley, RI
R. Starostecki, RI
T. M. Novak, NRR
W. Butler, NRR
AEOD
[illegible]ELD
NMSS
RES
ACRS (10)
NSIC
NTIS
Regional Administrators
Regional Division Directors
T. Speis, NRR
E. L. Jordan, IE
J. Axelrad, IE
Team Members
H. Boulden, OIA
SECY
OPE
W. J. Dircks, EDO
H. R. Denton, NRR
OCA (3)

IE:DQAVT:QAB	IE:DQAVT:QAB	IE:DQAVT:QAB	IE:DQAVT:QAB:C	IE:DQAVT:D
GSLewis:hmc	EVImbro	JLMilhoan	GTAnkrum	BKGrimes
10/7/85	10/ /85	10/16/85	10/ /85	10/ /85

MILLSTONE UNIT NO. 3
Engineering Assurance In-Depth Technical Audit No. 59
Results and Corrective Action Inspection Report 50-423/85-60
August 26 through August 30, 1985
September 12 and September 13, 1985
September 18 and 19, 1985

1. Background

NRC inspection activities related to the Millstone 3 Engineering Assurance In-Depth Technical Audit were conducted in three phases:

1. Inspection of program preparations
2. Inspection of program implementation
3. Inspection of audit results and corrective action

The first phase of the inspection was accomplished on May 28 and May 29, 1985. The NRC's report of that inspection (50-423/85-29) was forwarded to Northeast Nuclear Energy Company (NNECo) via letter dated June 21, 1985 (B. K. Grimes [NRC] to J. F. Opeka [NNECo]). The second phase of the inspection was accomplished on June 24 through June 28, 1985. The NRC's report of that inspection (50-423/85-31) was forwarded to Northeast Nuclear Energy Company (NNECo) via letter dated July 19, 1985 (B. K. Grimes [NRC] to J. F. Opeka [NNECo]). The third phase of the inspection which is the subject of this report was conducted in three segments on the dates shown in the heading.

2. Purpose

The purpose of this inspection was to accomplish the third phase of the NRC inspection, namely inspection of the audit results and corrective action. Specifically, the objectives of this inspection were to (1) review the audit team findings, (2) ensure that the various resolutions of the findings were adequate, (3) ensure proposed corrective actions were adequate, and (4) verify that the items identified in inspection reports 50-423/85-29 and 50-423/85-31, were incorporated into the program or otherwise satisfactorily resolved. The purpose of this report is to provide resolution of the items identified in the previous inspection reports. The results of the inspection of the other aspects of the Millstone Unit 3 Engineering Assurance In-Depth Technical Audit will be provided in a Supplemental Safety Evaluation Report (SSER).

3. Personnel Contacted

A large number of NNECo and SWEC personnel were contacted during the course of the NRC's inspection. The following is a brief list of key personnel involved:

Name	Organization	Position
A. Capozzi	SWEC	Ass't Chief Engineer, EA
D. Malone	SWEC	Audit Team Leader
R. Ackley	SWEC	Project Engineer
R. Fortier	SWEC	Mechanical Auditor
T. Morse	SWEC	I&C Auditor
C. Ferguson	SWEC	Pipe Stress Auditor
R. Sexton	SWEC	Pipe Support Auditor
N. Goldstein	SWEC	Equipment Qualification (Seismic) Auditor

Name	Organization	Position
F. Chin	SWEC	Structural Auditor
A. Papp	SWEC	Electrical Auditor
C. Morrell	SWEC	Hazards Program Auditor
D. Norquist	NNECo	Manager, QA

4. STATUS OF NRC INSPECTION ITEMS FROM INSPECTION REPORT 50-423/85-29 DATED JUNE 21, 1985.

Item No.	Subject	Status	Original Comment/Resolution
1	Mechanical Systems		
1.1	E&DCR and N&D Review	Closed	Wording of some attributes of E&DCR and N&D Review Plans was open to interpretation. Review Plans were reviewed and the ambiguities were eliminated.
1.2	Calculations Review Plan	Closed	Review Plan did not specifically address: (1) Assumptions needing later verification, and (2) Assessment of the appropriateness of computer codes. Review Plans were revised to incorporate these comments.
1.3	Calculations	Closed	Some non-safety-related equipment was selected for review. The non-safety-related equipment was dropped from the review and additional safety-related equipment was added.
1.4	Hazards Review Plan	Closed	Audit was not reviewing the design process for Seismic II/I hazards protection. Applicant took a different approach to the Seismic II/I design, that is similar to that used for SEP plants. This item has been referred to NRR for resolution as an open licensing issue. It is closed for purposes of this report.
2	Mechanical Components		
2.1	Scope of Equipment Qualification Review Plan	Closed	The scope of review of the equipment qualification area (seismic) was too narrow to draw meaningful conclusions. The Review Plan was revised to encompass all requirements and expand on interfaces.

Item No.	Subject	Status	Original Comment/Resolution
2.2	RP #1907-1- Seismic Qualification	Closed	A checklist specifically for seismic and pressure boundary considerations was not developed. Checklists were developed for seismic and pressure boundary considerations.
2.3	RP #1901 - Consistency Between Design and FSAR Subject Chosen	Closed	Inclusion of NRC Regulatory Guides 1.60 and 1.122 was not germane to the review of pipe stress and pipe support design. Other suitable Regulatory Guides were included.
2.4	Selection of NSSS Criteria Items	Closed	The items selected for review appeared to be limited. The NSSS interface was expanded to include modeling requirements.
2.5	RP 1903-1 - Additional Requirements Regarding Calculation Review	Closed	The pipe stress analysis checklist did not address a number of technical areas which are normally essential to adequate design. The checklist was revised to include the additional areas of concern.
2.6	Small Bore Piping Calculation Review	Closed	The basis for maximum span length tables used in the design and installation of small bore piping was not reviewed. Only one piping run was designed per the spacing tables; therefore, the above review was not necessary.
2.7	Comprehensive Review of the Use of Computer Codes	Closed	Questions concerning the correct application of the computer codes (NUPIPE and STRUDL) and the determination of the effects of known errors found in the code were not addressed. A review of NUPIPE and STRUDL was performed.
2.8	Adequacy of E&DCR and N&D Preparation	Closed	The review of E&DCR's and N&D's did not consider the completeness of the problem posed and whether all interdiscipline considerations had been included.

Item No.	Subject	Status	Original Comment/Resolution
			The scope of review was revised to include problem description and interdiscipline review.
3	Civil/Structural		
3.1	Containment Liner Plate Analysis	Closed	The containment liner is subject to pressure and thermal expansion/ contraction loads. It was therefore important to verify that adequate design calculations had been performed to ensure the integrity of the liner plate. The EA team reviewed the appropriate calculations and found them to be adequate.
3.2	Seismic Analysis of Containment Structure	Closed	The adequacy of the seismic analysis of the containment structure needed to be verified. The seismic analysis and response spectra development was verified by the audit team.
3.3	Verification of Computer Programs	Closed	The computer programs used in the seismic analysis and in generating seismic spectra were not being verified. The computer programs used in seismic analysis have been reviewed for verification and qualification.
3.4	Design Verification of the Refueling Water Storage Tank (RWST)	Closed	The design criteria and design calculations for the RWST were not being reviewed to verify the tank's ability to withstand tornado missile and seismic loads. Further, the ability of the model of the RWST to adequately account for sloshing of water inside the tank during a seismic event was not being reviewed. The review of the analysis and design of the RWST was included in the audit team review.

Item No.	Subject	Status	Original Comment/Resolution
3.5	FSAR Requirement	Closed	Analytical documentation concerning whether gaps provided between adjacent structures were adequate to preclude impacting during a seismic event was not being reviewed. The audit team reviewed the shake space requirements for the containment structure.
3.6	Conduit/Cable Tray Supports	Closed	Cable tray design criteria documents were not being reviewed to verify consistency with analytical and test work. Also the data transmitted between electrical, EMD, and the structural group was not being reviewed for consistency. The audit team included these items in their review of the design of conduit and cable tray supports.
4	Electric Power and Instrumentation and Controls		
4.1	Items Not Included in Review	Closed	The scope of the review plans did not always include all items or elements considered to be essential. The review plans were revised to address additional items and elements of the design process.

5. STATUS OF NRC INSPECTION ITEMS FROM INSPECTION REPORT 50-424/85-31 DATED JULY 19, 1985.

Item No.	Subject	Status	Original Comment/Resolution
1.	Mechanical Systems		
1.1	Calculation Review	Closed	Several calculations were reviewed by the NRC reviewer to see if NRC would arrive at the same conclusions as those reached by the EA audit team. No concerns were identified by this review so that this item was closed out in the original inspection report.

Item No.	Subject	Status	Original Comment/Resolution
1.2	Environmental Qualification of RSS Pumps	Closed	A review of the Equipment Qualification Report to demonstrate the environmental qualification of the RSS pumps determined that the report used the environmental temperature of the cubicle (120°F) rather than that of the recirculating fluid (peak temp. 240°F with temperatures above 150°F for 30 minutes). Some components of the RSS pump are qualified for 194°F. In addition, the generic implications needed to be addressed. An Action Item was generated by the audit team regarding this item. The Project's response was rejected. An audit observation was issued by the EA team which includes generic implications to track this item.
1.3	Hazards (HELB/MELB)	Closed	The HELB/MELB portion of the hazards review plan was not ready for review. The implementation portion of the plan could not be verified. The hazards review plan is now complete including the implementation portion of the plan.
1.4	RSS Thermal Performance	Closed	Calculation US(B)-273 Rev 3, which should verify that the RSS is capable of meeting design commitments, had not been reviewed by the EA audit team. Calculation US(B)-273 Rev 3 has been reviewed by the EA audit team.
1.5	ESF Building Environment	Closed	The EA team auditor had questioned the project's assertion that there are no high energy line breaks to be considered in the ESF Building, however no action item was prepared to track this item. An action item was prepared to document and track this concern.

Item No.	Subject	Status	Original Comment/Resolution
1.6	Inspection Report No. 50-423/85-29	Closed	As of the date of the inspection Observation No. 1.4, relative to non auditing of the Seismic II/I hazards protection, was unchanged and remained an open item. This item has been referred to NRR for resolution as an open licensing issue. It is closed for purposes of this report.
2.	Mechanical Components		
2.1	Mechanical Qualification of Equipment	Closed	The mechanical qualification aspects (seismic and ASME III Code conformance) of the equipment qualification review plan were unauditable. The review plans were revised to be more comprehensive and are now acceptable.
2.2	E&DCR Review - Piping	Closed	The review of piping E&DCRs did not verify that changes were adequately reflected in appropriate design documents. The audit was expanded to address this concern.
2.3	Implementation of FSAR Commitments	Closed	Several pipe support related licensing commitments referenced in the FSAR were found to be absent from the project implementation document. The reviewer had not determined this from his review. This indicated a need for a more thorough review of the FSAR commitments. Review plan 1901 now thoroughly examines the FSAR commitments.

Item No.	Subject	Status	Original Comment/Resolution
2.4	Pipe Support Calculations	Closed	A pipe support calculation had been reviewed by the EA audit team and was found adequate. However, the NRC reviewer found the combination of loads was not developed in a conservative manner, and that several attributes basic to confirming the calculation adequacy were not reviewed. The EA audit team has now performed a comprehensive review of the pipe support calculations to satisfy the review checklist requirements and found them to be satisfactory.
3	Civil/Structural		
3.1	Containment Liner	Closed	NRC reviewer indicated additional review of EA audit team action item S-010 and the project response was needed. This action item dealt with calculations EA-11 and EA-15. The EA audit team performed an additional review and found the two above calculations appropriate for the containment liner design. This removes NRC concern on this matter.

Item No.	Subject	Status	Original Comments/Resolution
3.2	Structural Steel Connection Design	Closed	It was not apparent that the structural steel load tracking program addressed structural steel connections and anchorage loads. The EA audit team reviewed the steel connection design.
4.	Electric Power		
4.1	Motor Data	Closed	The results of a review of Specification 2362.200-164 were not correlated with the data obtained from a walkdown of the system. The NRC reviewer noted the valve data sheet, electric motor and load list, vendor drawings and one line drawings have motor data different from the nameplate data. An action item was prepared to track this observation. The project has initiated a walk-down procedure to verify motor nameplate data.
4.2	Reduced Voltage Starting of Motor Operated Valves (MOV)	Closed	The EA reviewer noted a 70% minimum starting voltage for MOVs in the review of Specification 2362.200-164. However, no further review was conducted to determine whether the MOVs supplied were in compliance with this specification. In addition, the environmental qualification test report indicated that the lowest voltage these MOVs were tested to was 490 V ac. Action should have been taken to ensure these valves are qualified.

Item	Subject	Status	Original Comment/Resolution
4.2		Closed	for operation at reduced voltage accident conditions. Follow-up review was expanded to include MOVs furnished by other vendors to ensure that the environmental qualification of those MOVs and the supporting documentation demonstrated that the MOVs will function as required under reduced voltage conditions consistent with the FSAR, design commitments and specifications.
4.3	Environmental Qualification of Equipment	Closed	The equipment being reviewed for environmental qualification were essentially in mild environment areas. It was recommended that power cables and control cables located in harsh environments be evaluated. The EQ review plan was revised to include equipment in harsh environments.
5.	Instrumentation and Controls		
5.1	Calculations Selected for Review	Closed	The controls discipline selected one calculation for review and it was found to be deficient in a number of areas. Consequently, it was recommended that additional calculations be reviewed to determine if there are generic problems in the performance of controls discipline calculations. Audit Observation 161 was written to track this observation. Additional calculations were reviewed. Since this item is being tracked by AO 161, it is closed for purposes of this report.

Item No.	Subject	Status	Original Comment/Resolution
5.2	Barton Flow Instrument Switch (FIS) Environmental Qualification	Closed	The EA auditor found that 3RSS*FIS 38A (control switch for the minimum flow recirculation valve) environmental qualification documentation was inadequate. The required audit forms were not completed and no action item was generated on the noted deficiency. The project had previously issued E&DCR T-C-05967 which will replace the Barton FIS with a Rosemount Model 1154 transmitter. Rosemount report D8400102 qualifies this model to the requirements of IEEE 323 & 324 for use in Class 1E applications.
5.3	Use of Underrated Terminal Blocks	Closed	N&D 11,436 allows the use of underrated terminal blocks (360V vs. 480V) for 3RSS*MOV 23C valve operator. It is not clear that the EA team should have accepted the conclusion that the terminal blocks were adequate for use without further evaluation of the technical basis. Adequate technical justification was obtained by the EA audit team for the use of underrated terminal blocks. The MOVs inside containment have been modified to eliminate the use of Marathon terminal blocks and that Marathon terminal blocks have been qualified for 460V motor leads in non-LOCA and non-HELB areas.
5.5	Qualified Life of Equipment Items	Closed	The environmental qualification package for the pressure transmitter 3RSS*PT 25A (Rosemount Model 1153) does not establish a qualified life of the item. The environmental qualification reviewer did not question the absence of this information nor did he prepare an action item questioning qualified life. The EA audit team review of the environmental qualification package for pressure transmitter 3RSS*PT 25A was subsequently found acceptable.

cc:

Gerald Garfield, Esq.
Day, Berry & Howard
City Place
Hartford, Connecticut 06103-3499

Mr. Maurice R. Scully, Executive Director
Connecticut Municipal Electric
Energy Corporation
268 Thomas Road
Groton, Connecticut 06340

Robert W. Bishop, Esq.
Corporate Secretary
Northeast Utilities
Post Office Box 270
Hartford, Connecticut 06141

Mr. T. Rebelowski
Senior Resident Inspector Office
U.S. Nuclear Regulatory Commission
Millstone III
P.O. Box 615
Waterford, Connecticut 06385

Mr. Michael L. Jones, Manager
Project Management Department
Massachusetts Municipal Wholesale
Electric Company
P.O. Box 426
Ludlow, Massachusetts 01056

Regional Administrator
U.S. NRC, Region I
631 Park Avenue
King of Prussia, Pennsylvania 19406

Mr. Karl Abraham
Public Affairs Office
U.S. Nuclear Regulatory Commission
Region I
King of Prussia, Pennsylvania 19406