

# NORTHEAST UTILITIES



THE CONNECTICUT LIGHT AND POWER COMPANY  
WESTERN MASSACHUSETTS ELECTRIC COMPANY  
HOLYoke WATER POWER COMPANY  
NORTHEAST UTILITIES SERVICE COMPANY  
NORTHEAST NUCLEAR ENERGY COMPANY

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August 3, 1990

Docket No. 50-423  
B13559

Mr. T. T. Martin, Administrator  
Region I  
U. S. Nuclear Regulatory Commission  
475 Allendale Road  
King of Prussia, Pennsylvania 19406

Dear Mr. Martin:

Millstone Nuclear Power Station, Unit No. 3  
Employee Concerns

By letter dated June 6, 1990,<sup>1</sup> the NRC informed Northeast Nuclear Energy Company (NNECO) of an allegation provided to an NRC inspector concerning the adequacy of computer software testing methods at Millstone Unit No. 3. The allegation identified three areas of concern with procedures dealing with quality related computer programs at Millstone Unit No. 3. The June 6, 1990 letter requested that the results of our review and disposition of the matter be forwarded to Region I. NNECO hereby provides the following response to that request.

## Allegation 1

The Nuclear Engineering and Operations Procedures which provide guidance for the development of Quality Related Computer Programs at the Millstone site are inadequate in that they do not fully implement recognized industry standards. For example, NEO 2.24, "Quality Software Programs" does not fully adhere to ANS 7.4.3.2, "Application Criteria for Programmable Digital Computer Systems in Safety Systems of Nuclear Power Generating Stations."

1. William Kane letter to E. J. Mroczka dated June 6, 1990.

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## Response

Northeast Utilities' software quality assurance program has been significantly upgraded over the past three years. Revised Quality Software Manual (QSM) procedures, effective October 1989, fully incorporate applicable industry standards. Millstone Unit No. 3 has committed in Northeast Utilities Quality Assurance Program (NUQAP) Topical Report, Revision 13, to implement the guidelines of Regulatory Guide (RG) 1.152<sup>2</sup>, which endorses ANS 7.4.3.2. Revision 13 is currently being reviewed by the NRC and approval is expected by September 1990.

The QSM is applied to Quality Software having applications that include:

- o The design process associated with Category I structures, systems, or components;
- o Support of Technical Specifications related to Category I structures, systems, or components, or design basis analysis;
- o The verification of compliance with Technical Specifications related to design basis analysis, when used as the sole or principal means of verification;
- o Support of plant licensing with respect to Category I structures, systems, or components, or design basis analysis, and
- o Implementation of a safety function of a Category I system (QS-12).

The guidelines of RG 1.152 and ANS 7.4.3.2 are incorporated in various procedures within the Millstone Unit No. 3 procedural system and, by reference to the NUQAP Topical Report, other applicable industry standards are applied as appropriate to the utilization of software in the operation of all four Northeast Utilities' nuclear units.

Here it seems appropriate to provide a brief explanation of the procedural system. Nuclear Engineering and Operations (NEO) 2.24, Revision 1, references RG 1.152 (which is an endorsement of ANS 7.4.3.2) as a source document forming the basis of the procedure. The NEO Section 2 procedures are programmatic documents in that they are neither proscriptive nor instructive. As such, NEO 2.24 is a Program description which is then implemented with subtier procedures or, in this case, the QSM.

The QSM provides the implementing instructions for the control of software and was written to address Quality software which is used to design or provide a support function for the design or operation of a nuclear power plant. Several of the provisions of RG 1.152 are common to activities governing all Quality software, not just Category 1 software, and are contained in various QSM procedures. Within the QSM, we have written QS-12

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2. Criteria for Programmable Digital Computer System Software in Safety-Related Systems of Nuclear Power Plants (November 1985).

which is specifically employed for the control of Category I Software. QS-12 was written to implement the additional provisions of RG 1.152 applicable to Category 1 software, namely for those systems which ensure (1) the integrity of the reactor coolant pressure boundary, (2) the capability to shut down the reactor and maintain it in a safe condition, or (3) the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to the 10CFR Part 100 guidelines. We have only one software system at Millstone Unit No. 3 that falls within the scope of QS-12, and thus, the guidelines of RG 1.152: the Inadequate Core Cooling System (ICCS).

Northeast Nuclear Energy Company (NNECO) purchased the ICCS as a complete software package from Energy Incorporated, an approved supplier. The formulation of this program was conducted under their approved QA program as a qualified supplier of safety-related material. One change to the ICCS control system has been made by the Instrument and Control (I&C) Department and is discussed as part of our response to Allegation 2.

#### Allegation 2

The verification/validation process for computer software programs at the Millstone site is deficient since the verification/validation process does not include a functional test with specific predetermined acceptance criteria. This is contrary to accepted industry practice.

#### Response

We have investigated the allegation regarding the verification/validation process not including a functional test with specific predetermined acceptance criteria. Specifically, after discussion with the NRC resident inspector at Millstone Unit No. 3, we examined Software Implementation Packages (SIPs) for Quality software and control software from 1987 to the present to evaluate the adequacy of the documentation related to validation and verification of changes and the independence of reviews performed by the independent reviewers. The SIPs selected were on the Safety Parameter Display System (SPDS), radiation monitor system, and the ICCS. The results of the examination were that the acceptance criteria for the validation and verification tests were adequate based on the nature and complexity of the change and conformed to applicable procedures.

Only one change to the ICCS Category I software was conducted, starting in 1989. This involved a change to an EPROM and was programmed by the supplier of the system, Energy Incorporated. The plant design change record (PDCR 89-015) for this change is still open. The documentation of the EPROM includes a certificate of compliance to the original specification for the system. The modified EPROM was installed and the ICCS was tested with predetermined acceptance criteria as documented in procedure NUSCO-930 and automated work orders (AWO) M3-89-15952 and M3-89-15953.

All of the modifications to Quality software that were reviewed were done in accordance with approved procedures that fully implemented the functional test and acceptance criteria guidelines of Millstone Administrative Control Procedures (ACPs).

In a change to plant process computer software (non-QA) related to ICCS communications, Plant Incident Report (PIR) 3-89-205 and Licensee Event Report (LER) 89-29 were written as a result of operational problems with program "R5 - Flux and Tilting Factors". The reviewer failed to follow procedures and did not perform an adequate verification of the installation of the plant process computer software change (non-QA) related to ICCS communications noted above. The root cause was failure to follow procedures and inadequate verification of installation of the plant process computer software change. This has since been corrected as documented in LER 89-29.

### Allegation 3

Personnel qualifications for review of software are not specified by procedure. Therefore, the possibility exists for unqualified people to conduct reviews of software packages.

### Response

Guidelines for the qualification of software review and test personnel are reflected in Millstone ACP-QA-2.13A, which specifies that personnel shall be qualified per ACP-QA-8.16, "Training Certification, and Identification of Qualified Inspection and Testing Personnel." In the SIPs examined (as discussed above in the response to the second allegation) personnel assigned to review software were qualified in accordance with applicable procedures by experience, education, or both.

### General Comments

Our review of these allegations has been somewhat hampered by the lack of specific details regarding the allegations. If for some reason the information in this letter is not fully responsive, please inform us so that appropriate follow-up can be undertaken.

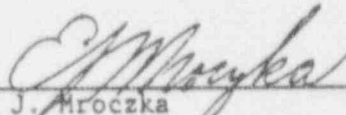
There is some difficulty in evaluating the verification and validation process for long term software modification and development projects, some of which were initiated as early as 1983 and extending to the present. Thus, the projects were started before the issuance of any controls on software and are now subject to the current revision of the QSM which implements accepted industry standards. Implementation of changes to software prior to Revision 0 of the QSM did not require documentation of the software changes to the extent of the current manual. Therefore, for early changes to software, adherence to quality assurance requirements may not be as well documented as it is under present standards.

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We trust the Staff finds this information satisfactory in addressing these concerns and we appreciate being given the opportunity to address these matters. We also hereby confirm that none of the information in this letter is subject to the provisions of 10CFR2.790. Should you require any additional information, please do not hesitate to contact us.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

  
\_\_\_\_\_  
E. J. Mroczka  
Senior Vice President

cc: Document Control Desk  
D. H. Jaffe, NRC Project Manager, Millstone Unit No. 3  
W. J. Raymond, Senior Resident Inspector, Millstone Unit No. 3  
W. F. Kane, NRC Region I



## ALLEGATION RECEIPT

Thu. Mar 15, 1990  
7:34 PM

ALLEGATION NO.: RI-A-90-0033  
Resident Office No.: B 20.1

Name: [REDACTED]  
Phone: [REDACTED]

Address: [REDACTED]  
City/ St: [REDACTED]

## Confidentiality:

Was it requested?

Yes \_\_\_ No X

Was it initially granted?

Yes \_\_\_ No \_\_\_

Was it finally granted by the allegation panel?

Yes \_\_\_ No \_\_\_

Does a confidentiality agreement need to be sent  
to the alleged?

Yes \_\_\_ No \_\_\_

Has a confidentiality agreement been signed?

Yes \_\_\_ No \_\_\_

Memo documenting why it was granted is attached?

Yes \_\_\_ No \_\_\_

Employer: NNECO  
Facility: MILLSTONE 2

Position/Title: Electrician  
DOCKET NO.: 50-336

SUMMARY: Five concerns associated with: (i) improperly completed surveillance on the main station batteries and inadequate personnel qualifications; (ii) equipment tagouts; (iii) [REDACTED] (iv) [REDACTED] and (v) industrial safety hazard in maintenance shop. The attachment to this allegation receipt report contains a more detailed summary of the concerns, along with my recommendations for followup. [REDACTED]

NUMBER OF CONCERNS: 5

EMPLOYEE RECEIVING ALLEGATION: WILLIAM J. RAYMOND

Information in this record was deleted  
in accordance with the Freedom of Information  
Act, exemptions 5, 6 & 7C  
FOIA- 91-165

ACTIVITY: X REACTOR

FUNCTIONAL AREA: (a) X Operations (f) \_\_\_ Onsite H&S  
(c) \_\_\_ Safeguards (g) \_\_\_ Offsite H&S  
(h) \_\_\_ Other

Time Required to Process Request: \_\_\_ Man-Hours

N/46

(1) Improperly completed surveillance on the main station batteries and inadequate personnel qualifications - See 3/15/90 memo entitled Battery QA surveillance. The allegations are: battery surveillance not properly completed on March 7 as evidenced by data sheets showing "normal" level and as found cell conditions noted by allegor on March 7 "at or below" low level mark; recording incorrect data on March 7; maintenance supervision accepting out-of-tolerance values; contractors performing March 7 test not qualified; and, electricians signed for work they did not do.

Preliminary review by the SRI noted the following on March 15:

- a. The electrolyte levels on all station battery cells were acceptable based on inspector observations during a tour of main station battery rooms - therefore there is no battery operability issue at the present time;
- b. Based on inspector knowledge of battery standard IEEE 450, it is noted that electrolyte levels above the top of the cell plates will assure adequate capacity.
- c. Surveillance procedures SP 2736A and/or 2736B may have been violated on March 7 since both procedures require workers to add water to the battery if levels are not found "between the high and low marks";
- d. [REDACTED] performed an acceptable surveillance test on March 14 and restored battery levels to acceptable values. Inspector observations on March 15 noted most cells just above the low level mark and about a half dozen (out of 120 cells) at the low level mark. Since there was no evidence of battery leakage, there is some question whether [REDACTED] performed the surveillance adequately.

**Recommendation:** The resident staff should review the recently completed battery surveillances to determine which issue are substantiated and what NRC followup actions are warranted.

(2) Equipment tagouts - See 3/15/90 memo entitled Tagging Program - Unit 2. The allegations are: TBCCW pump improperly tagged on March 15 - use of blue tag posed a worker safety problem; the wrong type of tag was used on equipment (not specified) and a tagging error occurred (SPE breaker) during PMs on March 12; a tagging procedure violation occurred during a recent operation of the instrument air system; and tagging problems on Unit 2 are recurrent.

**Recommendation:** The resident staff should review there tagging issues to determine what issues are substantiated and what additional actions are warranted. Further input is required first from the alleged since the information provided is too non-specific for efficient use of resident resources.

E45

**Recommendation:**

E45

**Recommendation:**

(5) Industrial safety hazard in maintenance shop - See memo dated 3/2/90 and associated electrical shop load study. A study of the maintenance shop by an independent contractor confirmed discrepancies and safety hazards previously identified by [ ] and shows that NU does not act on his concerns.

**Recommendation:** This issue should referred to the licensee through the NSC program. Specific NRC follow at a later date should be done to assure proper closure of safety concerns and to verify integrity of new NSC program to "represent the issue".



## UNIT 2 MAINTENANCE SHOP ELECTRICAL MODIFICATIONS

- ✿ 1. All extension cord and pigtail arrangements used to power permanently mounted equipment (attached to the shop floor) should be replaced with on/off pullbox switches and conduit connected to the equipment. There are approximately twenty (20) such pieces of equipment in the shop which require this change.
- ✿ 2. Cable trays which run over the electrical mezzanine and the machine shop mezzanine should have covers installed on both top and bottom.
3. Lighting should be installed along the north side of the electrical crib (above shop electrical boxes) as well as below the machine shop mezzanine.
- ✿ 4. Permanently attach a lighting fixture on the North wall to the building structure.
- ✿ 5. Conduit and wiring along the north wall which appears abandoned should be tested and if disabled should be removed.
6. Addition of convenience receptacles in the machine shop mezzanine area.
7. Interleaf UPS requires a dedicated circuit (120 VAC).
8. Emergency lights added to the lunch room and downstairs and upstairs bathrooms.
9. Proto-Power recommendations (See Attached)
10. Provide various equipment (See Attached) with dedicated circuits.
- ✿ 11. Disconnect fluorescent lights (4 banks) over the mezzanine office area should be disconnected and removed.

## Recommendations

The following is a list of recommended changes:

1. Panel No. 6 is supplied by two separate feeder cables that splice to one feeder cable connected to a fuse/disconnect. The cables (500 mcm) to the fuse/disconnect must carry the load from both parts of panel No. 6. Based on 70% demand and a cable rated for 75°C, this cable is undersized. Also the cable rating is less than the protective device. NU should supply each section of panel No. 6 from separate fuses/disconnects or circuit breakers with the appropriate cable size in lieu of one disconnect.
2. The plasma arc welder, normally connected to panel No. 6 was not included in the load summary. The welder is infrequently used and has been moved to the storage area adjacent to the Maintenance Shop. The welder is rated at 140A and, when used, is connected to a 125A circuit breaker on panel No. 6.

If this welder is to be used a new circuit should be provided with the proper rating. The circuit should be from a panel other than panel No. 6 since the panel No. 6 feeder is at the present time heavily loaded.

3. The air handling unit/heater connected to panel No. 4 is rated at 13.8 KW/63 amps and is being supplied by a 60 amp breaker. Breaker size should be increased to accommodate the connected load and the cable size increased so that its rating is greater than the new breaker rating.
4. Table 10 is a list of equipment that during the walkdown was found to be plugged into convenience receptacles and should be considered for dedicated circuits.
5. Note 6 on Tables 1-9 identifies cables connected to distribution panels with no existing loads. These cables should be disconnected at the distribution panel.
6. The lunch room presently has convenience outlets divided between two 20A circuits. Since actual loads on the convenience circuits are not known and convenience breaker tripping has occurred, the convenience circuits should be supplied from four feeder breakers in lieu of the present two. Administrative controls could also be considered to limit the type and size of loads used.
- \* 7. Emergency light (Pnl. 8-40) shown on the lighting plan for the mezzanine should be moved to the hallway to provide more light in the walkway.
- \* 8. Feeder to the hydraulic lift from panel 2B should be disconnected at the panel since the lift is not operable.

- ✱9. Welding receptacle #13, panel No. 22C4-2 should be dedicated only for the 29A & 15A welding machine since the breaker is rated at 40 amps. The other welding machines are rated at 48 amps.
10. The following cable sizes/circuit breaker sizes should be revised to ensure that the cables are protected by the associated overcurrent device:
- a) Panel No. 1A, Circuit 3B, 5C - 14 AWG to 12 AWG.
  - b) Panel No. 2B, Circuit 10B, 12C - 12 AWG to 10 AWG or 30A circuit breaker to 20A circuit breaker.
  - c) Panel No. 6, 500 MCM Feeder - Upgrade cable rating to greater than 400A. (See Comment 1)
  - d) Panel No. 8, Circuit 28B, 30C - If cable is not disconnected as recommended in Table 8, then either the cable size should be increased or circuit breaker size decreased. (10 AWG or 20A bkr)
  - e) Panel No. 22C4-2, 500 MCM Feeder - Upgrade cable rating to greater than 400A.
  - f) Panel No. 6, #4/0 Feeders - Feeders should have separate protective devices (See Comment 1) or cable rating should be greater than 400A.
  - g) Spare circuit should be disconnected from health facility feeder since its rating of 100A exceeds the feeder rating of 65A.
  - h) The 500 MCM feeder cable between the splice point for the feeder cable to Panel No. 5 and the main transformer CT should be sized for 600A.
11. The rating of the main transformer CT's should be increased to 600A from the present 400A.
- ✱12. Panel No. 2B, Circuit 24 - Two wires are connected to the circuit breaker. Verify which wire feeds the receptacle in the Health Facility and disconnect the other wire if no load can be identified.

Load margin exists at the 208/120 volt level for panel Nos. 2B, 1A, 7, 3, and 8. Single phase loads could be added up to the level of the existing highest phase load on a given panel.

TABLE 10  
EQUIPMENT WHICH REQUIRES  
DEDICATED CIRCUITS

During the course of the walkdown, the following equipment was found to be plugged into convenience receptacles, or another machine's receptacle, and should be considered for dedicated circuits.

EQUIPMENT	LOCATION	VOLTAGE
Soda Machine #3	Near Lunchroom	120V
Refridgerator (2)	Lunchroom	120V
Microwave (3)	Lunchroom	120V
Tool Grinder	General Work Area	120V
Tool Grinder	Weld Shop	120V
Marvel Saw	Machine Shop	208V, 3Ø
Grinder	Machine Shop	120V
Belsaw	Machine Shop	120V
Tool Grinder	Machine Shop	120V
Disc Sander	Machine Shop	120V
Tool Grinder	Machine Shop	120V
Refridgerator	Machine Shop	120V
Microwave	Machine Shop	120V
Refridgerator	Mezzanine	120V
Microwave	Mezzanine	120V
Copier	Mezzanine	120V
Ice Machine	Mezzanine	120V
Refridgerator	Health Facility	120V
Microwave	Health Facility	120V
Copier	Health Facility	120V

## RECORD OF ALLEGATION PANEL DECISIONS

SITE: MILLSTONE 2

PANEL ATTENDEES:

ALLEGATION NO.: RI-90-A-033Chairman - W. KANEDATE: 3/21/90 (Mtg. 1 2 3 4 5)Branch Chief - E. WENZINGERPRIORITY: High Medium (Low)

Section Chief (AOC) -

SAFETY SIGNIFICANCE: Yes (No) UnknownOthers - R. MATAKUS - OT

CONCURRENCE TO CLOSEOUT: DO BC SC

A. RAYMONDCONFIDENTIALITY GRANTED: Yes (No)  
(See Allegation Receipt Report)A. VEDELIS THEIR A DOL FINDING: Yes (No)

IS CHILLING EFFECT LETTER WARRANTED: Yes No

HAS CHILLING EFFECT LETTER BEEN SENT: Yes No

HAS LICENSEE RESPONDED TO CHILLING EFFECT LETTER: Yes No

## ACTION:

ISSUE

① RI Turn-over to licensee② RI Turn over to licensee

Information in this record was deleted  
in accordance with the Freedom of Information  
Act, exemptions 2  
FOIA- 91-162

⑤ RI Turn over to licensee No response required

NOTES:

N/47